

TIFR-BOSLA National Conference on

Future Librarianship Innovation for Excellence

[Proceedings]

22-23 April, 2016, MUMBAI, INDIA

Chief Editor

Dr. Mallikarjun Angadi

Editors

Dr. Satish Munnolli

Ms. Truptee Shah

Dr. R. Prabakaran

Dr. K. Praveen Kumar

Dr. Satish Kanamadi

Organised by

Scientific Information Resource Centre
Tata Institute of Fundamental Research, Mumbai
and
Bombay Science Librarians' Association, Mumbai



Imperial Publications, Mumbai

2016

Managing Committee

CHAIRMAN

Dr. B. S. Kademani

Bhabha Atomic Research Center, Mumbai

General Secretary

Dr. R. Prabakaran

Tata Institute of Fundamental
Research Mumbai

Joint Secretary

Dr. H. S. Waydande

Indian Institute of Technology
Mumbai

Treasurer

Dr. K. Praveen Kumar

International Institute for
Population Sciences, Mumbai

Executive Committee

Dr. Satish Kanamadi

Tata Institute of Social Sciences, Mumbai.

Dr. Mallikarjun Angadi

Tata Institute of Social Sciences, Mumbai.

Dr. Satish Munnolli

Advanced Centre for Treatment, Research and
Education in Cancer, Navi Mumbai

Mr. Prabhu Gaddimani

Tata Institute of Social Sciences, Mumbai.

Mr. N. D. Raut

Tata Institute of Fundamental Research
Mumbai

Dr. J. Shivarama

Tata Institute of Social Sciences, Mumbai

Ms. Truptee Shah

Centre for Development of Advanced
Computing, Mumbai

Mr. Manju Naika

Indian Institute of Technology, Mumbai

Ms. Savita Rao

Centre for Development of Advanced
Computing, Mumbai

Dr. Anand Bandi

National Institute of Fashion Technology,
Navi Mumbai

Dr. (Mrs.) Medha Joshi

Tata Memorial Centre, Mumbai

Dr. Deepak Meena

Central Institute for Research on Cotton
Technology, Mumbai

Mr. Rahul Hiremath

N.S.S. College of Commerce and Economics,
Mumbai

Dr. Jayadev Kadli

Lala Lajpat Rai College, Mumbai

Ms. Nita Bhaskar

Bhabha Atomic Research Centre, Mumbai

© Bombay Science Librarians' Association, Mumbai. 2016

All rights reserved. No part of this publication can be reproduced in any form or by any means without the written permission of publisher. The opinion expressed by the contributors in their respective article is their own and the Editorial Committee members and the BOSLA owe no responsibility for the same.

ISBN : 9788190402569/8190402560

Price : Rs. 1000/-

Printed at :

National Advisory Board:

Prof. Muttayya Koganuramath, Central University of Gujarat, Gandhinagar

Prof. (Mrs.) Ashu Shokeen, Chairperson, DLISc, Kurukshetra University, Kurukshetra

Prof. C. R. Karisiddappa, Former Emeritus Professor, Karnatak University, Dharwad

Prof. A.R.D Prasad, DRTC, ISI, Bangalore

Prof. B. D. Kumbhar, DLIS, KU, Dharwad

Prof. S. K. Patil, Rtd , University of Pune, Pune

Prof. B. Ramesh Babu, Former Professor, University of Madras, Chennai

Organising Committee:

Dr. B. S. Kademani , Chairman, BOSLA

Dr. R. Prabakaran, General Secretary BOSLA

Dr. H. S. Waydande, Jt Secretary BOSLA

Dr. K. Praveen Kumar, Treasurer, BOSLA

Dr. Anand Bandi , NIFT Mumbai

Dr. Satish Kanamadi, TISS Mumbai

Dr. Mallikarjun Angadi, TISS Mumbai

Ms. Truptee Shah C DAC Mumbai

Ms. Savita Rao, C DAC Mumbai

Mr. Prabhu Gaddimani, TISS Mumbai

Mr. N. D. Raut, TIFR Mumbai

Mr. Rahul Hiremath, NSS College, Mumbai

Dr. J. Shivarama, TISS Mumbai

Dr. Jaydev H Kadli, LLR College, Mumbai

Mr. Manju Naik, Central Library, IIT Bombay

Dr. Deepak Meena, ICAR-CIRCOT, Mumbai

Dr. Satish Munnolli, ACTREC, Mumbai

Ms. Varsha Phatak, TIFR Mumbai

Ms. K. N. Gajendragadkar, TIFR Mumbai

Programme Committee:

Conference Director : Dr. A. N. Bandi

Organising Secretary : Dr. R. Prabakaran

Co-Organising Secretary : Ms. Savita Rao

Rapporteur General : Dr. Satish Munnolli

Co-Rapporteur : Ms. Truptee Shah

Chief Editor:

Dr. Mallikarjun Angadi

Editorial Members:

Dr. Satish Munnolli

Ms. Truptee Shah

Dr. R. Prabakaran

Dr. K Praveen Kumar

Dr. Satish Kanamadi

Foreword



As Chairman, Bombay Science Librarians' Association, Mumbai, it gives me immense pleasure in writing a *Foreword* for the Proceedings of the *National Conference on Future Librarianship: Innovation for Excellence*.

Although, the man is a late comer on this planet, the human civilization could advance so much and make dramatic impact on every aspect of human endeavour within a shortest possible time mainly because of the inquisitive, probing and analytical thinking the man possesses and our innate dissenting and questioning traits of not accepting things the way they are and the techniques of storage, retrieval and transmitting knowledge from one generation to another on a continuous basis.

There is no denying fact that the libraries and librarians have played a very significant role in national development by way of dissemination of knowledge and preserving it for the posterity. In the digital era, it is natural for a common man to think of libraries as collections. But the libraries of the future will be more about connections. Libraries are really about transforming people through access to information. In the past, that meant access to books. But for the next generation of libraries, information means everything from Internet connections to make spaces. Emerging new information technologies and changing user needs and expectations, the library and information science profession has become one of the most exciting professions to work in and provides opportunities for the LIS incumbents. The future of librarianship is diverse and complex with a lot of changes and challenges in the ever changing technological environment.

The Bombay Science Librarians' Association (BOSLA) has been in the forefront in organising Local, National and International level events to promote the professional activities. BOSLA in association with Scientific Information Resource Centre, TIFR, and Mumbai has planned to organise the National Conference on the theme *Future Librarianship: Innovation for Excellence*. This is the third National Conference in the series which covers all the issues faced by the present day library and information Science professionals.

I really appreciate the efforts of the Editorial Committee especially Dr. Malliakrjun Angadi, the Chief Editor and all his able Editorial Committee members in bringing out this proceedings volume very meticulously in a short notice.

I am confident that the deliberations in the conference will go a long way in enriching the participants and enable them to tackle various professional challenges.

I wish the conference a great success.

Dr. B. S. KADEMANI

Chairman, BOSLA &
Scientific Officer-G
Scientific Information Resource Division
Bhabha Atomic Research Centre, Trombay,
Mumbai-400 085

Preface

The nature of information environment is changing dramatically with the advancement in ICTs and emerging technology trends. Ever changing user needs and expectations have made library and information science profession as one of the most exciting professions to work in and provides opportunities for LIS professionals.

BOSLA Conferences have since long, not only provided a platform for library professionals to trend up but also served as a meeting place to discuss various issues. Keeping up with this practice, a *National Conference on Future Librarianship: Innovation for Excellence* has been jointly organized by Tata Institute of Fundamental Research, Mumbai and Bombay Science Librarians' Association during 22-23 April 2016 and intends to address the issues and challenges of future librarianship. It is going to definitely help libraries of the future to stay in tune with rapid changes occurring due to the introduction of emerging innovations, trends and technologies and strategize themselves for excellence to serve the tech-savvy information centric users.

The two day National Conference has focused on various themes of the National Conference under the main theme **Future Librarianship: Innovation for Excellence**. The conference announcement has attracted the attention of many professionals including Teachers from Library Schools, Practicing Librarians from Corporate companies, Schools and Colleges contributed good number of papers to share their experience on this platform. The sub-themes were very well reflecting the main theme and were encouraging the authors to identify their area of expertise and write papers accordingly. Another interesting point to note here was the active participation of young professionals who have shared their practical experiences and also integrated the theoretical aspects appropriately.

Editorial Committee would like to thank and acknowledge all the authors for their interest and contribution of papers. All possible efforts have been made by the Editorial Committee to keep up the standard and quality of the conference volume without affecting the thought process and ideas of the authors.

Editorial Committee acknowledges the sincere efforts of reviewers who could respond to the request and maintained the time frame and enabled the committee to complete the tough task of finalizing the press copy. The Editorial Committee would like to place on record the timely direction and encouragement of the Programme Committee of the conference. Last but not the least the Editorial Committee appreciates the active support of M/s. Imperial Publications Mumbai for publishing this volume so elegantly within a short span of time.

It is hoped that the DELIBERATIONS at this national conference would be promising and rewarding for the delegates and more particularly the proceedings would be a useful source of reference to the professionals who are engaged in various activities. Editorial committee is eagerly looking forward to have pleasant and stimulating interactions and fruitful meeting with the delegates during the two day conference.

Chief Editor

Dr. Mallikarjun Angadi

Editorial Members

Dr. Satish Munnolli

Ms. Truptee Shah

Dr. R. Prabakaran

Dr. K Praveen Kumar

Dr. Satish Kanamadi

CONTENTS

DIGITAL LIBRARIES

- 1 Institutional Repository for Long-Term Access of Digital Information
Rachna Patnaik and Shelley Jamwal -----
- 2 Collection Development and Management of Institutional Repositories Using Open Source Software
Prabhu B. Gaddimani; Puttaraj A. Choukimath and Mallikarjun Angadi -----
- 3 Digital Preservation and Procedures
Shelley Jamwal and Rachna Patnai -----
- 4 ETD Digital Library at IIT Bombay: An Overview of Growth and Sustainability
Manju Naika and Satish Kanamadi -----
- 5 Application of Digital Preservation Techniques in Libraries: Need of the Hour
Swapna Bhide -----
- 6 Digital Preservation and Procedures: A Case Study on Digital Preservation at the National Library of India
Jayabrata Hazra -----
- 7 Design and Development of an Institutional Repository for an Architectural School: A Case Study of KRVIA library
Manju Kalita -----
- 8 Institutional Repositories: The Issues and Challenges for Libraries
Linsha M. and M. Bavakutty -----
- 9 Design and Development of a Special Collection on Fukushima Nuclear Accident Using Greenstone Digital Library Software
Kavi Upreti -----

LIBRARY TECHNOLOGIES AND TRENDS

- 10 Access to Information and Acquisition of Knowledge in Electronic Environment Era
Nirupama Warriar and J. Shivarama -----
- 11 Voyage Towards Green Libraries: A Great Revolution
Kavitha J. R. -----
- 12 Digital Information Security for Academic Libraries: An Overview
J. Shivarama and Vaishali A. Dawar -----
- 13 The Space Saving and Role of Mobile Library
C. K. Das -----
- 14 Fundamentals of Virtual Reference Services
Jyoti Rani; Harsh Bardhan Arya and Sandeep Kumar Pathak -----
- 15 Virtual Reference Services: Models and Standards
Harsh Bardhan Arya; Jyoti Rani; Sandeep Kumar Pathak; J. K. Mishra -----
- 16 Changing Priorities of Five Laws of Library and Information Science in the 21st Century
Santosh Biradar and Anand Bandi -----
- 17 Quick Response (QR) Codes in Libraries: A Case Study on the Use of QR Codes in the Central Library, NITK
Iranna M. Shettar -----
- 18 Use of QR Codes and other Technologies in Libraries: A Survey
Parvin L. Kureshi and Pralhad Jadhav -----
- 19 Smart Library for Smart User: Whatsapp Based Services
Rahul R. Hiremath -----
- 20 Research Support Services in the Changing Information Landscape
Meghana Sanjeeva -----

SCIENTOMETRICS AND WEBOMETRICS

- 21 Scientometric Analysis on Materials Science Research Publication of Indian Institute of Technology Madras 2004-2013
S. Muthumari; S. Raja and Mahendra N. Jadhav -----
- 22 Publication Trends in Library and Information Science in India
Ganesh Surwase; B. S. Kademani; E. R. Prakasan; T. Swarna and G. Ravi Kumar
- 23 India's Contribution to Open International Nuclear Information System
Anil Kumar; Sandeep Kada; Nita Bhaska; B. S. Kademani and G. Ravi Kumar ---
- 24 Doctoral Research on Sociology Fields in Indian Universities: A Bibliometric Study
Anand Bandi and Amrit Kaur -----
- 25 A Scientometric Analysis of the Journal 'Library Progress (International)'
Alka D. Wadhwana -----
- 26 Indian Journal of Fibre and Textile Research: A Scientometric Portrait
Deepak Meena and Anand Bandi -----
- 27 Scientometric Dimensions of the Central Nervous System (CNS) Cancer Research in India
Satish S. Munnolli -----
- 28 Scientometric Dimensions of Knowledge Management: A Global Perspective
Lalit Mohan; B. S. Kademani and G. Ravi Kumar -----
- 29 Transfer of Journals Published By Societies to Commercial Publishers: Changes Observed
E. R. Prakasan; Ganesh Surwas; N. K. Mishra; Saroj Sharm; T. Swarna and G. Ravi Kumar -----

LIBRARY RESOURCE SHARING, NETWORKING AND CONSORTIA

- 30 Sharing Information Resources in Digital Environment
Suvarna Walimbe -----
- 31 Acquire to Access E- Resources through Consortia in Management Science Institutions: A Study

J.Shivarama; Sheela V. and Akhilesh Kumar Sankhwar -----

32 Sharing Information Resources Through Digital Library Consortium

J.Shivarama and Adithya Kumari H -----

HUMAN RESOURCE MANAGEMENT

33 Library Changing Technology Landscape, Trends, and the Traditional Roles of LIS Professionals in Modern Era

M.Muthu; Mahendra N. Jadhav and Bholeswar Kisa -----

34 Go Where the Users Are

Maya Carvalho e Rodrigues -----

35 Skills and Competencies Required for Engineering College Librarianship

Bavesh N. Patel -----

36 Seven Simple Steps to Improve User Satisfaction in Library

Anand Dodamani -----

37 Need for Change Management in Libraries: A TISS Experience

Yogita Parmar; Rakhi Tomar and Brijesh Kumar Verma -----

38 Removing Barriers to Literacy: Marrakesh VIP Treaty!

Pralhad Jadhav and Neelima Jadhav -----

39 A Study of Scientific Co-Operation Among SAARC Nations

Samit De -----

40 Marketing of Library and Information Products and Services with Social Media

Chetan Sudhakar Sonawane -----

41 Skills of LIS Professionals in ICT Environment: A Case Study of LIS Professionals of Colleges in Goa

Nandkishor Bandekar -----

42 Academic Integrity and Plagiarism Prevention at Tata Institute of Social Sciences, Mumbai: A Case Study

Shekappa Bandi; Devyani Pothare; Mallikarjun Angadi and Suresh Jange -----

- 43 High Quality Professional Communication: The Path to Excellence
Perin Marolia -----
- 44 Marketing of Library Resources and Services: New Challenges and Opportunities
Mugdha A. Raul; Swati S. Belapurkar and Satish S. Munnolli -----
- 45 University Library Acquisition Model in ICT Environment: A Case Study of the BITS Pilani Library
Ishappa Bandi; Giridhar Kunkur; K. C. Ramakrishnegowda and Anand Bandi --

Institutional Repository for Long-Term Access of Digital Information

Rachna Patnaik¹, Shelley Jamwal²

¹*rachna@sac.isro.gov.in*

²*shelley.jamwal@gmail.com*

Space Applications Centre, Ahmedabad – 380015

ABSTRACT

Information and Computer Technology have provided effective ways of storing, organizing and dissemination of information. With an increasing amount of digital scholarly content, libraries and information centers have to cope up with the issues of preservation and long-term access. Institutional Repositories play a significant role in managing digital resources and as a means of preserving the intellectual content of an organization. They have the potential to bring together intellectual output of the researchers on a single window and make it accessible to the users. This paper provides an overview of Institutional Repository, purpose for designing and implementation of an effective Institutional Repository of Space Applications Centre (SAC) which is accessible through organizational intranet. The paper also describes infrastructure required for creating a repository and steps involved in making available digital content so that it remains permanently accessible to the present and future generations.

Keywords: Institutional Repository, Digital Preservation, Metadata, Open Source Software, Dspace

1. INTRODUCTION

The digital environment has resulted in an increase in scholarly content in digital format and libraries play a vital role in preserving and managing its accessibility over the network. To ensure long-term preservation of digital resources for our community the concept of open access and Institutional Repositories has emerged. An Institutional Repository provides seamless access to research of our scientific community in digital format. Space Applications Centre (SAC) is a Research and Development Organization where digital content exists and in order to provide more coordinated access to information, an Institutional Repository was designed and implemented using DSpace, open source software with proper metadata to archive scholarly digital content of its scientific community. It promotes collaboration and knowledge sharing between researchers as it reflects the past and present research interests of an institution as well as its future research goals. Institutional Repositories help to measure the productivity of the institution and increase the institution's visibility, status and value. Libraries invest in the future by managing Institutional Repositories with proper searching so that information remains permanently accessible by the present and future generations.

2. DEFINITION OF INSTITUTIONAL REPOSITORY

An Institutional Repository is “a set of services that an institution offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members”. It is an organizational commitment to the stewardship of these digital materials, including long-term preservation. (Lynch 2003)

Thus, an Institutional Repository (IR) is a database with a set of services to capture, store, index, preserve and redistribute research in digital formats and make it accessible over the network. The Scholarly Publishing and Academic Resources Coalition (SPARC) Organization

defines IRs as Institutionally defined; Scholarly; Cumulative and perpetual; Open and interoperable and Searchable within constraints (Crow, 2002).

3. NEED FOR INSTITUTIONAL REPOSITORY

In an institution large amount of research exists in digital form, collecting and preserving this content serves the following purposes:

- Provides wider accessibility, professional visibility and distribution of the scholarly work of an institution.
- Enables long-term preservation of the scholarly work and serves the community.
- Provides a global platform for research collaboration and information flow and allows authors to archive the scholarly work freely over the network.
- Brings together the intellectual output of an institution on a single platform which otherwise would be scattered.
- As a self-evaluation tool for the management.
- Store and preserve institutional digital assets, including unpublished or otherwise easily lost (“grey”) literature (e.g., theses or technical reports).
- Lowers access barriers and offers the widest possible dissemination work.

4. DIGITAL PRESERVATION

Digital preservation is a set of procedures required to ensure the longevity of digital documents that are either created digital or converted from analog to digital format. Digital preservation is a challenging task as the contents like research papers, reports, theses, etc. generated by an institution needs to be preserved with proper metadata for the entire time span. The challenge is to trust the ability of the repository that despite hardware and software changes depositing intellectual assets into repositories we are able to access the information over long term.

5. METADATA

Metadata is often called data about data or information about information. Metadata is structured information that describes, locates and makes it easier to retrieve, use or manage an information resource. In a digital information management system metadata is an essential component as it describes various attributes of information objects and gives them meaning, context and organization and aids long-term preservation of digital information. Metadata is needed for preservation, discovery and retrieval, as well as to protect the integrity, reliability and authenticity of digital objects. For a digital object, metadata can be categorized into three categories i.e. Descriptive, Administrative and Structural. Digital materials require constant maintenance and migration to new formats as technology changes.

6. INSTITUTIONAL REPOSITORY OF SPACE APPLICATIONS CENTRE LIBRARY

The Institutional Repository of SAC library uses DSpace open source software to capture, store, index, preserve and disseminates the intellectual output in digital format. It consists of original research in digital form including technical reports (unclassified), publications, theses, eBooks, in-house publications, etc. generated by the institute. The Institutional Repository is limited to digital research products and materials for which the copyright is owned by the author or the institution. This facilitates the researchers in self archiving and long-term preservation of their scholarly materials and they are able to disseminate their research quickly. Special measures are taken in order to maintain the integrity and authenticity of publications as well as providing access over time.

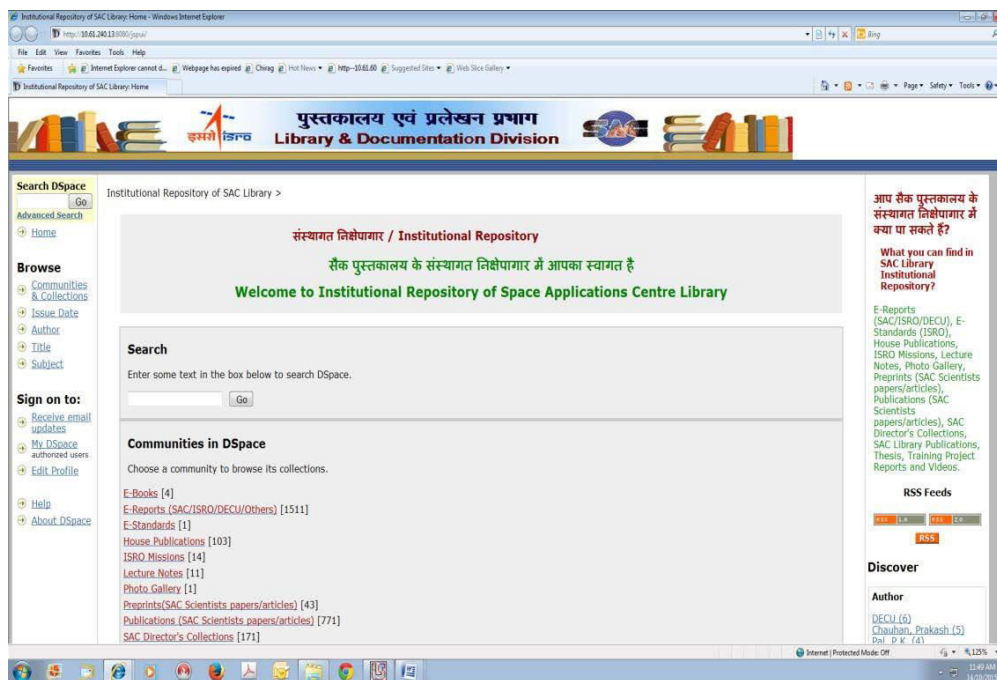


Fig.1. Overview of SAC Institutional Repository

7. SEPTS INVOLVED IN DESIGNING THE INSTITUTIONAL REPOSITORY

The mission of establishing a repository is to provide reliable, long-term access to managed digital resources to its community, now and in the future. The steps involved in designing, customizing and implementing SAC Institutional Repository are:

7.1 Examining The Need

Before designing an Institutional Repository the need was evaluated and guidelines were generated regarding what is to be deposited in the repository. Since, a large amount of digital content is generated in an institution it was decided that the content submitted in repository should be scholarly i.e. educational and research oriented in digital form. The work must be in a complete form and ready for dissemination. Licensable in perpetuity i.e. the author of the work must be willing to grant library the right to preserve and distribute the work via the repository.

7.2 Choosing Repository Software

Many open source Institutional Repository software, CDSware, DSpace, EPrints, Fedora, ROADS, Greenstone are freely available on Internet and can be easily customized. Looking to the functionalities of Dspace it was decided to use it for creation of our Institutional Repository. Dspace is developed jointly by Massachusetts Institute of Technology (MIT) Libraries and Hewlett-Packard (HP) and distributed under BSD Open source license. Dspace is specially designed for the institutional setting, where members of faculty/staff submit their documents to a system that enforces common standards.

7.3 Assembling and Setting Up Necessary Hardware, Software

The next step was setting up of hardware and prerequisites of Dspace. The hardware used is Intel Xeon Server HP Proliant DL 380P Gen 8, 23.5 GB RAM and 9 TB hard disk. Dspace 3.1 is installed on Ubuntu 13.05 LTS operating system. The other software used are Oracle Java JDK 6 or higher, Apache Maven 2.2.x or higher (Java build tool), Apache Ant 1.8 or later (Java build tool), Apache Tomcat 5.5 or later and PostgreSQL 8.3 or 8.4 Relational database which is the backend database of DSpace which stores information about communities, collections, members, their email address and passwords in encrypted form.

7.4 Installing And Customizing The Software

The Dspace software was downloaded with other required software and installed out-of-box. The classic web interface was customized according to our need for managing, submitting, searching/browsing, and downloading documents. DSpace supports Descriptive Metadata, Administrative Metadata and Structural Metadata for its archived content. Dspace uses Dublin core metadata format and stores items and metadata in normalized relational database tables for efficient retrieval. Also, supports new metadata formats in XML form input as it is OAI-PMH (Open Archive Initiative Protocol for Meta Data Harvesting) compliant. It uses Lucene search engine and not only the metadata you provide for a given file will be searchable, but all of its contents will be indexed as well. Also, it has ability to incrementally add new indexed content without regenerating the entire index.

7.5 Creation of Communities And Collections

DSpace model contains communities that contain one or more collections of digital items arranged hierarchically. Many sub-communities can be created under each community. An item contains content and metadata that helps in archiving content. Various communities and collections were created as per our institutional requirement and proper workflow system was established for submission of the documents.

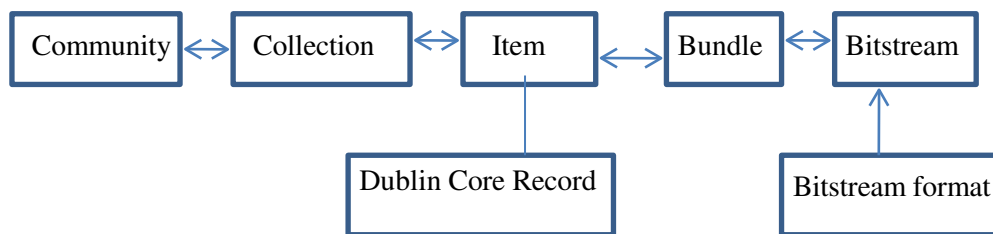


Fig.2. Dspace Item Structure

SAC library Institutional Repository consists of the following communities:

- ❖ **Publications**
- ❖ **Reports (Unclassified)**
- ❖ **Theses**
- ❖ **E-Books**
- ❖ **House Publications**
- ❖ **Lecture Notes**

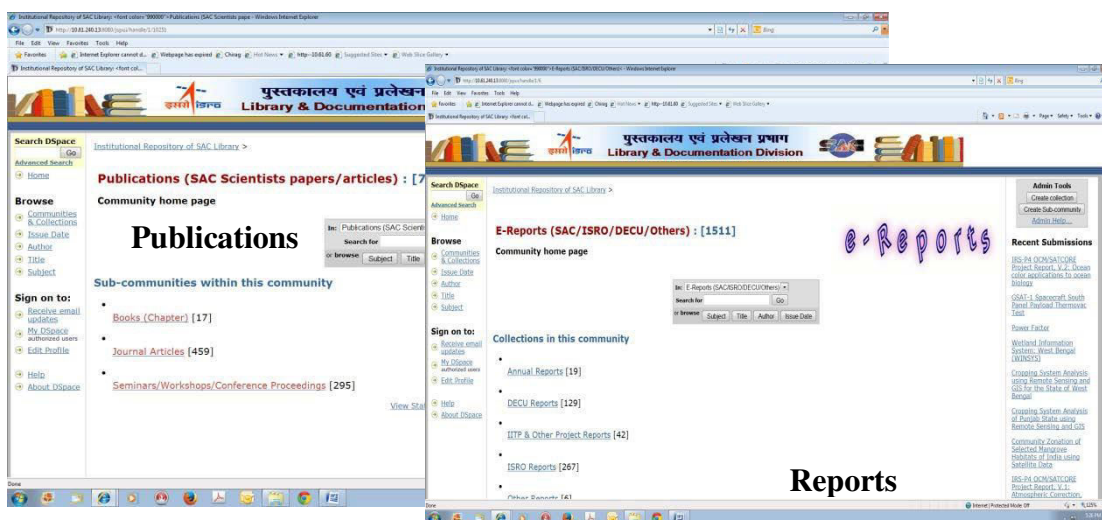


Fig.3.Scientific Communities of SAC Repository

7.6 Submission Of Content In The Repository

Once the communities and collections were created the next step was to decide on how the content will be submitted in the repository. Will authors self-archive or will authors submit publications to library staff for archiving? It was decided that authors can submit their content through a workflow system for e-person to edit/check metadata, approve submission before it is publicly available. With each content submission it was mandatory for authors to include metadata fields i.e. title, author, subject, keywords.

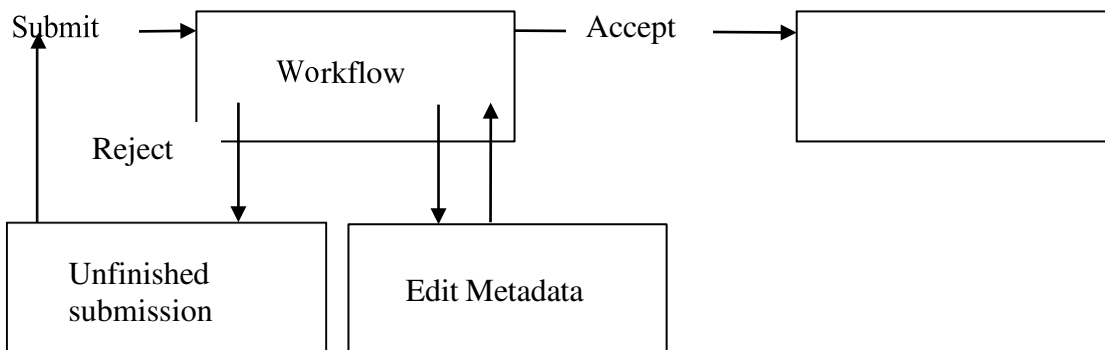


Fig.4. Workflow steps for submission in repository



Fig.5. Policy for a collection

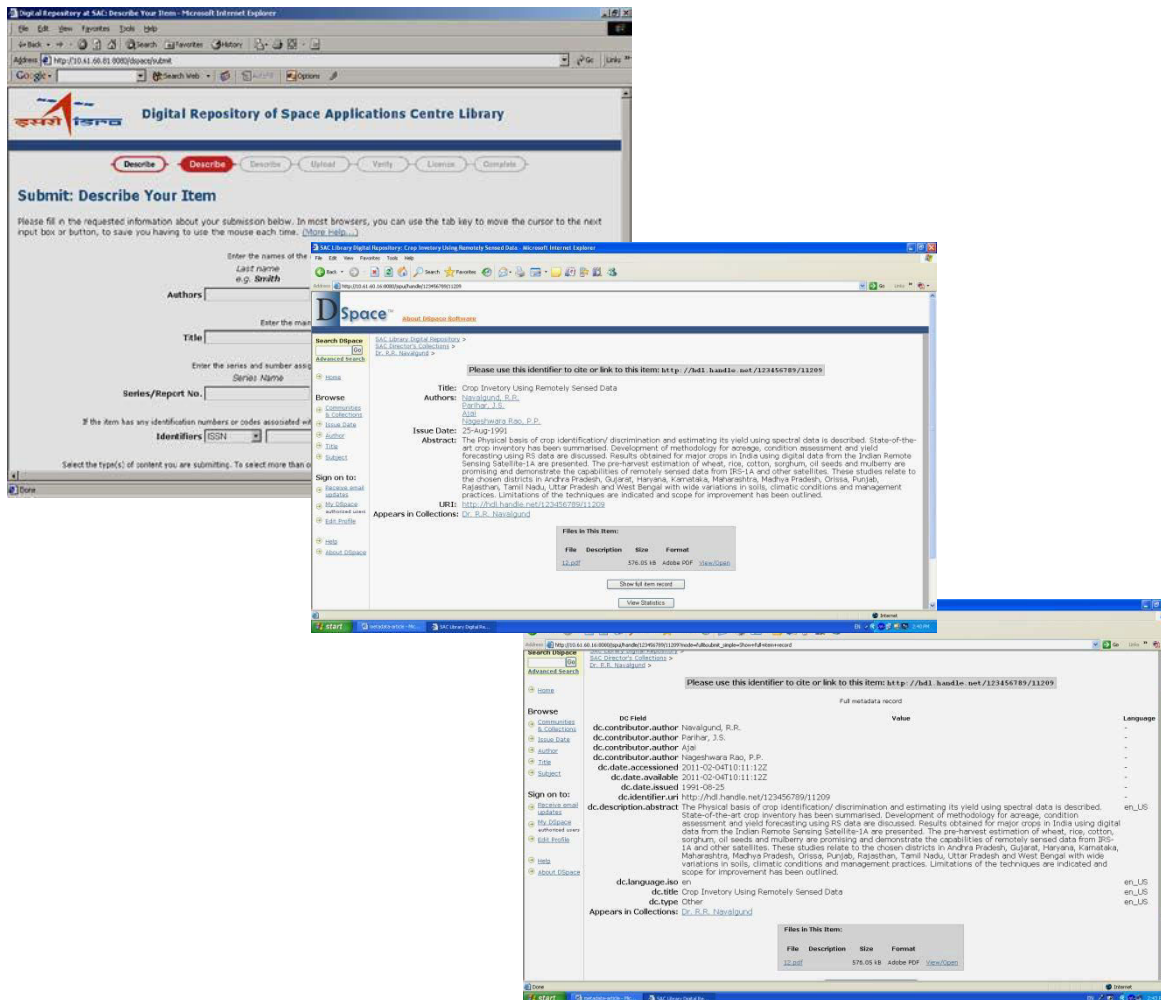


Fig. 6. Submission in collection and adding metadata

7.7 Quality Control of Content

Proper guidance was provided to the users to submit publications and accessing material from the repository. The quality of the content was checked by the administrator and authorization was provided to accept, edit or reject a submission at this stage. Depending on the type of collection, the content were loaded with appropriate metadata. A group of members (E-people) are authorized to review, approve and modify metadata of submissions.

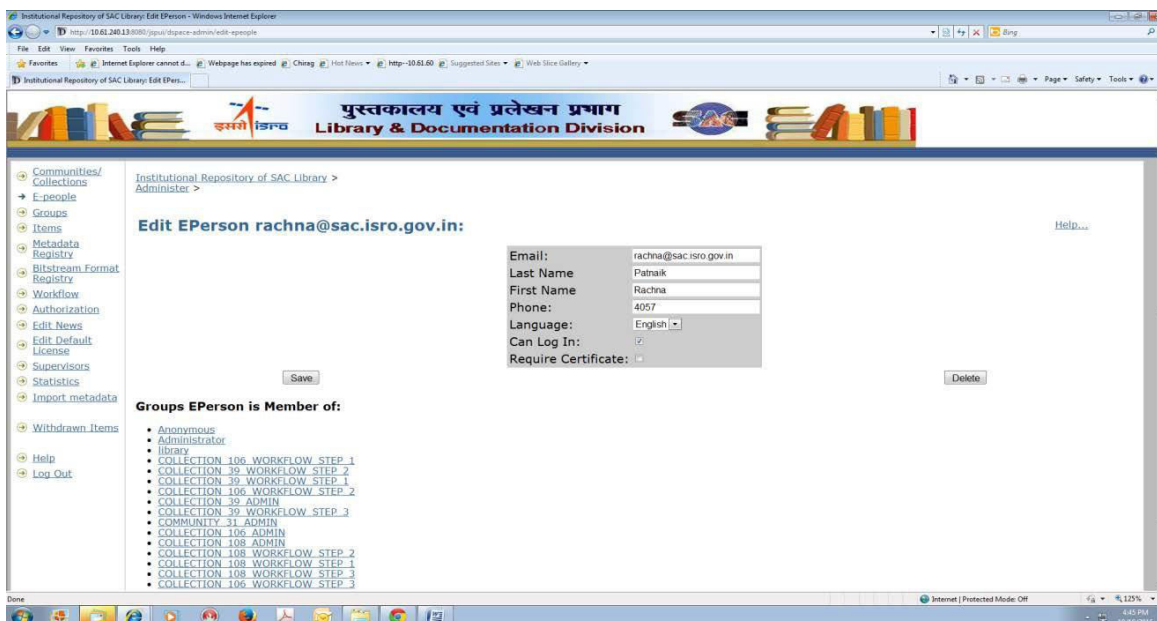


Fig.7.Creation of E-Person

7.8 Implementation

A test/demo version was evaluated before the entire repository was linked to the library home page for the users on the intranet. Users were then encouraged to upload their publications.

8. INTELLECTUAL PROPERTY RIGHTS (IPR) FOR INSTITUTIONAL REPOSITORIES

While designing an Institutional Repository, IPR has to be considered like copyright, content licensing and rights management. DSpace offers support for licenses on all levels i.e. each community and collection in the hierarchy of a DSpace repository can contain its own license terms. This allows an institution to use the repository both for collections where certain rights are reserved and others from which the content may be accessed and distributed more freely. At the end of the manual submission process, the submitter is asked to grant the repository service an appropriate distribution license. In its most common form, the submitter grants to the repository service a non-exclusive distribution license, meaning that he officially gives the repository service the right to share his or her work on the network.

9. USAGE METRICS

All the page views and file downloads in Dspace are recorded in a search index, SOLR for reporting purpose. Usage statistics can be retrieved from individual item, collection and community pages.

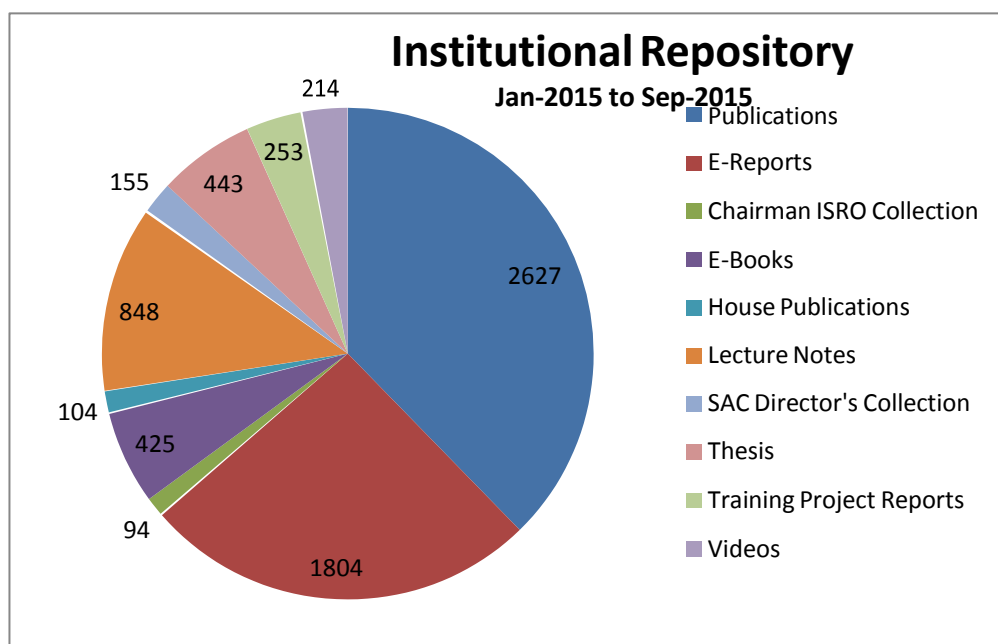


Fig.8. Usage of Institutional Repository of SAC library

10. CONCLUSION

Institutional Repositories enhance teaching, learning, research and are considered as a boon to the scholarly community. SAC Institutional Repository provides access to and manages materials in a professionally maintained archive and has great potential for improving visibility and impact of institutional research. The usage of this repository is tremendous and authors are encouraged for self-archiving their research outputs in Institutional Repository.

AKNOWLEDGEMENTS

The authors are thankful to Shri Tapan Mishra, Director, SAC for his encouragement and Dr. Prakash Chauhan, Chairman Library Committee, SAC for his constant support and guidance. Our gratitude is also due to Shri. P.J. Soni for his critical and fruitful discussions on the paper.

REFERENCES

1. A mandate to self archive? The role of open access institutional repositories by Stephen Pinfield presented at the UKSG seminar 'Scientific Publications: Free for all?' November 2004.
2. A White Paper for the UNC-Chapel Hill Scholarly Communications Convocation by Wallace McLendon, January 2005.
3. The case for institutional repositories: A SPARC position paper release 1.0, 2002. <http://www.arl.org/sparc>.
4. Institutional Repositories: Hidden Treasures by Miriam A. Drake
5. Institutional Repositories: Partnering with Faculty to Enhance Scholarly Communication by Richard K. Johnson, D-lib Magazine, Vo. 8 No. 11, November 2002. "Sharing Research through UD's innovative Institutional Repository" Daily, October 25, 2004 <http://www.udel.edu/PR/UDaily/2005/oct/repository102504.html>.
6. Crow, R. (2002). The case for institutional repositories: A SPARC position paper. The Scholarly Publishing and Academic Resources Coalition, Washington, DC. Retrieved March 15, 2011 from http://www.arl.org/sparc/bm~doc/ir_final_release_102.pdf

7. Lynch, C.A. (2003). Institutional repositories: Essential infrastructure for scholarship in the digital age. ARL: A Bimonthly Report on Research Library Issues and Actions from ARL, CNI, and SPARC, no. 226, 1-7. Retrieved January 18, 2011 from <http://www.arl.org/bm~doc/br226ir.pdf>

Collection Development and Management of Institutional Repositories Using Open Source Software

Prabhu B. Gaddimani¹, Puttaraj A. Choukimath² and Mallikarjun Angadi³

¹ *prabhu@tiss.edu*

² *choukimath@tiss.edu*

³ *mallikarjun@tiss.edu*

Tata Institute of Social Sciences, Mumbai, India

ABSTRACT

From information society to knowledge society, the role of libraries has been tremendously change because of, application of Information and telecommunication (IT) in the higher education institutes and Universities particularly. In the present context, collection development and institutional repositories became the need of the hours. Contents and subject oriented collection development and intuitional repositories are more important to provide information to the user. The paper describes the concept of collection development, Institutional repositories, principles of repositories. It also discuss the advantage and barriers and how to develop quality collection development and Institutional repositories.

Keywords: Collection Development; Institutional Repositories: Collection Development; Open Source Software.

1. INTRODUCTION

Development in information and communication and web technologies has changes the way of information production, acquisition and its dissemination. Information revolution and ever increasing demand for exact and consolidated information and old method followed by the libraries are being replaced by such new technologies these days. These technologies revolutionize the library service system by digital information collection, repackaging and online distribution. It is not only simply complementing the need of a conventional library service system, rather it has opened a most convenient, rational and a democratic platform for the academicians to contribute and share their intellectual research output through an institutional repository among the peers within the host organization and the outside without having any kind of hassle from the publishing houses.

2. INSTITUTIONAL REPOSITORIES

2.1 Understanding the Institutional Repositories

Repository means formally organized and managed collection of digital content generated by faculty, staff and students at an institution. The main purpose of institutional repositories are to bring together and preserve the intellectual output of a laboratory, department and commitment. An **institutional repository** (IR) is an online archive for collecting, preserving, and disseminating digital copies of the intellectual output of an institution, particularly a research institution such as articles, Dissertations of M.A, M.hil, Ph.D. An institutional repository can be viewed as a set of services that a university offers to members of its community for the management and dissemination of digital materials created by the institution and its community members. For a university this includes materials such as monographs, academic journal articles, both before (preprints) and after (postprints) undergoing peer review, as well as electronic theses and dissertations (ETDs). An institutional repository might also include other digital assets generated by academics, such as administrative documents, course notes, question papers, convocation address, learning, or conference proceedings. Deposit of material in an institutional repository is sometimes mandated by that institution. Some of the main objectives for having an institutional repository are to provide open access to institutional research output by self-archiving it, to create global visibility for an institution's scholarly research, and to store and preserve other institutional digital assets, including unpublished or otherwise easily lost literature (grey literature) such as theses or technical reports. A repository can also be intended for a particular type of material, such as theses.

According to Lynch“University-based institutional repository is a set of services that a university offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members. In a university setting an Institutional Repository my provide a place for faculty work, students theses and dissertations, e-journals, datasets and so on.” Wikipedia an encyclopedia described IR as follows An institutional Repository is an online locus for collecting and preserving in digital form the intellectual output of an institution particularly a research institution. For a university, this world include materials such as research journal articles before and after undergoing peer review and digital versions of theses and dissertations but it might also include other digital assets generated by normal academic life, such as administrative documents, courses notes or learning objects.

Open access is one step ahead of free access. It holds to remove all barriers whether it is the matter of prizes or permission by using scientific communication medium and internet and Institutional Repository is a step towards open access.

The origin of the notion of an Institutional Repository are two-fold:

- Institutional repositories are partly linked to the notion of digital interoperability, which is in turn linked to the Open Archives Initiative (OAI) and its Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH). The OAI in turn had its roots in the notion of a "Universal Preprint Service", since superseded by the open access movement.
- Institutional repositories are partly linked to the notion of a digital library - i.e., collecting, housing, classifying, cataloguing, curating, preserving, and providing access to digital content, analogous with the library's conventional function of collecting, housing classifying, curating, preserving and providing access to analog content.

Institutional repositories are one of the recommended ways to achieve the open access vision described in the Budapest Open Access Initiative definition of open access. This is sometimes referred to as the self-archiving or 'green' route to open access.

2.2 Objectives of Institutional Repositories

a) Institutionally defined:

The four main objectives for having an institutional repository are:

- i. to create global visibility for an institution's scholarly research;
- ii. to collect content in a single location;
- iii. to provide open access to institutional research output by self-archiving it;
- iv. to store and preserve other institutional digital assets, including unpublished or easily lost literature (e.g., theses or technical reports).

2.3 Essential Characteristics of Institutional Repository

Following are the essential elements that an Institutional Repository should have:

a) Institutionally Defined:

- Content generated by the community in an institution
- Content present historical and tangible embodiment of the intellectual life and output of an institution.
- Existing library consortia will be a platform
- Consortia could help rapid growth of IR

b) Scholarly Content:

- Content include preprints, working papers published papers
- Research material, Staff information, teaching material, thesis, dissertations
- Research and technical reports, numerical and statistical report or data

c) Cumulative and Perpetual:

- Formed by successive additions
- Material should include should be preserved for future scholars to use
- More and more material or information should accommodate
- IR will continue piling up day by day

d) Interoperable and open access:

- The user outside the institute must be in a position to find out information from the repository.
- System should maintain and expose the metadata to allow other services to harvest and search the content.
- Internal and external users can access the content.

2.4 Features and Benefits Institutional Repositories

According to the Directory of Open Access Repositories (DOAR) data the majority of institutional repositories are built using open-source software. While the most popular open source and hosted applications share the advantages that institutional repositories bring to institutions, such as increased visibility and impact of research output, interoperability and availability of technical support, institutional repository advocates tend to favor open source solutions for the reason that they are by their nature more compatible with the ideology of the freedom and independence of the internet from commercial interests. On the other hand, some institutions opt for outsourced commercial solutions.

In her briefing paper on open access repositories, advocate Alma Swan lists the following as the benefits that repositories bring to institutions:

The four main objectives for having an institutional repository are:

- Opening up outputs of the institution to a worldwide audience;
- Maximizing the visibility and impact of these outputs as a result;
- Showcasing the institution to interested constituencies – prospective staff, prospective students and other stakeholders;
- Collecting and curating digital output;
- Managing and measuring research and teaching activities;
- Providing a workspace for work-in-progress, and for collaborative or large-scale projects;
- Enabling and encouraging interdisciplinary approaches to research;
- Facilitating the development and sharing of digital teaching materials and aids, and
- Supporting student endeavors, providing access to theses and dissertations and a location for the development of e-portfolios.

In other way, the below are the most common benefits of the Institutional Repository:

- i. **Broader Dissemination and Increased Use:** Items posted to the Institutional Repository can also be accessed by searching in Google, Google Scholar and other search engines. Items can be accessed by anyone in the world who has Internet access. Online articles are cited 4.5 times more often than offline articles; articles with fewer citations were more likely to be in journals with restricted access. (Jantz and Wilson, 2008).
- ii. **Stability and Longevity:** Each item deposited in the Institutional Repository has a permanent URL associated with it. Deposited items will be preserved over time. Backups will be managed and as technology and formats evolve your work will remain accessible.
- iii. **Statistics:** Viewable activity statistics for each item including downloads and views by

country.

- iv. ***Convenience:*** Libraries and Cultural Resources will obtain copyright permission for published items that you wish to have deposited. * Students retain copyright for their theses and dissertations when depositing in the Institutional Repository. Libraries and Cultural Resources will create and maintain your Institutional Repository collection with your input and assistance.
- v. ***More exposure:*** Repositories make your work available to everyone who may be interested. A growing body of evidence shows that's as a result of being openly accessible, publications are cited more frequently.
- vi. ***Universal access:*** While an article published in a journal may be available to only a few hundred subscribers, the same article when also posted in a repository is available to all, greatly enhancing the public value of research.
- vii. ***Easier information discovery:*** By opening their content to service providers such as Google, Google Scholar, and OCLC, repositories allow Web users to search every item they hold.
- viii. ***New computational research techniques:*** Digital repositories open the door to new computational research techniques and pathways, such as text mining, creation of text-data linkages, and identifying and visualizing relationships that are not otherwise observed.
- ix. ***Persistent access:*** By depositing your works in a repository, they will have persistent URLs (a reference URL) that will never change — no more dead links. Unlike items on ever-changing personal Web sites, works in repositories are available to whoever needs them, whenever needed.
- x. ***Long-term preservation:*** Digital repositories are managed by your library, which is committed to long-term access to and preservation of the collection. The library will ensure ongoing maintenance and back-ups.
- xi. ***Wide range of content:*** Digital repositories collect more than just journal publications; they also collect other types of materials, such as conference proceedings, images, and sometimes research data — enabling you to integrate and provide access to a wide range of materials.
- xii. ***Benefits to the Students:*** Since no library can afford to subscribe to all the resources students need, putting your works in a digital repository ensures students everywhere can read and learn from them, creating an important new layer of information that is readily accessible. Students, who are early adopters of open approaches, are also benefiting from digital repositories by depositing their theses and dissertations — broadening the reach of these important works.

2.6 Limitations of the Institutional Repositories

- (a) They affect the balance of institutional power as some departments proceed faster than

others.

- (b) They rely on unproven methods for long term digital preservation.
- (c) They may need quick wins to sustain institutional support.
- (d) Initial costs may be high as contributors perceive high risks and duplicate effort to reduce them.

3. COLLECTION DEVELOPMENT AND MANAGEMENT IN INSTITUTIONAL REPOSITORIES

efforts to their individual departments and constituencies.

3.1 Institutional Repositories and Libraries

Libraries and archives of course have long experience with developing and managing content and many of the skills applied to print and other forms of digital collections will be transferable to the institutional repository environment. By building upon their existing collection management experience and skills and adapting them to the selection of content for institutional repositories, libraries will be able to reinforce their role in the institutions they serve.

Indeed an institutional commitment is ultimately necessary if success is to be achieved because an institutional repository by its nature an inclusive service, one that requires the involvement of nearly everyone within the institution. In the academic setting librarians may be the heart of the operation. Liaisons as mentioned should spearhead the outreach efforts to their individual departments and constituencies.

3.2 Setting up an Institutional Repository

There may be various reasons as to why an institution should go for the IR approach that may include long term preservation of knowledge, wider access to content or simply, centralized organization of information. Once an institution opts to setup an IR, it has to consider manifold issues, having both, technical and social hues. These include choosing the software platform for the repository, the content to be deposited, the metadata to be ingested, authorization policies, levels of accessibility, IPR issues, promotion and advocacy of the IR, running costs etc. The structure of repository depends on the nature of work, hierarchy of departments or nature of the content generated by the institution. Initial costs of setting up the repository vary across institutions, and heavily depend on the volume of the content not available in digitized formats. Digitization of physical content (paper or other forms) entails a major portion of the costs incurred. Availability of world-class open source IR and digital library software like DSpace (www.dspace.org), Eprints (www.eprints.org) and Greenstone (www.greenstone.org) helps the cause of reduction of setup costs. Metadata creation is another aspect that tends to be a time and human resource guzzler. Thus depending upon the quantum of content to be deposited in the IR, an institution can even decide to outsource certain activities like digitization and metadata creation of the content to specialist external agencies and firms. Once the repository is up and running (with an initial set of content), promotion of the repository among the institution personnel becomes pertinent, as the repository will only get populated, if the users submit content to it. It is important to make them aware of the functionality, benefits, workflow and the IPR issues associated with the IR.

3.3 Contents of an Institutional Repository:

While creating an IR, it is important and foremost to have self-explanatory 'content development guidelines'. However, as CARL (2002) advocates in its 'A Guide to Setting-Up an Institutional Repository', "a review of a number of existing repositories shows that institutional

policies regarding content vary substantially. In general, e-prints/pre-prints archives tend to accept one or more editions of 'working papers', while institutional repositories accept a wider range of content types, such as post-prints (copies of already published journal articles), conference papers, technical reports, etc.”

However, the various contents/forms which shall be included in an Institutional Repository can be enumerated in the following indicative list:

- Articles
- Audio Materials
- Braille and other Tactile Materials
- Committee Papers
- Computer Software
- Conference Proceedings/Papers
- Course-ware/Course-packs
- Data Bases
- Datasets Resulting for Research Projects
- Images
- Newsletters and Bulletins;
- Photographs
- Pre-prints
- Post-prints
- Projects Reports
- Published Work
- Question Papers
- Research Reports
- Revised Text of Published work with comments for academic readers
- Students Projects
- Surveys
- Teaching Materials
- The Text/ Draft of Articles accepted for publication
- Technical Documentation
- Technical Reports
- Thesis and Dissertations
- Tutorials
- Video Recordings
- Working Papers

Therefore, in the opinion of Genoni (2004), for libraries developing institutional repositories, the issue of content should be foremost. They are, after all, simply another form of collection, which should be subject to established levels of decision making with regard to collecting priorities, and the same level of management with regard to associated matters, such as access and preservation. So familiar are these tasks that they should be able to be smoothly incorporated into the current collection management programs of libraries, and the associated policy decisions can be recorded within the framework of existing collection development policy documents.

4. OPEN SOURCE SOFTWARES FOR INSTITUTIONAL REPOSITORIES

There are a number of open-source software packages for running a repository including:

- Archimede
- Bepress
- CDSware
- Dspace
- Eprints
- Fedora
- Greenstone
- Invenio
- iVia
- Open Repository
- Phronesis
- ROADS
- SobekCM
- Zope

5. CONCLUSION

The Libraries have long experience with developing and managing content collections. After observing the advantages and disadvantages we get to know that IR has more advantages. It is useful to all the users of library. Libraries have always been engaged in managing and developing their collection. LIS professional are always in front of new technology and they accept it and try to develop their library services. Services like dissemination of information, access, preservation and use information and content submission and organization of information become useful which helps libraries to follow all five library rules. Libraries should have to take part in Institutional Repositories. Libraries or Librarians can perform vital role in building and maintain Institutional Repositories. University libraries and the librarian have to play a major role in developing successful repositories for their institutions.

REFERENCES

- 1) CARL. (2002). A Guide to Setting-Up an Institutional Repository, Accessed from <http://www.carl-abrc.ca/en/scholarly-communications/carl-institutional-repository-program/a-guide-to-setting-up-an-institutional-repository.html>
- 2) Genoni, Paul. (2004). Content in Institutional Repositories: A Collection Management Issue, *Library Management*, Vol. 25 (6/7), pp. 300–306
Accessed from <http://www.emeraldinsight.com/doi/full/10.1108/01435120410547968>
- 3) Ghosh, S.B. and Das, Anup Kumar. (2007). Open Access and Institutional Repositories – A Developing Country Perspective: A Case Study of India. *In: IFLA Journal*, Vol.33 (3), October, pp.229-250. Accessed from <http://ifl.sagepub.com/content/33/3/229.full.pdf+html>
- 4) Hirwade, Mangala and Hirwade, Anil. (2006). Institutional Repositories: Challenges and Opportunity for LIS Professional in Digital Age, *Library Herald*, Vol.44 (2), pp.146-151.
- 5) Khatri, M.B. and Bheti, S.R. (2008). Institutional Repositories: Role of Libraries. *In: Proceedings of the International Conference on Knowledge for All: Role of Libraries and Information Centres*, Tata Institute of Social Sciences, Mumbai, pp.22-27.
- 6) Philip Hunter and Michael Day, *Institutional Repositories Aggregator Services and Collection Development*, University of Bath, United Kingdom. pp.1-31.
- 7) Rao, P. Venkata. (2007). Institutional Repositories: A Key Role for Libraries, *In: Proceedings of 5th International CALIBER-2007*, Punjab University, Chandigarh, 08-10 February, pp. 689-695. Accessed from <http://ir.inflibnet.ac.in/bitstream/1944/1443/1/689-695.pdf>
- 8) Robinson, Mary. (2007). Institutional Repositories: Staff and Skills Requirements, University of Nottingham, SHERPA Document, 8th August. Accessed from <http://sherpa.ac.uk/documents/sherplusdocs/notts-Repository%20Staff%20and%20Skills.pdf>
- 9) Singh, S.N. et al. (2007). Open Source Software: A comparative Study of Greenstone and Dspace. *In: Proceedings of 5th International CALIBER-2007*, Panjab University, Chandigarh. pp.89-97. Accessed from <http://ir.inflibnet.ac.in/bitstream/1944/517/1/89-97.pdf>

- 10) Vishala, B.K. and Bhandi, M.K. (2007). Building Institutional Repository (IR): Role of the Library, In: Proceedings of 5th International CALIBER-2007, Panjab University, Chandigarh. pp. 631-640. Accessed from <http://ir.inflibnet.ac.in/bitstream/1944/1438/1/631-640.pdf>
- 11) Wikipedia (2016). Institutional Repository. Accessed from https://en.wikipedia.org/wiki/Institutional_repository

Digital Preservation and Procedures

Shelley Jamwal¹, Rachna Patnaik²

¹*shelley.jamwal@gmail.com*

²*rachna@sac.isro.gov.in*

Space Applications Centre, Ahmedabad – 380015

ABSTRACT

Steadily growing demand for digital content has forced libraries to digitize a majority of their content and services. However, preserving the digitized and born-digital content is not a trivial task. Rapid changes in digital technology, file formats and media used to store / access digitized content means that the librarians have to be on their feet all the time migrating to the newer technological changes. In the absence of established standards or protocols, each library has to come with their own methodologies to adapt to these changing needs and establish procedures for preservation based on the lesson learned along the way. This calls for expertise in the areas which go beyond the usual library domain, as it involves technical expertise in the field of computer technology to manage the digitized content and develop software to make the content easily available to library patrons. This paper discusses these issues related to digital preservation and the challenges involved therein. The library of Space Applications Centre (SAC), Indian Space Research Organisation, took up the activity of digitizing and preserving some of its selected documents and making them easily accessible to the researchers. The methodology evolved and adopted, the lessons learned and future plan of action is discussed.

Keywords: Digital Content, Digitization, Preservation, Digital Media, Library Software, Space Applications Centre (SAC), ISRO

1. INTRODUCTION

My grandmother rode a bullock cart confidently but was afraid to ride in a two-wheeler. My mother rode two-wheeler confidently but was afraid to ride in a car. My wife rides in a car comfortably but is afraid of airplane. My daughter is confident in an airplane but is afraid to ride in a bullock cart!

This old Readers' Digest anecdote, aptly sums up the problems related to Digital Preservation and why it is such a challenge as compared to the traditional content preservation methods. In only a few decades, we have moved from noisy digital storage media that occupied huge buildings and still had little capacity, to devices we carry in pocket having far greater capacity. The technological changes are so rapid that what one generation uses confidently is a fear to its next or previous generation. Added to this is the fact that the storage media that was available just a couple of decades can no longer be used in machines available today. Therefore, if you have not migrated all the data carefully, the data stored up in those media are null and void. Compare this with traditional books and immediately you can see that books written 100s of years ago are still preserved and made available to library patrons in their original form. Thus, one major difference between preserving of traditional materials as compared to digitized material is that while the former is passive preservation wherein we merely protect the material from damage, in the latter we have to actively change the media and file format, so that the contents remains usable and readable. Secondly, the policies and methodologies to protect and preserve traditional materials are well established and standardized. No such protocol exists for preserving digital materials. In absence of

standard protocol, each library is left to form its own policies and procedures to handle the digital preservation activities. Like, in SAC library, any data/documents which are to be digitized, are first scanned and then saved as PDFs, the content is secured and then preserved in Digital Repository of library. Finally, we have the legal issue or the copyright issue. Does the library have the legal right to make more than one copy of a book or document in order to preserve it? Can the library change the file format or original media of the digital material? If multiple copies are made how do we protect the copyrights?

2. WHY DIGITIZE?

One can safely say that when computers and handheld devices started proliferating in the modern world, digitization became the need of the hour for every library. The user, using handheld devices, was accessing digital media in every form for everything from news to maintaining personal records. There was a growing demand for immediate & easy access to rich content, up-to-date information and ease of access to this information. The development of '*digital libraries*', a concept also known as the electronic library, the virtual library and the library without walls (Raitt, 2000), has preceded and anticipated much of this demand. To reach these large number of users parallel and easily, digitization was the only way forward. Digitization is necessary for various reasons:

1. More than one person can access the same record. Consider a library which subscribes to newspaper or popular magazines. Obviously, dozens of people would like to read the same document at the same time. Making digital copies available to a large number of users on a network is the solution to such a requirement.
2. Not only can more than one person access the information but they can do so from different locations.
3. When the same documents or books in the traditional form are issued to users very frequently, there is a problem of wear and tear. Many rare or important documents/ books are damaged this way. One of the primary advantages of digitization is that the digital form is not subject to wear and tear, nor does it get corrupted, no matter how many users access it.
4. Various media can be combined easily to form one integrated document pertaining to a subject and this document can be indexed easily, browsed and searched quickly. Also, the document can be shared over the web with other users and linked to other similar documents on the internet. The information can be easily copied and transmitted to a large audience instantly.
5. Creating backup copies is easy. Libraries are reluctant to keep many backup copies of traditional paper books or documents as it is a costly process and takes too much space.
6. The amount of space that is required to store an entire library might be just one hard disk.

3. WHAT IS DIGITIZATION AND DIGITAL PRESERVATION

Computers or digital readers use "0" and "1", also called as bits or binary digits, for communication. Digitization refers to the process by which data is converted from its native format to the computer readable bits format. Various devices like iPads, Kindle Readers and even mobile phones can read this format.

In the context of libraries, digitization means converting books, reports, articles, standards, references, video and audio, entire archive collections and manuscripts, paintings, prints, drawings, photographs, ephemera and more into standard electronic forms by scanning.

While Digitization as described above is one method of preserving contents which otherwise might get lost or damaged, it is by no means an end in itself. Digital records cannot be maintained in their original form permanently because of changing technology which changes both the media which is used to store the data and the method of accessing digital records. These records need to be constantly updated, changed to different format or stored in a different media.

Digital Preservation relates to the proper maintenance of digital records, both material that were digitized from non-digital forms and those that were born-digital, so that it is always accessible to library patrons.

Wiki defines Digital Preservation as follows: "In library and archival science, *digital preservation* is a formal endeavor to ensure that digital information of continuing value remains accessible and usable.

It involves planning, resource allocation, and application of preservation methods and technologies, and it combines policies, strategies and actions to ensure access to reformatted and "born-digital" content, regardless of the challenges of media failure and technological change.

The goal of digital preservation is the accurate rendering of authenticated content over time. According to the *Harrod's Librarian Glossary*, digital preservation is the method of keeping digital material alive so that they remain usable as technological advances render original hardware and software unusable.

4. MODELS FOR DIGITAL PRESERVATION

Several Models exist for libraries seeking to develop and adopt a digital preservation policy. For example:

1. *Liz Bishoff's "Digital Preservation Plan: Ensuring Long Term Access and Authenticity of Digital Collections"*. It identifies eight components of a good digital preservation plan: rationale for digital preservation, statement of organizational commitment, statement of financial commitment, preservation of authentic resources and quality control, metadata creation, roles and responsibilities, training and education, and monitoring and review.
2. *ERPANET's Digital Preservation Policy Tool* provides a framework to address the benefits of digital preservation, the scope and objectives of the policy, as well as requirements, roles and responsibilities, context, areas of coverage, costs, monitoring and review, and implementation of the policy.
3. *JISC's Digital Preservation Policies Study* provides a matrix for policy clauses that include a principle statement, contextual links, preservation objectives, identification of content, procedural accountability, guidance and implementation, a glossary, and version control.

Although many such models and guidelines exist, there is no specific protocol or standard established that take into account all the aspects of Digital Preservation ranging from creation of policy to its final implementation. This makes the whole exercise very subjective. Each library develops its own set of Digital Preservation policies and procedures.

5. WHY DIGITIZATION AND PRESERVATION IN SAC LIBRARY?

The Library at Space Applications Center (SAC Library) is a hybrid library with the state-of-the-art technological applications. Different initiatives are taken up in library towards building up the digital resources and providing its access to the users on their desktops.

Users can access the online databases and also find out the real-time availability of library materials from their own computer terminals. Information and Communication Technologies (ICTs) have propelled the growth of large numbers of electronic resources.

With time, collection of SAC library has tremendously increased. Presently, collection of library is simply not confined to technical/non-technical books, but it also comprises other forms of documents, like, reprints, standards, weather reports, trade literature and other reports (SAC/ISRO,DOS, NASA, ESA) which are all available in print form. A study was carried out to figure out which type of the documents could be digitized at initial level. And it was decided to digitize NASA reports as they are freely available on internet without any copyright issues and they are required by user any time, though infrequently. Therefore, a list of NASA Reports which were physically available in the SAC library was prepared, and these reports were then downloaded from the NASA website (<http://www.sti.nasa.gov/>). More than 250 in pdf form and now these NASA reports are getting preserved in Digital Repository of SAC by adding proper metadata.



Fig. 1 . NASA reports in Digital Repository

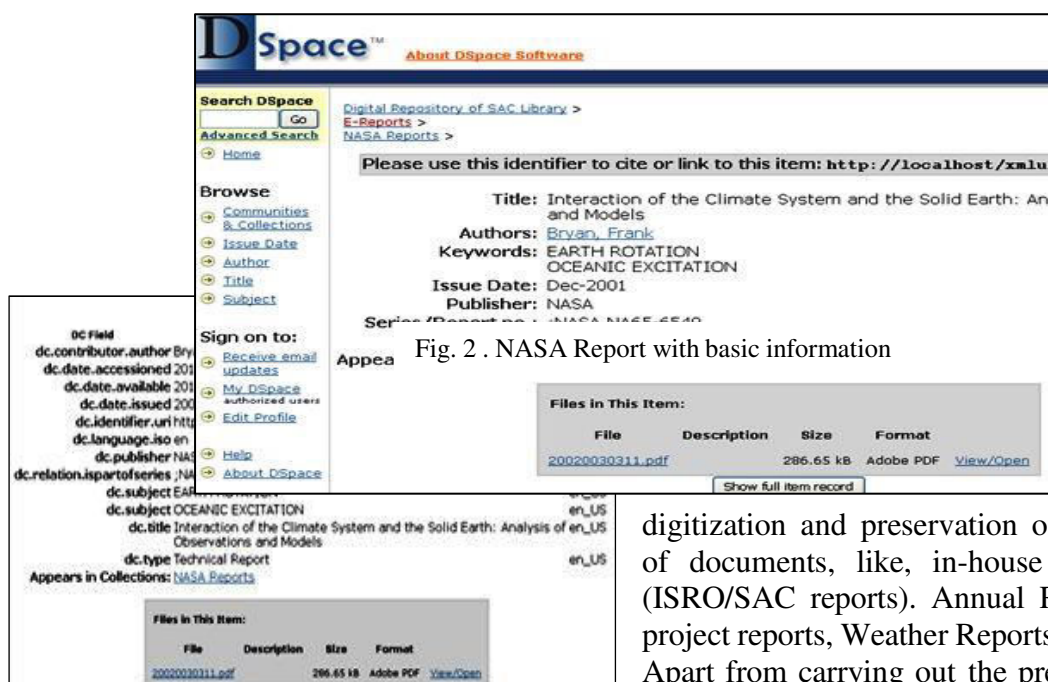


Fig. 2 . NASA Report with basic information

SAC library is also engaged in

engaged in digitizing Weather Rep

Weather Reports are scanned. But considering their size, these weather reports are cut in to pieces and then they are scanned individually, after which they are stitched together and are saved as OCR's. These OCR's are then submitted to Digital Repository of SAC library for quick access.

digitization and preservation of other types of documents, like, in-house publications (ISRO/SAC reports). Annual Reports, IITP project reports, Weather Reports etc.

Apart from carrying out the preservation of

Fig.3. Full Metadata

f digitization,

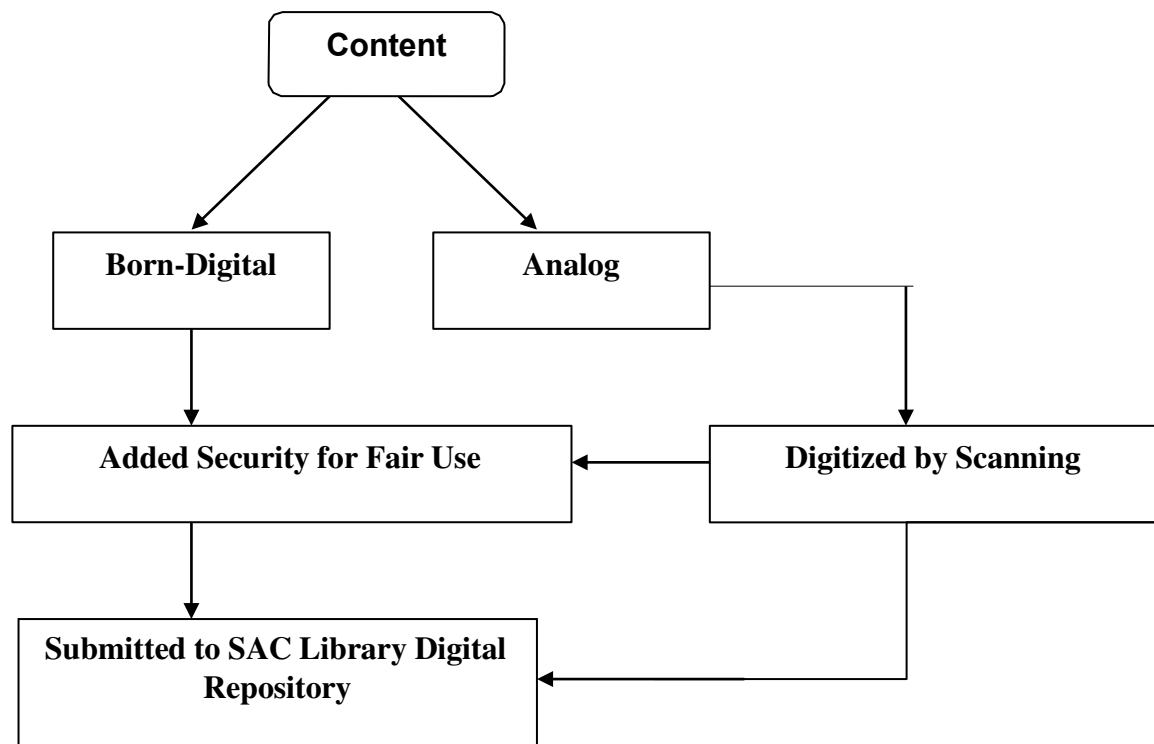


Fig. 4. Work flow explaining how content is digitized and preserved in Sac library

Library also makes sure that none of its preserved content is misused. Therefore, library adds security features as well as water marks to its preserved digitized contents for fair use.

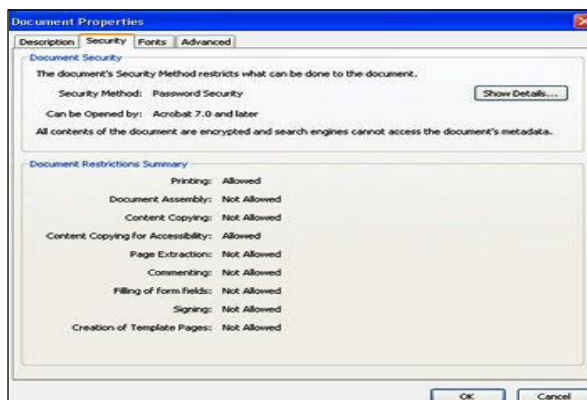
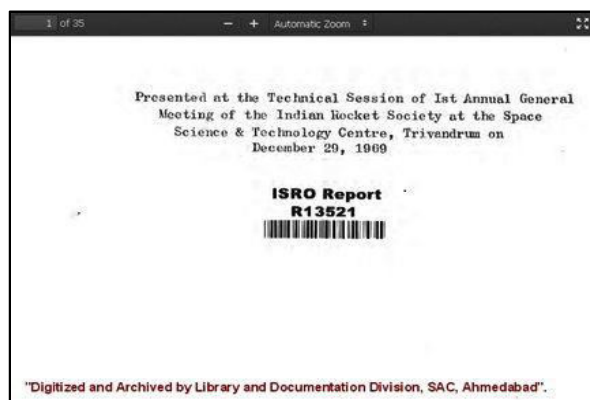


Fig.5. Added security features



R Fig.6. Water mark for security purpose

We have seen above, how SAC library is digitizing and preserving digital content. But, for preserving the digital content, SAC library requires a platform where all digitized content can be preserved to ensure its access in present and in future. Many free and open source software solutions are freely available for the purpose of developing digital libraries and for preserving the digitized contents. Dspace (<http://www.dspace.org>) is one of the most popular open source software used by libraries worldwide. It has been developed jointly by MIT Libraries and HP labs. Therefore, SAC library decided to use DSpace for the purpose of setting up the Digital Repository to carry out the digitization and preservation of digitized content, considering its functionalities and following features,

- Freely and open source software.
- Easy customization as per the institutional needs.
- Conforms to the standards like Dublin Core and OAI-PMH.
- Can recognize any file format, word, pdf, jpeg, mpeg.
- Submission facility allows scientists to upload their publication from their desktop.
- Authentication levels are available for restricting User access.
- Any number of communities and sub-communities can be created, with unlimited number of collection, having unlimited number of items.

DSpace 3.1 is installed on Ubuntu 13.05 LTS operating system.

7. IMPORTANCE OF METADATA IN DIGITAL PRESERVATION

According to Wikipedia, metadata is data about data. Metadata is used to describe things and in DSpace metadata is used to describe the items that it holds. That means, each and every community, collection, item and bit stream has its own metadata for providing its description. Broadly, there are two types of metadata, one is descriptive and other is administrative. While, descriptive metadata provides information about the content, like, its name, creator, size; administrative metadata helps in the administration of the content.

DSpace by default uses Dublin Core metadata schema and Dublin core is made up of qualifier and base elements. So, when the content is digitized and entered in Digital Repository, the metadata helps in organizing, archiving, preservation and accessing the required information by relevant criteria.

8. METHODS OF DIGITAL PRESERVATION IN SAC LIBRARY

SAC library uses various methods for preserving the digitized content. Some of them are listed below:

- 1) Digital Repository: SAC library is preserving its digitized content in its Digital Repository which is running on DSpace, a Open Source Software. Thus, providing access to preserved content to user community at their desktop.
- 2) DVD's: Library is also preserving its contents in DVD forms and then saving them in the form of electronic document, providing its access through library website. News clipping, weather reports are few examples of data storage in DVD's. These resources can be accessed via library website on the intranet.
- 3) NAS (Network-Attached Storage) Server: NAS server is also used for storing digitized content and providing access to the contents directly through library website. Currently, library is having NAS server of 60 TB.

9. CHALLENGES IN DIGITIZATION

1. Selection: Major issue which SAC library faced and is still facing is what to digitize and what not to. How and who will decide which type of document should be digitized. Is it the library professional or the library users!
2. Storage: Once it is decided what to digitize, next problem which came up was how to store the digitized content. Technology changes very fast and this is very evident from the fact that initially floppy disks were in demand for storage and retrieval purpose, but now they don't exist anymore. So, the major problem is how to store the digitized content, so that even when technology changes those contents are easily accessible. This leads to the need to copy contents from old media to new media with requisite change in file format if required. This can be a costly affair.
3. These new recording media are vulnerable to deterioration and catastrophic loss. Old preserved CDs or DVDs are often not readable on new laptops or PCs. So there is a need to have a multiple backup copies of the contents.
4. Recruitment of specialist to do software related tasks and regular training of the library staff is a necessary requirement of digital preservation. Software development is required both for period update / backup of contents and also to develop user interface to make available the digital contents to the library patron in an easy to use format.
5. Copy rights and Intellectual Property Rights (IPR): This is one of toughest challenges. The moment we release a single digital version of a document, we have opened a door for many copies being saved by the numerous online readers of that document. It is too easy to make copies of digital documents at practically zero cost and redistribute them via various means.

10. GLIMPSE OF SAC LIBRARY RESOURCES

As one can see from the table below, the SAC library has over 15000 reports, nearly 6000 standards, manuals and nearly 1000 trade literature, maps, atlases etc. These items are an extremely important part of the library for a scientific research organization like Indian Space Research Organization. These will be accessed rather infrequently but whenever they are required, they need to be made available readily and searched easily. In many instances, these reports are required on the spot for laboratories, clean rooms etc. and so instant on-line access to such documents will be of immense help to those working on tight scheduled projects. This necessitates that these reports must be made available online in digital form. Their preservation becomes paramount considering that they may contain all the lessons learned along the way and all the specific details regarding any project.

Table 1. Available Print and Digital Resources in SAC Library

Traditional Resources			Digital Resources		
Sr.	Type of Resources	No.	Sr.	Type of Resources	No.
1.	Books and Monographs	38125	1.	Audio	5
2.	Hindi & Miscellaneous Books	7195	2.	Book Selection List (BSL)	131
3.	Bound Volumes of Journals	23907	3.	E-Books	163
4.	Current Periodicals	633	4.	E-Journals	539
	Print Journals	65	5.	E-Reports	7

	Print+Online Journals	54	6.	E-Standards	10
	Only Online Journals	589	7.	Magazine Articles	92
5.	Technical Reports	15291	8.	News Clips	959
6.	Reprints	2810	9.	Society Newsletters	37
7.	Standards	5903	10.	Tutorials	6
8.	Trade Literature (Data Books)	678			
9.	Maps & Atlases	342			
10.	Microforms, Audio & Videos	546			
11.	Electronic Documents (CD/DVD's Floppies)	3078			
12.	E-Books (Online)	315			
13.	Electronic Resources (Digital Journals, E-Reports & E-Standards)	1456			
14.	Popular Magazine (Print)	25			
15.	Newspapers (Print)	13			

11. CONCLUSION

As brought out in the paper, digitization and preservation of digital content are now a must for any library. A definite set of procedures needs to be established to ensure that the materials converted to digital form are updated, preserved and made available to the patrons. Since, the digital technological changes are rapid and may lead to older media or file formats becoming unusable, it is mandatory that a continuous evaluation is carried out and necessary changes in file formats or media is done to ensure availability of the content over a long duration.

However, this is not an easy task given that the expertise to handle digital media and its content does not fall in the librarian's domain. Also, policies or procedures cannot be established in a hurry. SAC Library too faced difficulty in identifying the most critical content to be digitized and preserved. While carrying out digitization and preservation tasks for the content, procedures or policies can be established and put in place. Further tasks can then be implanted as per these established procedures.

ACKNOWLEDGEMENT

Authors are thankful to Shri Tapan Mishra, Director, SAC for his encouragement and Dr. Prakash Chauhan, Chairman Library Committee, SAC for his constant support and guidance. Our gratitude is also due to Shri. P.J. Soni for his critical and fruitful discussions on the paper.

REFERENCES

1. http://www.niso.org/apps/group_public/download.php/4250/FE_Bishoff_Digital_Preservation_Plan_isqv22no2.pdf.

2. http://www.bl.uk/aboutus/stratpolprog/collectioncare/digitalpreservation/strategy/BL_DigitalPreservationStrategy_2013-16-external.pdf.
3. http://www.webarchive.org.uk/wayback/archive/20140614062339/http://www.jisc.ac.uk/media/documents/programmes/preservation/jiscpolicy_plfinalreport.pdf.
4. <http://www.dspace.org/why-use>.
5. delnet.nic.in/DSpace.doc.
6. <http://www.lsrj.in/UploadedArticles/75.pdf>.
7. <https://www.nedcc.org/free-resources/preservation-leaflets/6.reformatting/6.6-preservation-and-selection-for-digitization>.
8. <https://www.mcgill.ca/library/services/research/digitization>.
9. <https://www.libraries.psu.edu/psul/digipres/aboutus.html>.
10. https://en.wikipedia.org/wiki/Digital_preservation.
11. <http://cadair.aber.ac.uk/dspace/bitstream/handle/2160/618/Module+-+An+introduction+to+metadata+in+DSpace.pdf;jsessionid=91ACC62691CF2BEEE94EFD0217A0D7AF?sequence=8>.
12. <https://en.wikipedia.org/wiki/Metadata>.

ETD Digital Library at IIT Bombay: An Overview of Growth and Sustainability

Manju Naika¹ and Satish Kanamadi²

¹*manjunaik@iitb.ac.in*

Indian Institute of Technology Bombay, Mumbai 400 076

²*satish@tiss.edu*

Tata Institute of Social Sciences, Deonar, Mumbai, 400 088

Abstract

This paper describes the activities of ETD-DL initiative of IIT Bombay. It reveals the experience of 17 years (1999 to 2015) ETD-DL management, it moved from Thesis and Dissertation electronic plus print submission into electronic only submission since 2012. It discusses the life cycle of ETD, implementation of in-house developed ETD Digital Library based on open source software, digital content format used, the ETD policy of this institute, stakeholders involved in the development and management of ETD, computing and other resource like LaTeX available to the students in the preparation of ETD. Use of plagiarism prevention Turnitin software to check the originality of the ETDs, the forces behind the implementation of ETD, preservation and conservation of digital content, submission process, review and access policy, and lessons learned and future plan.

Keywords: Scholarly Communication channel, ETD Digital Library

1. INTRODUCTION

Indian Institute of Technology Bombay established in 1958, is a world class institution offering programs of higher learning with a strong focus on research in engineering, technology and sciences. It has 34 Academic Departments/Centres/Schools. Besides offering undergraduate and postgraduate programmes, it offers doctoral programmes in over 44 areas of engineering, sciences and management.

ETD encourages to produce creative and interactive documents with better features such as hyperlinks, sound, video, 3D animation, spreadsheets, databases, simulations and better graphics allow students the ability to represent their scholarly work with more clearly, and even include the more detailed data on which the research is done, those facilities were not available in print copy of the thesis and dissertation.

IIT Bombay has initiated ETD Digital Library Initiative due to its potential benefits offered by ETD for transforming teaching, research and learning through better access and archive and as a support to the Networked Digital Library of Theses and Dissertations (NDLTD) initiative of Virginia Tech. University. IIT Bombay has implemented Electronic submission of Thesis and Dissertation (ETD) in the year 1999 by using in house developed ETD system based open source software Linux, Java and Mysql, this was the first such initiative in India to make mandatory to submit soft-copy by all postgraduate students at IIT Bombay. IIT Bombay has been a strong supporter of open source and open access movement, Department of Computer Science and Engineering and Central Library of the IIT Bombay initiated ETD system at the institute. It facilitates students to submit their theses and dissertation after defense by using institute LDAP ID and password. It pass through verification process by respective supervisor and library staff. Till 2015, IIT Bombay ETD holds 13491 full text records in PDF format. It can be accessed on intranet at <http://etd.library.iitb.ac.in>

2.ETD PREPARATION:

Students are using open office word processor, Microsoft office word processor or LaTeX software to prepare their ETD, excellent computing facility has been provided to the students, institute has been organizing training programmers on LaTeX regularly and prerecorded video tutorials are also available which are created under spoken tutorial project of the institute on LaTeX, it helps the students to prepare their ETDs easily and convert into PDF format to submit onto the ETD system.

3.PLAGIARISM CHECKING USING TURNITIN SOFTWARE:

IIT Bombay has subscribed to commercial database Turnitin plagiarism-detection software in 2012. Central Library has been helping users to use Turnitin software. It is very important to ensure that theses and dissertations are plagiarism free as evidence of this would severely damage student's, advisor's, as well as the department's and institution's reputation. So, theses and dissertation are being tested before submission using Turnitin plagiarism-detection software. This software would compare text of documents that are identical or similar in free web, publisher's journals full text database, and previously checked documents by other users in Turnitin database and generate originality report. Students have to submit the committee approved version of their thesis/dissertation and in order to confirm this, scanned copy of approved certificate and student's academic honesty declaration sheet (about the originality of the work) has to be inserted in full text of thesis and dissertation which has to be submitted to ETD.

4.SALIENT FEATURES OF ETD DIGITAL LIBRARY:

Following are some important features.

4.1. Submission

Submission of Thesis and Dissertation is done by students only, so in order to make submission task easier, submission work flows has been done very simple as much as

possible and guidelines and specifications/templates have been provided at ETD site, so each student can submit ETD successfully to the system within 5 minutes without help or with minimum help of others. As ETD Software is authenticated with institute LDAP database, so submission rights is provided to every postgraduate students, with their IITB LDAP user-id and password they can login and submit their thesis and dissertation. Every student has to submit their theses and dissertation after defence to the ETD system without any exemption even for those who are applying for patents but their full text will be put on embargo as per their requested period. The following fields need to be filled by students along with full text file - title of the thesis and dissertation, abstract, keywords, supervisor name, total page number and size of the file and personal details for alumni database. Students can make changes until the approval of ETD supervisor, but, once approved, they can't make any changes to the uploaded details.

4.2 Review/Approval

Review is an important step to make ETD collection error free&systematic, every submission goes through proper verification process by respective guide and library staff, if there are any mistakes in uploaded ETD, guide and library staff will instruct students to make necessary corrections. As soon as students uploads their file in ETD system, auto-generated e-mail will go to the respective guide for approval. If everything is correct then the guide can approve it or can reject it by giving appropriate suggestions/improvements, subsequently suggested changes will be verified by library staff, then an ETD submission certificate will be issued to the student by the library.

Table 1: IIT Bombay ETD Collection

Year	Number of ETDs	Year	Number of ETDs
1999	37	2008	905
2000	375	2009	949
2001	57	2010	985
2002	650	2011	1066
2003	653	2012	1155
2004	641	2013	1106
2005	782	2014	1257
2006	737	2015	1322
2007	814	Total	13,491

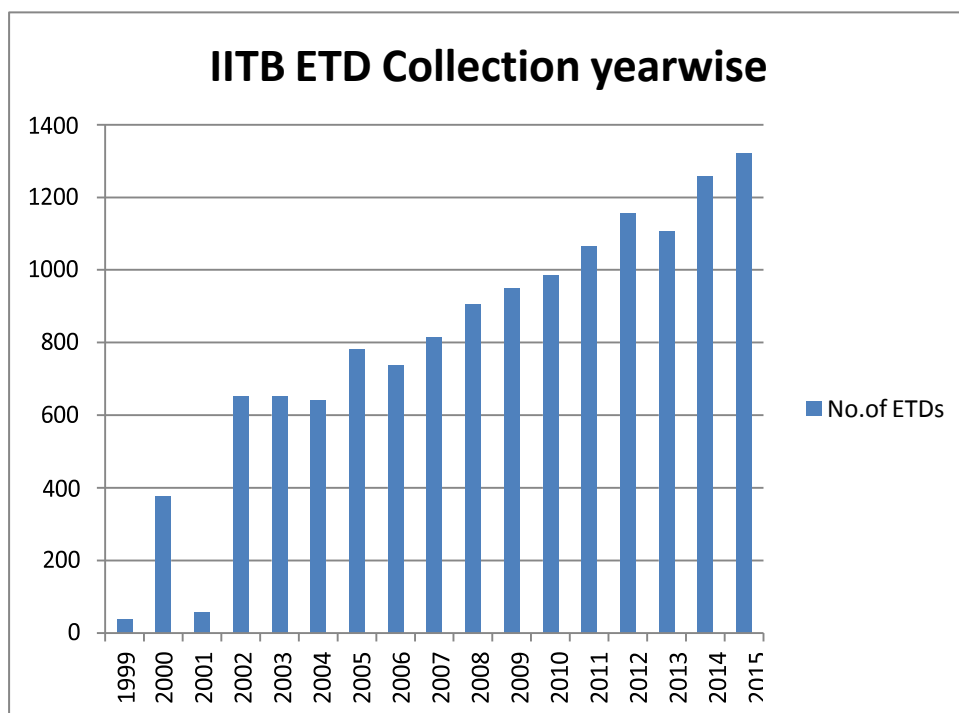


Fig 1. ETD Collection year wise

4.3 Browsing facility

In-order to access ETD Collection by users, browse facility has been provided; user can browse the ETD collection by department/degree/title/year wise.



INDIAN INSTITUTE OF TECHNOLOGY BOMBAY

ELECTRONIC THESIS DISSERTATIONS

Submit Thesis	Student Login
Faculty Approval	Faculty Login (To approve your Student's Thesis and/or View earlier submissions of Your Students)
View Submitted Abstracts	See submissions in 2000 - 2016
Guidelines And FAQ	FAQ for Students and Supervisors
Contact Us	Please let us know any difficulty faced

Fig 2. Screen-shot of ETD Homepage

4.4 Help Facility/ FAQ

Help/FAQ link has been provided by answering some important questions and instructions about how to submit electronic thesis and dissertations and students also can take help of staff either in-person/telephone/email. Excellent help support facility is provided to all students. ETD site can be accessed at below given address <http://etd.library.iitb.ac.in> (Intranet only)

5. SUSTAINABILITY OF ETD DIGITAL LIBRARY:

IIT Bombay ETD Digital Library has completed 17 (1999-2015) years of service. The ETD Digital Library has proved economically and technically sustainable system as there was no special budget was required separately to maintain it so, it's economically viable and PDF digital content format used to be the best preservation format for long term sustainable. The institute has considered the ETD as a part of institute's regular activity and made the policy to accept only electronic copy of the dissertation in the year 2012 whereas for research degree

thesis (Doctor of Philosophy) it has continued to accept both the formats print as well as electronic copy.

6. ADVANTAGES OF ETD

The ETD offers following benefits such as centralized database of theses and dissertation to access it, preventing plagiarism by using plagiarism detection tool and helps to avoid duplication of research, improving the visibility of research and provide costs savings for both students and institutions. It has increased quality of research and reputation of the institute. It requires no physical library space.

7. CONCLUSION

IIT Bombay's better IT infrastructure and policy have led to the successful development and implementation of economic and technically sustainable system of ETD. The institute has made the policy to accept only electronic copy of the dissertation in the year 2012 this indicates that maturity of ETD Digital Library and well received the ETD DL as a regular activity of the IIT Bombay academic system. IIT Bombay has been a strong supporter of open access and adoption of open source software. It has been used Turnitin plagiarism prevention tool to check the thesis and dissertations before submission into ETD DL. We need to keep on updating ETD DL as technology changes and find innovative way to sustain for the long term. We have been working towards to enhance ETD more user-friendly to submit and discovery ETD collections for users to enrich their scientific knowledge.

REFERENCE:

- Fletcher, Kathryn; Advice from the Front Line: Providing Computer Support for ETD Preparation; ETD 2000 Symposium Paper
<https://eidr.wvu.edu/esra/documentdata.eSRA?documentid=4094>
- Greg Hanek, Anita Schwartz , Kathy Fletcher. IT in the ETD puzzle: making the pieces fit Proceedings of the 34th Annual ACM SIGUCCS Conference on User Services 2006, Edmonton, Alberta, Canada, November 5-8, 2006 pp.135-140 2006
- Hagen,John.WVU Electronic Institutional Document Repository; ETD 2005 Symposium Poster Session
<http://adt.caul.edu.au/etd2005/papers/078Hagen.ppt>
- Jadhav, M.N. and Bamane, N.J. "Enhancing digital repository of scholarly publications at Indian Institute of Technology (IITB), Bombay India", 9th International Symposium on Electronic Theses and Dissertations, Quebec, 7-10 June 2006
- Lang, Gerald; Straight Talk: Provosts' and Deans' Views on ETDs; ETD 2000 Symposium Plenary Panel
http://www.wvu.edu/~thesis/Presentations/Straight_Talk.pdf



Application of Digital Preservation Techniques in Libraries: Need of the Hour

Swapna Bhide

swapna.bhide@yahoo.co.in

Al Diyafah High School, Dubai (UAE)

ABSTRACT

Digital Library and Digitization is playing important role in Libraries. Digital Preservation has become the vital issue today to preserve born digital and digitized documents. It aims to keep digital objects accessible, over a long period of time, ensuring the authenticity and integrity of these digital objects. This chapter overall discusses various aspects of Digital Preservation like Strategies, Techniques, Objectives, Issues etc. Digitizing documents or other material is the latest need around the world. Digital Libraries should help people to transform information to knowledge by effective digital information.

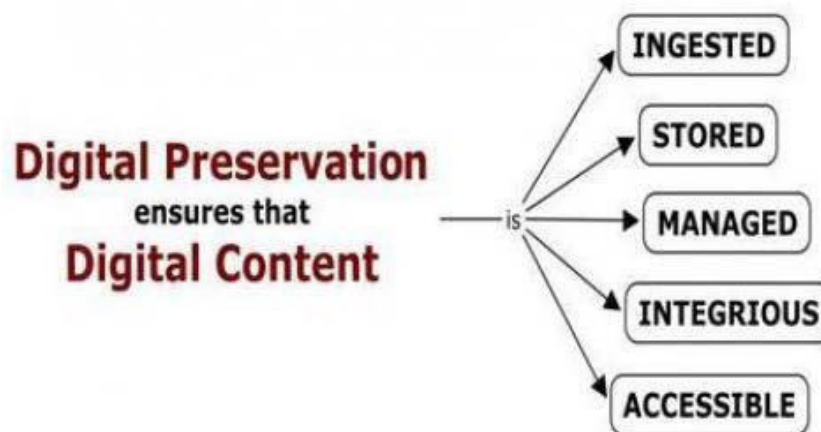
Keywords: - Digital Library, Digitization, Digital Preservation, Information & Communication Technology, Libraries, Preservation Strategies

1. INTRODUCTION:-

In Library and Archival Science, Digital Preservation is a formal endeavor to ensure that digital information of continuing values remains accessible and usable. It involves planning, resource allocation, and application of preservation methods and technologies, and it combines policies, strategies and actions to ensure access to reformatted and born digital content, regardless of the challenges of media failure and technological change. The goal of digital preservation is the accurate rendering of authenticated content over time. Digital technologies enable information to be created, manipulated, disseminated, located, and stored with increasing ease. Due to the low cost, minimum space and little effort, there has been a fundamental change in the way we perceive information storage. Initially, digital preservation was generally treated as a technology problem. Previously focus was only on CD's, DVD's and the overall focus of preservation was on ICT issue and thus its solution fell on ICT staff. But now the situation has been changed and it proved that technology is only one facet, and there are other factors which are responsible too.

2. DEFINITION:-

According to the Harrods's Librarian Glossary, "Digital preservation is the method of keeping digital material alive so that they remain usable as technological advances render original hardware and software specification obsolete".



3. DIGITAL PRESERVATION FUNDAMENTALS:-

3.1. Appraisal or Selection:-

It refers to the process of identifying records and other materials to be preserved by determining permanent value.

3.2. Identification:-

In digital preservation, discovery and identification of objects is aided by the use of assigned identifiers and accurate descriptive metadata. An Identifier is a unique label that is used to reference an object or record, usually manifested as a number or string of numbers and letters.

3.3. Integrity:-

Data Integrity provides the cornerstone of digital preservation, representing the intent to “ensure data is recorded exactly as intended [...] and upon later retrieval, ensure the data is the same as it was when it was originally recorded.”

3.4. Fixity:-

File fixity is the property of a digital file being fixed, or unchanged. File fixity checking is the process of validating that a file has not changed or been altered from a previous state, this effort is often enabled by the creation, validation, and management of checksums.

3.5. Characterization:-

Characterization of digital materials is the identification and description of what a file is and of its defining technical characteristics, often captured by technical metadata, which records its technical attributes like creation or production environment.

3.6. Sustainability:-

Digital sustainability encompasses a range of issues and concerns that contribute to the longevity of digital information. Unlike traditional, temporary strategies, and more permanent solutions, digital sustainability implies a more active and continuous process. Digital sustainability concentrates less on the solution and technology and more on building an infrastructure and approach that is flexible with an emphasis on interoperability, continued maintenance and continuous development. Digital sustainability incorporates activities in the present that will facilitate access and availability in the future.

3.7. Renderability:-

Renderability refers to the continued ability to use and access a digital object while maintaining its inherent significant properties.

3.8. Physical Media Obsolescence:-

Physical media obsolescence can occur when access to digital content requires external dependencies that are no longer manufactured, maintained, or supported. External dependencies can refer to hardware, software, or physical carriers.

3.9. File Format Obsolescence:-

File format obsolescence can occur when adoption of new encoding formats supersedes use of existing formats, or when associated presentation tools are no longer readily available.

Factors that should enter consideration when selecting sustainable file formats include disclosure, adoption, transparency, self-documentation, external dependencies, impact of patents, and technical protection mechanisms.

3.10. Significant Properties:-

Significant properties refer to the "essential attributes of a digital object which affect its appearance, behavior, quality and usability" and which "must be preserved over time for the digital object to remain accessible and meaningful".

3.11. Authenticity:-

Whether analog or digital, archives strive to maintain records as trustworthy representations of what was originally received. Authenticity has been defined as “. . . the trustworthiness of a record as a record; i.e., the quality of a record that is what it purports to be and that is free from tampering or corruption”.

3.12. Access:-

Digital preservation efforts are largely to enable decision-making in the future. Should an archive or library choose a particular strategy to enact, the content and associated metadata must persist to allow for actions to be taken or not taken at the discretion of the controlling party.

3.13. Preservation Metadata:-

Preservation metadata is a key component of digital preservation, and includes information that documents the preservation process. It supports collection management practices and allows organizations or individuals to understand the chain of custody. Preservation Metadata: Implementation Strategies (PREMIS), an international working group, sought to “define implementable, core preservation metadata, with guidelines/recommendations” to support digital preservation efforts by clarifying what the metadata is and its usage.

4. THE FACTORS OF PRESERVATION:-

Juan Voutssas divided complex issues which are involved in digital preservation into six groups-

4.1. Technological Factors:-

These factors are related to rapid and unstoppable changing in technology. The challenge is not only to maintain the information bit chains, but to do so in such a way that they are readable and useful in the future. Technological factors are mainly related to obsolescence of computers, storage devices and media; changes in version of operating systems, formats, programs, interfaces, reading and reproducing devices; emerging new standards and methodologies to carry out the task. Information security is also a big issue and it has to do with the relationship among threats, risks, vulnerabilities, impacts, and control measures of digital objects assets. The challenge is how to keep those innumerable records from destruction or tampering due to accidents, negligence or hacking.

4.2. Methodological Factors:-

These factors are associated with the tools and standards used for appraisal among the different materials, proper selection and disposal, logical storing and future retrieval of documents. It is already known that just descriptive metadata like, author, title, keywords is currently not enough for proper future retrieval. We are moving towards the “Semantic Web” and from there to semantic libraries and archives. This system will require digital document has not just a simple set of metadata attached. It has too a semantically rich set of metadata. These new metadata allow to link and contextualize the document in relation with other documents enhancing its reuse, search, linking, weighting, integration, data mining and interoperability with other programs who could use them. In brief, they add ‘meaning’ or ‘context’ to the document in its relation to other digital documents and the user needs.

4.3. Cultural Factors:-

These factors are related to the lack of awareness about the historical value and significance of their digital documentary heritage by large group of society, including planners and decision makers. Although we currently consider that we live in the information age, there exists a deep cultural problem regarding preservation of digital information. We produce a large number of digital information but there is not enough awareness of preserving it. This cultural factor is the main issue within developing countries like India, where the number of organizations that do not preserve digital materials properly or do not preserve them at all.

4.4. Legal Factors:-

Information preservation has to do with achieving the appropriate and delicate balance between protecting copyrights and confidentiality while defending rights to information access. This is very challenging issue now days to keep information available without violation of intellectual rights. Another important legal issue is the right to privacy. This right in this legal context is concerned with identifiable data relating to a person that is collected and stored in digital forms.

4.5. Economic Factors:-

These include the cost of digitizing and preserving a document collection. The costs of preserving can be calculated as cost of digitizing (cost of scanning and/or producing a digital original); cost of editing (to prepare, assemble, alter, adapt and refine); cost of standard (to add the set of metadata pertinent to the digital object); cost of storing (cost to maintain in storage devices whether online or offline) and cost of updating (cost to copy, update, refresh, convert, and reshape digital documents to fulfill new requirements). A non-direct cost is training cost of staff to train them about these works. Additionally, preservation is an on-going

process, there are some recurring costs which must be calculate before preservation project to deal with long term economic issues.

4.6. Social Factors:-

These are some issues which are related to the sociological behavior of community. We must assure access and usability of documents after preserving them. It is important that future generations have effective and granted access to the information that we are preserving. There is no use in preserving if no one or just a few will have access to those documents. We are already dealing with “digital gap” or “digital divide” and it is very important that issues related to preservation and long term access do not increase this divide.

5. DIGITAL PRESERVATION PLANNING STRATEGY:-

Digital Preservation requires a long term planning, we must consider following points before planning a preservation policy.

5.1. Selection:-

Selection of documents is the main issue related to preservation. We should identify a document by its documentary, academic, historical value and other issues such as use, condition, property, convenience, non-duplication, among others.

5.2. Quality:-

Quality of document is another issue related to long term preservation. It deal with the quality of documents, media, which is in direct proportion with the degree that the digital document emulates an “original” and endows it with “usability”.

5.3. Permanence:-

This is related to the concept of the future existence of the digital document. We must assure about making the document available for the “long-term”.

5.4. Accessibility:-

Accessibility is now a day big issue related to long term preservation. We must make a strategy to make sure the accessibility our digital document in the future. We must assure that the digital document, while existing in the future, will still be accessible, i.e. it can be interpreted, read, executed and displayed again.

5.5. Availability:-

Availability deal with the policy related to user community of digital document. Availability determines who, how, where and when will be able to access the document; because of this, availability is also related with confidentiality and privacy.

5.6. Functionality:-

Functionality deal with the intrinsic characteristics of a document, which will help the ICT interfaces to search, find, and link a document. It is related to the creation of metadata of the document and also with its semantic issues like, interoperability factors, construction standards, context completeness, metadata relationships, and other factors.

7. Trustworthiness:-

Trustworthiness can be defined as the accuracy, reliability and authenticity of a digital document.. When a document has trustworthiness, it will have acceptability; i.e. it will be accepted for those who examine the record assuming it is trustworthy and thus it will be useful for the purposes that the record was created and also as a source of reliable information.

6. DIGITAL PRESERVATION TECHNIQUES:-

There is no one single technique is followed by institutions to preserve their documents. The choice of technique is depend upon the nature of the material to be preserved, the purpose of preservation and the organizational policy. The major preservation techniques are as follows:-

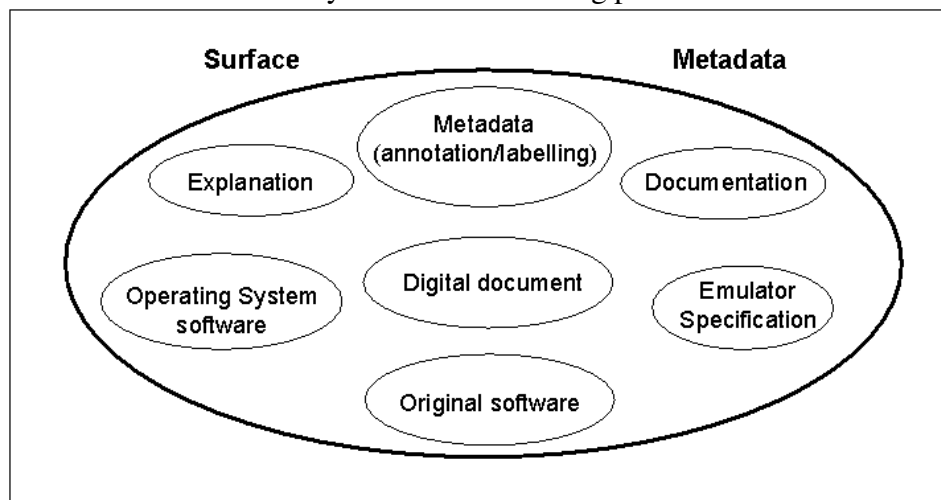
6.1. Migration:-

Migration is the transfer of digital materials from one hardware or software type to another or from one generation of computer to another. Migration can also be the transfer to non-

digital media such as paper to digital form, or the transfer to a more advanced storage medium; for example floppy disc to CD-ROM. Migration is a costly and time consuming process. Its use has also not been fully tested on complex file formats. The Process of migration can also include refreshing. Refreshing is copying digital information from one long term storage media to another without changing the object or the bit stream. Refreshing ensures that the information is stored on a newer media before the old media becomes obsolete.

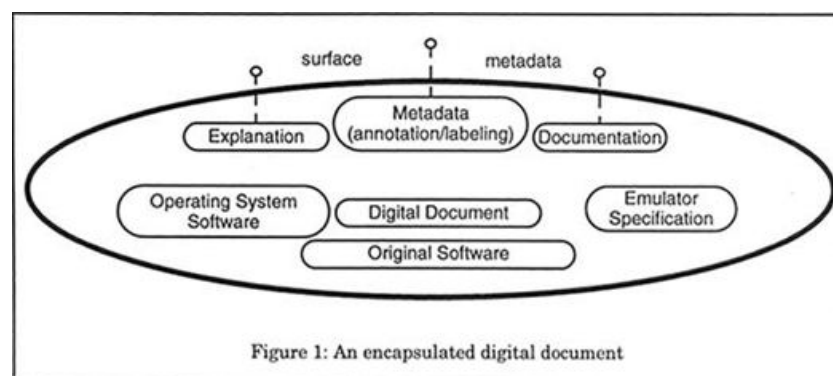
6.2. Emulation:-

Emulation is duplicating the functions of one system using a different system so that the second system behaves and appears to be the first system and the original digital material is thought to still be available in its original form. Emulation is a way to combat technological obsolescence as it provides a way of preserving the functionality of access to digital information which may be lost with the software or hardware when it becomes outdated. Emulation involves the creation of emulators, which are programs that translate code and instructions from one computing environment to be correctly executed in the other. This strategy of emulation can be a costly and time consuming process.



6.3. Encapsulation:-

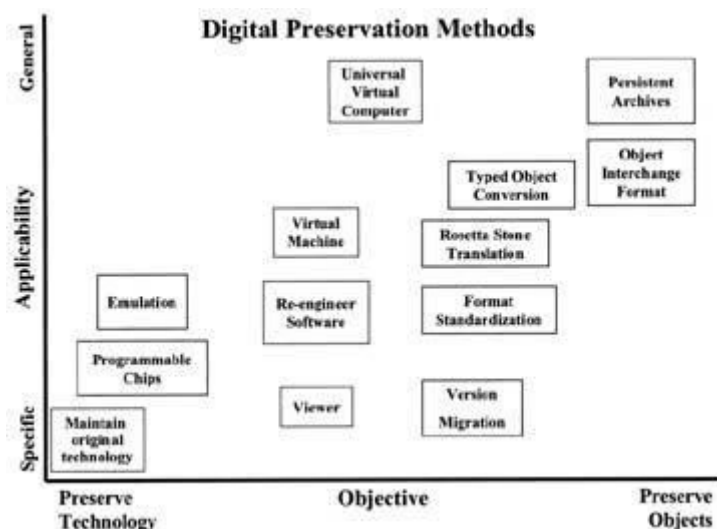
Encapsulation is the grouping together of digital objects and metadata needed to provide access to the object. It lessens the chances that components needed to decode the object will be lost. It is seen as a solution to technological obsolescence for file formats because all the information to interpret the 'bits' is available.



6.4. Universal Virtual Computer:-

Universal Virtual computer is a computer that creates a layer between the underlying computer platform and the underlying software. It is a form of emulation and all files are

backed up in a way that they can be accessed by the universal computer. To read the data in the future would only require a single layer between the UVC and the computer at the time.



6.5. Normalization:-

Normalization involves the migration of digital records to standard formats. Normalization is the most frequently used preservation strategy. What occurs is the data file format is detected and converted to an open format for preservation. Using this technique the records authenticity may be lost if during the conversion essential metadata is affected. It converts the record to an open standards based format that allows it to be documented and accessible. During the normalization process some information may be lost, thus the new version is not considered an original copy.

6.6. Bit Stream Preservation:-

Bit stream preservation is to be used as a foundation for other preservation strategies, it is no stand alone. Bit Stream preservation is storing the binary code of the digital object. The object will not be viewable without the original creation hardware and software, thus it needs to be used in conjunction with other preservation strategies to ensure accessibility.

6.7. Durable or Persistent Media:-

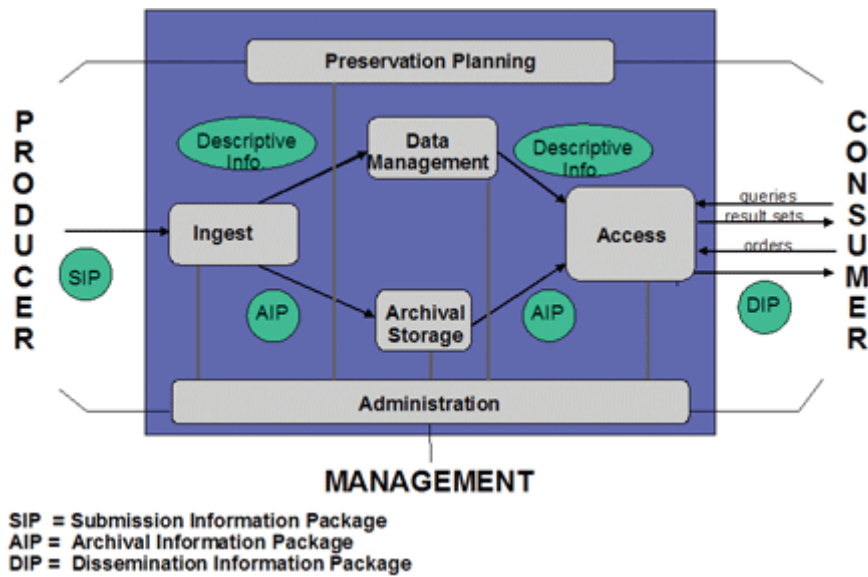
Durable or persistent media is the use of media that is designed to be superior. This technique reduced the need for regular refreshing and minimizes loss from media deterioration. This technique does not combat media obsolescence or physical loss; it largely means that the short term preservation or storage techniques will last minimally longer. Many libraries hope to postpone have to complete migration or emulation by using formats thought to have a longer shelf life.

6.8. Technology Preservation:-

This involves preserving working replicas of key computer hardware with the programs that run it and on it. This is not a viable preservation option in the long run due to the costs associated with maintaining the ageing computers and the staff and training required to maintain and run the technology.

6.9. Open Archival Information System (OAIS):-

Open Archival Information System (OAIS) is the only official standard in digital preservation. A reference model is available that provides a model and framework for building and maintaining repositories for long term preservation and access to Digital material.



7. DIGITAL PRESERVATION SOFTWARE PLATFORM:-

The Digital Preservation Software Platform (DPSP) is free and open source software developed by the National Archives of Australia. The DPSP is a collection of software applications which support the goal of digital preservation. Which comprises of:-

- Xena.
- Digital Preservation Recorder.
- Checksum Checker.
- Manifest Maker.
- Preservica.
- Archivematica.

1 Create manifest with Manifest Maker



2 Process files and manifest in DPR. This transfers the files to the Digital Archive. During processing, DPR calls Xena to convert digital files to preservation formats.



3 Check integrity of files on the Digital Archive with Checksum Checker.



8. THE DIGITAL PRESERVATION NETWORK:-

The Digital Preservation Network (DPN) was formed to ensure that the complete scholarly record is preserved for future generations. DPN uses a federated approach to preservation. The higher education community has created many digital repositories to provide long-term preservation and access. By replicating multiple dark copies of these collections in diverse nodes, DPN protects against the risk of catastrophic loss due to technology, organizational or natural disasters.

9. ADVANTAGES OF DIGITAL PRESERVATION:-

- Low cost.
- High quality and accuracy of the library documents.
- Privacy of the library documents.
- Free sample for each and every digitized documents of library.
- Perpetual preservation of historical documents.
- De - duplication of data or document of library.
- Time saving for the users.
- Back up data for the library available.
- Effective resource sharing with other institutions.

10. CONCLUSION:-

Digital Preservation raises challenges of a fundamentally different nature, which are added to the problem of preserving traditional format materials. The digitization is the milestone and new opening in the history of any institution. To keep digital collection live for long time, it requires a proper plan and policy threats and inactive in the form of transforming technology. Considering both simultaneously, possibility of success in digital preservation remains favourable. Digital preservation has to face lot of new challenges in future. Digital preservation is a cost-intensive activity of continuing nature. Library, archives or museum cannot make a decision to adopt digitization with long term preservation and storage of research collections without deep and continuing commitment to preservation by parent institutions. Lastly, digitization will save the time: for the information user and also save the space of the institutions.

REFERENCES:-

1. Granger, Stewart (2000) Emulation as a Digital Preservation Strategy, D-Lib Magazine, 6(10), <http://www.dlib.org/dlib/october00/granger/10granger.html> (access on 27.10.15)
2. Kyong-Ho Lee... et al (2002) The State of the Art and Practice in Digital Preservation, Journal of Research of The National Institute of Standards and Technology, 107(1), p. 93-106
3. Rosenthal, David S. H... et al (2005) Requirements for Digital Preservation Systems: A Bottom- up Approach, D-Lib Magazine, 11(11)
<http://www.dlib.org/dlib/november05/rosenthal/11rosenthal.html> (access on 29.10.15)
4. Katre, Dinesh (2012) Need of Legislation and Digital Preservation Policy Framework in Indian Context, DESIDOC Journal of Library and Information Technology, 32(4), p. 321-326
5. Gaur, Ramesh C and Tripathi, Manorama (2012) Digital Preservation of Electronic Resources, DESIDOC Journal of Library and Information Technology, 32(4), p. 293-301
6. Senthil Kumar, K. R (2012) Challenges to Preservation and Building Digital Libraries in India, International Journal of Advanced Research in Computer Science and Software Engineering, 2(9), p.172-179
7. Kumar, K. (2014) Analytical Survey on Digital Preservation and Techniques among Engineering Education Institutional Libraries in Rayalaseema Region of Andhra Pradesh, Library Philosophy and Practice (e-journal), p. 1-19

<http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=2520&context=libphilprac>(access on 27.10.15)

8.[Dr. Ahmad, Hilal \(2014\) Library Automation in India: A Survey of Information Retrieval System of Central Libraries of IIT Delhi, IIT Kanpur And Kashmir University, International Journal of Digital Library Services, 4\(4\), p. 78-89](#)

9.[Ansari, Mohd Shoaib, Long Term Digital Preservation: Indian Scenario, https://www.academia.edu/9860706/Long-term Digital Preservation Indian Scenario](#)(access on 27.10.15)

10.[The Digital Preservation Network- available at http://www.dpn.org/](#)access on 29.10.15

11.[Digital Preservation Software Platform- available at http://dpsp.sourceforge.net/](#) access on 29.10.15

Digital Preservation and Procedures: A Case Study on Digital Preservation at the National Library of India

Jayabrata Hazra

Joyhazra82@gmail.com

The National Library of India, Kolkata.

ABSTRACT

Preservation is the oldest and most fundamental function of the National Library of India. This library is changing towards digital environment with help of information technology. Preservation, access and management of digital resource have been a great challenge for library and information professionals. Digital preservation is a complex process which involves a number of technological issues. The present paper discusses different type of library material digitally preserve at the National library of India.

Keywords: Digital resources, Digital preservation, Digital conservation at the National Library, Digital resources at the National Library of India, Digital preservation at the National Library of India.

1. INTRODUCTION:

Development in information and communication technologies has brought about new methods of producing and disseminating information in a new media i.e. digital media. Information is now produced, processed and stored in digital form and distributed over electronic networks, such as internet and CD-ROM.

In many scientific fields, research depends on access to persistent stores of digital information that are built and refined continuously. Consistent with the cumulative nature of scholarly research, journals that report research findings and that make references to previous studies constitute a continuous record of research and discovery.

Moreover, libraries, archives, and other organizations have made considerable investments in acquiring digital content and in converting older print-only materials into digital form to improve access to disparate sources that were difficult to locate and retrieve.

The rapid acceptance of digital technologies and the growth of digital libraries created three primary motivations for investments in digital preservation research and program development. First, there is an increasing demand for continuing access to the resources that digital libraries make available. Once users become accustomed to accessing information on-line they do not want those resources to be removed or diminished. Second, there is an interest on the part of digital library developers to protect the investments made in digital resources, whether those investments are subscription fees paid to publishers for on-line content, the costs of initial data collection and preparation, or the costs of converting print and other analog materials into digital form. Third, there is a concern about preserving digital communications for the future study of our present time and culture. This includes the content of digital documents that might be considered ephemeral as well as evidence of the impact of digital communications on many aspects of society.

Despite evidence of increasing concern about digital preservation, there are numerous technical, organizational, legal and economic barriers to a comprehensive infrastructure for protecting and preserving digital assets. The most familiar problems in digital preservation are media failure or deterioration and rapid changes in computer hardware and software that make older systems obsolete on a regular basis. Efforts to preserve digital information have always been challenged by the relative instability and short life of most digital storage media. Media failures and undetected deterioration of storage media remain a problem for digital preservation, but the issue of media longevity has moved into the background. There have been significant improvements in the quality and longevity of almost all digital storage media. Although there is no "permanent" digital storage medium that meets standards of longevity and durability established for "permanent paper" or microfilm, improvements in magnetic and optical media reduce the frequency at which digital materials must be copied to new media in order to prevent deterioration or loss. In some cases, transferring older digital information to new media brings additional advantages, such as increased media capacity and faster access which offset the costs of copying. Established repositories and most digital library designers accept the need for systematic maintenance of digital materials and periodic replacement or "refreshing" of the underlying storage media.

2. PURPOSE :

This statement outlines the National Library policy on preserving its digital collections and collaborating with others to preserve digital information resources. The Library digital preservation program forms part of its overarching Preservation Program which covers all formats of material the Library collects. This policy should be read in conjunction with the Library general Preservation Policy and other policy documents and guidelines relevant to the way digital resources are created, selected, acquired, described and accessed. Of particular relevance are the Library Collection Development Policy, Collection Digitization Policy and Collection Preservation Intent Statements.

3. DIGITAL PRESERVATION:

Digital preservation concerns two type of documents namely born digital document and digitally created document.

Born digital document : These refer to those materials that were initially created using some form of digital technology. They are often termed as "electronic records"

Digitally created document : These refer to those materials, which have been transformed from analog to digital form through some reproductive means such a re-keying the information or scanning the document or objet etc.

4. DIFFERENT TYPES OF MATERIALS PRESERVED IN DIGITAL FORM IN THE LIBRARY:

- i. Printed material in library should be preserved in digital form. But, printed material have to choose which books, article, photographs, and other materials are to be converted from paper or film to digital form.
- ii. Tapes, hard drive, floppy discs, CD, Pen drive have very short life span when it considered in terms of obsolescence, the data on them should be preserved.

- iii. E-journals have been at the forefront of preservation discussion because of their critical role in scientific communication.
- iv. Scientific and statistical data is great important for the research purpose, should be preserved in digital form.
- v. Government produced scientific and technical information.
- vi. Significant Scientific information is first published at conference, meetings, lectures, colloquia etc.
- vii. Technical report and grey literature are the key mechanism for dissemination of research and development results especially in industry and Government.

5. STATISTICS OF DIGITALLY PRESERVED DOCUMENTS IN THE LIBRARY:

Work on the third phase of digitization in the library started on 31 January 2012. Till date about 3,50,000 pages have been digitized. Output is obtained in TIFF, JPEG and PDF format. Customization of the open source software (D-Space) has been done successfully. 650 books have been uploaded in the web server of the library and another 350 books are waiting to be uploaded. Soon these digitized books will be accessible to readers on campus. At present the Bengali books published since 1840 are being digitized. Digitization of the Jadunath Sarkar paper is in progress by in-house staff in the Reprography Division. 4,53,503 pages (1653 Bengali books published up to 1900) have been digitized and uploaded in the local server for readers' use.

Microfilming of old newspapers brought over from the Esplanase Reading Room has started. DPS Micrographics has Microfilmed almost 60 rolls consisting approximately 36,600 pages of old heritage newspapers. The National Library has initiated necessary steps such as methylene blue tests to check the quality of these films in conformity with archival standards.

6. CHALLENGES TO THE PRESERVATION OF DIGITAL RECORDS:

- i. The preservation of digital records represents a significant challenge for both government agencies and archival institutions. Factors affecting the level of risk include:
- ii. The carriers used to store digital records are usually unstable and deteriorate within a few years or decades at most.
- iii. The use of digital records requires specific combinations of hardware and software that typically become obsolete after a few years, rendering the digital records inaccessible.
- iv. File formats change over time, which can mean that the digital records are inaccessible using current software.
- v. File formats are sometimes unable to be determined, especially for older software.
- vi. Digital records may be lost in the event of disasters such as fire, flood, equipment failure, or virus or direct attack that disables stored data and operating systems.
- vii. Access barriers such as password protection, encryption and security devices may prevent ongoing access beyond the circumstances for which they were designed.
- viii. The digital records may be well protected, but so poorly identified and described that potential users cannot find them.
- ix. So much contextual information may be lost that the records themselves are unintelligible or not trusted.
- x. The inherent instability and vulnerability of digital records affects the ways in which the Archives secures, manages and preserves digital records.

7. BENEFIT OF DIGITAL PRESERVATION:

- i. Increased accessibility :Works can be accessed by multiple users at one time independent of their location.
- ii. Increased functionalities : Digital material can be converted to searchable text files to enable searching and analysis of content within and across works, independent of location.
- iii. Output of capability to other media : Generate digital copies, photo copies, microfilm without loss of quality.
- iv. Systematic and purposeful collaboration : Digital material can be accessed by the multiple institutions and integrate into their own virtual collection.

8. CONCLUSION:

Digital preservation is an important issue when it comes to preserving historic and current document, manuscripts etc. Libraries cannot keep away from technological progress. Technology has to be harnessed for better servicing by the libraries. Libraries have played a critical role in the creation and transmission of scientific knowledge and culture. As they undergo a metamorphosis from the physical to the virtual, they continue to serve this role, although their nature and reach may be very different in the future. There is a rising buzz within the information management communities about challenges posed by the preservation of digital objects. In this article we consider the digital preservation challenge, the concepts of archival science that might add value to the design and delivery of digital libraries, and a research agenda for digital preservation which aligns digital preservation with more traditional approaches. Digital materials bound to varying degrees to the specific application packages (or hardware) that were used to create or manage them. They are generally poorly described or annotated; they often have insufficient metadata attached to them to avoid their gradual susceptibility to syntactical and semantic glaucoma. Where they do have sufficient ancillary data, these data are frequently time constrained. Beyond maintaining the intactness of the bit stream (which is fairly straightforward), the long-term duration and preservation of digital materials is for the most part (even in 2012) a labor-intensive artisan or craft activity.

REFERENCES:

1. Preservation of library, archival and Digital Document by Ramaiah, L.S. and Sujatha, G. New Delhi: EssEss publication.2008.
2. The News Letter, January – June 2014, The National Library of India, Government of a. India.
3. Association of Research Libraries. (2000) ARL Supplementary Statistics, 1998-1999. Compiled and edited by Martha Kyrillidou.
4. Bearman, D. (April 1999) Reality and Chimeras in the Preservation of Electronic Records, D-Lib Magazine,
5. Bennett, J. (1997) A Framework Of Data Types And Formats, And Issues Affecting The Long Term Preservation Of Digital Material, British Library Research and Innovation Centre.
6. Cedars Project. (2000) Metadata For Digital Preservation The Cedars Project Outline Specification Draft For Public Consultation

Design and Development of an Institutional Repository for an Architectural School: A case study of KRVIA library

Manju Kalita

manjukalita@gmail.com

Kamla Raheja Vidyavidyalaya Institute for Architecture and Environmental Studies, Mumbai

ABSTRACT

Architectural libraries are different than other academic libraries in terms of collections. The library has no text books for the course. Apart from referring to reference books, research scholars and students also require in-house research output, which include studio work reports, research cell reports, study trips reports, exchange program reports etc. The library needs a system to organize those reports as well as suitable software to give instant access to those in-house research output. The KRVIA library tried to start an institutional repository through DSpace to archive and give access to in-house grey literature. The article is about how the KRVIA library took initiative to process for the institutional repository.

Keywords: Institutional Repository, DSpace, Digital Library.

1. INTRODUCTION:

This study is aimed to explore the steps and procedure to establish an Institutional repository in an architectural college library. The focus is on content collection, creating communities (contents) in the software and archiving process. First, I would like to give an overview of architecture education and architectural library and why institutional repository is important in an architectural library.

As an art, architecture conceives a design according to the functional need of a building, garden, bridge or road etc. Architects build better buildings, communities and environment through design. Architecture is both the process and product of planning,

Architects need to coordinate with other experts like landscape architects, civil engineers, contractors, plumbing consultants, lighting consultants, air-condition consultants etc. who are involved in the construction of a building.

In India, though architectural design/structure can be traced back to the time of Indus valley Civilization i.e. 3300 BC but formal architectural education was initiated after British came to India (16th century). British ruled India for three hundred years and during their ruling period, they developed many buildings and infrastructure in India.

2. INTRODUCTION TO ARCHITECTURAL LIBRARY:

Architectural libraries not only collect architectural books but they also collect books from various fields like humanities, social sciences and other fields which are necessary for architectural education. Architecture teaching always takes help of all reference books which contain historical and modern theory and professional works related to the architectural discipline. The architecture students require knowledge about society in order to design for them. For that they need to engage with those subjects which give understanding about the history of human life and the development of the society, environment etc. in their entire academic and practice life. For example, architectural libraries collect resources on modern architecture and contemporary architectural design, architectural theory, arts, graphics, architectural data, constructions, services, history, interiors, landscapes, urban design, town planning, housing, technology, environment, humanities, geography, biography, law (as it

relates to real estate), religion, cinema, literature, sociology, photography and philosophy etc. Besides these, it also includes samples of various materials and small scale models of sanitary fittings and fixtures in the material library section.

Architecture libraries have some peculiar features which make them different than other academic libraries. Some important features of architectural libraries are architecture discipline has no particular text books for their curriculum which makes it different from other academic libraries. Architecture libraries need to collect reading materials on multi-disciplinary subjects which are related to architecture discipline. Sometime architectural library users need to refer to maps of local and national areas, topological maps (diagrammatical maps), development plans, and gazetteers etc. which are related to government sectors. These types of libraries also offer movies/cinemas which give better understanding about the culture of a nation.

It also offers in-house digital and print documents which contain institutional lecture series, workshops, exhibitions on the architecture discipline, the documentation of architectural works by students and faculty etc. Architecture students are encouraged to refer to other works to get a better understanding about the subject. These kinds of grey literature do not last forever if it is not documented in good manner. With the passage of time, the condition of those reports becomes old and useless, until and unless we preserve them in a proper format, there is chance to lose those data. Fortunately, information technology has brought the facility to preserve and give better access to these kinds of important resources.

Architectural libraries are regularly used by students and faculty. Professionals and faculty members are always looking for recent development in their area. Hence, it is necessary to manage architectural library collection in a modern and scientific way to give faster and accurate access.

Institutional repository can be a great source for architectural students to get clear understanding about the subject. With the changing environment of teaching in architecture education since its inception, things have been changed drastically. It became necessary to provide access to all institutional work for the students' reference.

Therefore, there is a need to have Institutional Repository to manage in-house library collections for better access.

3. THE KRVIA LIBRARY

The Kamla Raheja Vidynidhi Institute for Architecture (KRVIA) library has very good collections of architectural resources. It comprises of books, thesis & dissertations, reports, periodicals, bound volumes, maps, drawings, posters of various programmers, question papers (KRVIA as well as University), newspapers, syllabus, brochures & prospectus of various architectural institutes and universities and building accessories in the material library.

The library operation was computerized in the year of 2006 with window version software 'Libsuite'. In the year of 2010 the library software was upgraded to web version with the proprietary software 'LibexNet'. However, the library has undertaken a project to have an Institutional Repository by using 'DSpace' software to explore the organizational works.

The library also have institutional works which contain reports of studio projects, workshops, exhibitions, lecture series, study trips and exchange programs etc. which are very useful and unpublished research output.

The objective of having institutional repository in KRVIA is to giving Green route to institutional research output and grey literature by shelf archiving it. This institutional repository is expected to support students and faculty members by giving additional service.

As 'DSpace' is most popular and economically preferable open source software for institutional repository, the library committee has decided to archive those reports in 'DSpace' software.

The KRVIA library committee and the advisor Dr. Maya Avasia have been working hard for the whole project. The team includes the Librarian, some faculty members (library committee members) from different subject areas and few Bachelor students.

Following are the steps were followed to establish the institutional repository in the KRVIA library:

4. DATA COLLECTION:

The library has started collecting data from studio projects, workshops, exhibitions, lecture series, annual functions, study trips, exchange programs, and reports of KRVIA Design cell. Apart from these the dissertations/ thesis submitted every year by both Bachelor and Master courses form an integral part of the institutional repository. The library has collected almost all the selected works from 2012 to till date and also some old data from many different sources like students, faculty members and old server in the computer laboratory.

5. DATA PROCESS:

Architectural data needs to be framed in a proper sequence to understand the project in its entirety. It is necessary to include the process along with the final design. As the library collects institutional data for archiving, the library has started processing them through library internships. Library conducts two different kinds of internship programs. One is in summer vacation for longer period where student process study trips drawings and compiled with necessary text. Second Internship is in Diwali vacation for short period, where students compile data which are collect from workshops, exhibitions, annual functions, lecture series and studio works etc.

KRVIA students produce rich quality of drawings during their study trips. The library has been scanning these drawings and making it available in soft copy. Students clean or remove unnecessary part and stitch those drawings and add text, photograph etc. and compile a complete report in hard copy as well as soft copy for library archival. Library keeps the hard copy on report shelf and soft copy upload in DSpace software. This work is undertaken during the long term internship program i.e. for full one month vacation work, as the work load is more and time consuming.

In Diwali vacation, students get only one week to work on archiving project, hence this is a short-term internship program. In this internship, students work on studio project, exhibition, workshop report etc., because this kind of data doesn't need a lot of time to be converted to the format required by the library. As Diwali vacation is shorter than summer vacation it suits the time to complete the task.

Steps to process the documents:

- Collect selected works from students or faculty members.
- Scan drawings and make it available in softcopy.
- Compilation of those softcopy to a complete report through library internships.
- Arrange those in a sequence with the help of concerned person (faculty or student).
- Make PDF file for all the text and picture part
- Keep video files as it is.
- Run OCR with help of Adobe Acrobat professional version.
- Assign password in order to protect the PDF file and restrict it from being copied, edited etc.

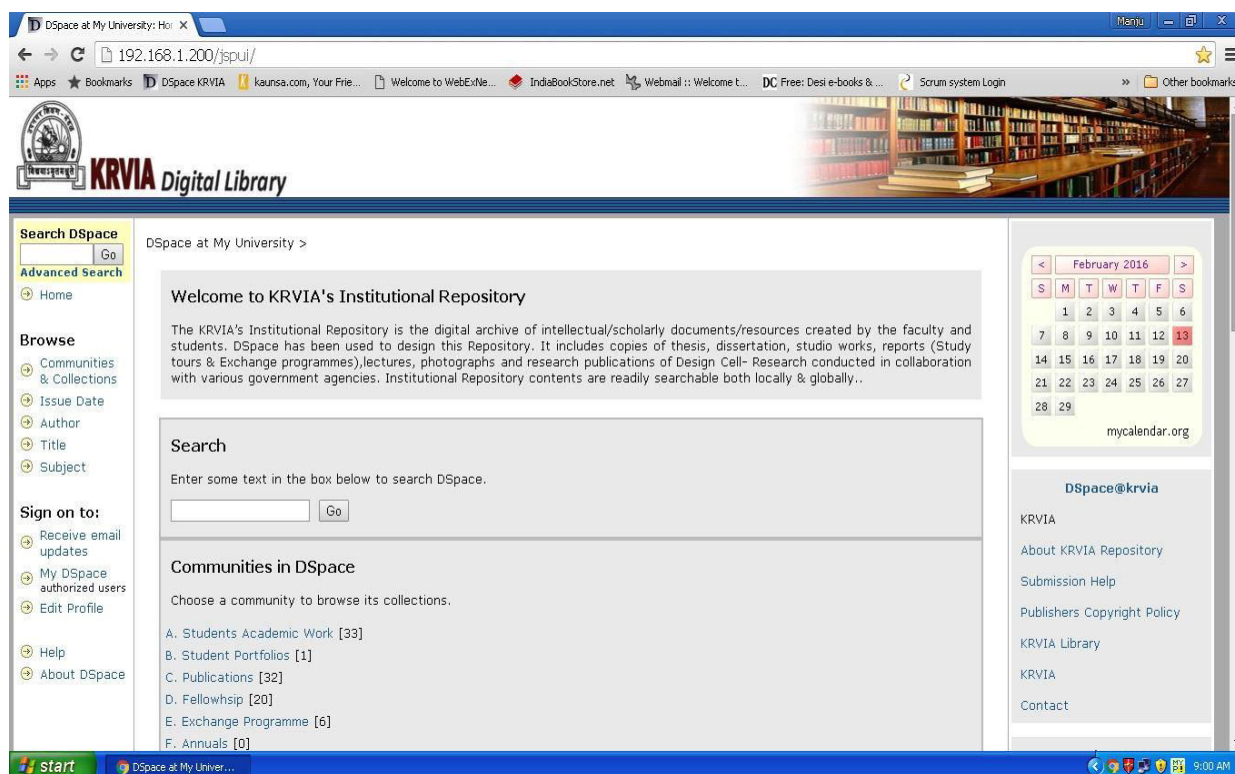
6. CREATE COMMUNITIES (CONTENTS) IN DSPACE:

Library has engaged faculty members and students for several times in blue sky and brainstorming to create the right structure of contents for the institutional repository in DSpace software. The library wanted to have simple and easily understandable structured contents of the Institutional repository. After several attempts the library committee has been successful in mapping the communities (contents) in DSpace according to the institute users' requirement.

All the institutional works were divided in to some major categories. And under those major categories there are sub categories for different activities. Following are the main categories (communities) for all the Institutional grey literature.

7. COMMUNITIES IN DSPACE

- Students' Academic Work
- Student Portfolios
- Publications
- Fellowship
- Exchange Program
- Annuals



Under academic work all academic activities were included which includes both the courses i.e. Bachelor (B.Arch.) and Master (M.Arch.) courses. Under these communities (B.Arch. & M.Arch) again sub communities were made for different subjects which include all the areas covered in their syllabus.

Secondly, in the main community made for 'Student Portfolios', students are asked to make a compilation of their selected works of their entire course. Year wise sub communities were made under this main community.

Third main community was made for institutional publications. KR VIA publishes 'Reflections' on annual basis and 'Newsletter' twice in a year, posters for different occasions etc. Also KR VIA has a research Centre which is known as 'KR VIA Design cell'. The Design cell publishes reports on variety of topics along with preparing urban plans and many of those

are government plans. Out of those 'Design Cell' research some reports are for sale by KRVIA, hence only the contents and abstract are available for those kinds of reports. Here, the research papers published by faculty members are also included.

Fourth community was given to the Fellowship program. KRVIA has been running a fellowship program since 1998, where minimum 1 to maximum 4 researches can take part every year. The completed research becomes part of the KRVIA library.

Fifth Community was made for Exchange program. KRVIA has been conducting exchange program since 1998 for students which is a collaboration program with some foreign country's architectural institute. In this program, some selected students from 3rd year and 4th year of bachelor degree, minimum 2 and maximum 5 students join for each exchange program. From each class two to three groups are selected and send to different countries for the program. Every year minimum 4 reports are generated by the bachelor courses.

Exchange program started for master course in the year of 2009. Whole class joins for the exchange program when program conducted within the country. Since 2010 master also started exchange program with foreign countries' institutes. Every year 2 exchange program are reports generated by the master course? In these program many different reports are created by students and guide faculty members. These reports are uploaded in this community.

Last community was given to annual program as a main community. Under this main community three sub categories (communities) were made for different events which take place in the every annual function in KRVIA. These are:

(a) **KRVIA Lecture Series:** where many prominent architect and faculty give lecture on the subject.

(b) **Exhibition:** Where students show their work done in the previous studio on selected project. These works are documented for archiving.

(c) **Workshop:** Here students do various kinds of workshops under some professional guidance. Viz. Workshop on dance, origami etc.

Following are the hierarchy of the DSpace Communities:

8. Communities and Collections

Shown below is the hierarchy of communities, sub-communities and the collections within them.

A.Students' Academic Work

- **B.Arch.**
 - 1.Design Studios
 - 2.Humanities, History and Theory
 - 3.Technology Studios
 - 4.Visual Studies
 - 5.Study Trips
 - 6.Co-curricular workshops
 - 7. Dissertation : Year wise
- **M.Arch.**
 - 1.Urban Design
 - 2.Urban Conservation
 - 3.Study Trips
 - 4. Dissertation : year wise
- **B. Student Portfolios**
- **C. Publications**
 - Annual Publications/Reflections
 - Design & Research Cell Projects

- Newsletters
- Posters
- Research Papers by Faculty
- **D. Fellowship**
- **E. Exchange Program**
- **F. Annuals**
 - 1. Exhibitions
 - 2. Lecture Series
 - 3. Workshops

9. TEST OF DSCPAE:

After archiving few reports in DSpace software, it was tested by the library. Initially library has given the access to the institutional repository only in the intranet to test.

When searching on the word 'Design' in the DSpace the following result shows:

The screenshot shows the KRVIA Digital Library DSpace interface. The search results for 'Design' are displayed, showing 49 results. The interface includes a search bar, a list of results, and a table of item hits.

Search Results

Search: All of DSpace
for Design Go

Results 1-10 of 49 (Search time: 0.001 seconds).

Results/Page 10 | Sort items by Relevance In order Descending Authors/record All Update

Collection hits:

Collection Name
Design & Research Cell Projects
1.Design Studios
1.Urban Design

Item hits:

Issue Date	Title	Author(s)
4-Feb-2016	Design Portfolio	Sanghavi, Ridhesh
29-Apr-2014	Environment Management Plan for the Geo Thermal Zone of the Tansa River Basin	Design Cell, KRVIA
24-Mar-2014	Shimla: Urban Design and Conservation	M.Arch.Students, Second SEM.2012
5-Apr-2014	Architectural Design Project, 2013	3rd Year Students, 2013

The above screen is showing forty nine (49) reports on the word 'Design'. These 49 reports consist of studio works, dissertations done by bachelor and master students, and KRVIA Design Cell research reports on architectural design.

The advantage of institutional repository is that apart from the library traditional collection, now the library can give additional resources to support the end users.

The KRVIA IR link has been given in the KRVIA website for in-house access.



10. CONCLUSION:

The intension of creating institutional repository is to make a digital library which is different from traditional library. It has the facility of searching and accessibility to large volumes of text, image and audio-visual resources. 'DSpace' is not only having the Boolean search but also have various kinds of search facility, like –Exact term, wild card, fielded search and fuzzy search etc. Apart from these searching facilities DSpace is extremely beneficial for any academic institute due to its facility of plagiarism detection system.

The major advantages of having institutional repository in 'DSapce' are that it does not require money (free of cost) except the initial amount to acquire the infrastructure to install the software. Secondly, it allows assigned members to submit report or collaborate. These members can submit scholarly report and it can be visible to the users after necessary process done by the librarian or the administrator of the repository.

As institutional repository evolves in the KRVIA, the users of the library are facilitated by additional services. It has changed the users' desire in a distinctive way.

The KRVIA institutional repository will impact the teaching and learning process. It will increase research impact and enhance the visibility of the institution through its scholarly output in a single platform. The repository will not only give access to institutions' users but also the outside researchers can access all institutional activities since its inception. Especially, those resources were never published or accessible to all till the repository was initiated.

The repository provides important structured data in real time in a faster accessible mode. The most important thing is that data is being updated time to time with the latest research output. Ultimately, those important data will be preserved forever.

11. BIBLIOGRAPHY:

12. Namavati, Roshan. *"Professional Practice: Estimating & Valuation for Architects, Engineering, Surveyors, Constructors, Builders and Students"*. New Delhi: Lakhani Book Depot, (1984).
13. Deobhakta, Madhav. *"Architectural Practice in India"*. Mumbai: Super Book House, 1997.
14. Tonta, y. "Internet and Electronic Information Management". Paper presented at the RTOIMC lecture series on "electronic information management". Bulgaria, (8- 10 September 2004) and published in RTO-EN_IMC- 002.
15. Breeding, Marshall (2004). "Information Today Inc. *Computers in Libraries*". accessed on July 27, 2015: <http://www.infotoday.com/cilmag/jan04/breeding.shtml>
16. Bodi, Sonia. "The Library of Babel: Making Sense of Collection Management in Post Modern World". *The Journal of Academic librarianship*. Vol.31, issue no.2. (2005): 143-150.
17. Browb, Jeanne M. "Indicators for the evolution of the academic architectural library". *UNLV, Art Documentation*. Vol. 25, No. 2. (2006).
18. Thakur, S. *"Library & Information science"*. New Delhi: Danika Publishing Company, (2007).
19. Ani, Okon E. and Ahiauzu, B. "Towards effective development of electronic Information Resources in Nigerian University Libraries". *Library Management* 29(6/7) (2008): 504-514.
20. Moghaddam, Golnessa Galyani. "To use of scholarly electronic journals at Indian Institute of Science: A case study in India". *Emerald Group Publishing Ltd.*, (2008): 15-29
21. Kelle, Michael M. "Establishing a Digital Library: White paper". Stanford University, 2009. https://lib.stanford.edu/files/establishing_digital_library_MAKFeb2009.pdf
22. K., Suja. "Application of information and communication technology for rural development in kerala". ShodhGanga, 2009.
23. Koganuramath Muttayya M. and Angadi, Mallikarjun. "Digitization in an Academic Library: A Success Story at Tata Institute of Social Sciences". *DESIDOC Journal of Library & Information Technology*, Vol. 30, No. 1, (January 2010): 38-43.
24. <file:///C:/Documents%20and%20Settings/manju.KRV/My%20Documents/Downloads/283-20053-1-PB.pdf>
25. Biswas, Goutam and Paul, Dibyendu. "An evaluative study on the Open Source Digital library softwares for Institutional Repository: special References to Dspace and Greenstone digital Library". *International Journal of Library and Information Science*. Vol. 2, No.1, (2010): 001-010.
26. Laxman, Ambe Vijaya. *"Electronic Resources in Engineering College Libraries affiliated to Pune University in Maharashtra"*. ShodhGangotri, INFLIBNET website (2011): <http://shodh.inflibnet.ac.in:8080/jspui/handle/123456789/1794>
27. Dhandar, Sangita. "Fundamentals of Library Management". Kanpur: Garima Prakashan, 2013.
28. Patel, Pravinkumar Ishwarlal. *"A Study of collection development management and computerization of pharmacy college libraries located in the central and north of Gujarat region"*. Shodhganga, 2013: Chapter I.
29. Rao, Nagavolu Venkata. *"Management of electronic resources in NBA accredited engineering college libraries in Andhra Pradesh (India): a survey"*. Shodhganga, (2013). <http://shodhganga.inflibnet.ac.in/handle/10603/12710>

30. National Information Standards Organization (NISO). "The Three S's of Electronic Resources management: System, Standard and Subscriptions". Retrieved from the NISO website on July 30, 2015.
<<http://www.niso.org/news/events/2011/nisowebinars/erm/>>
31. "The University of Chicago Library". Retrieved from the website on July 30, 2015.
<<http://www.lib.uchicago.edu/e/net/types.html>>
32. "Technique for electronic resources management" (TRMS). Retrieved from the blog on July 29, 2015. <<https://library3.hud.ac.uk/blogs/terms/>>
33. Wikipedia. "*Electronic Resources Management*". Retrieved from Google (July 29, 2015) <https://en.wikipedia.org/wiki/Electronic_resource_management>
34. "ALA TechSource". Retrieved from the website on July 28, 2015.
<www.alatechsource.org>

Institutional Repositories: The Issues and Challenges for Libraries

Linsha M.¹ and M. Bavakutty²

¹linsha1992@gmail.com
Univeristy Calicut, Thalassery Campus

²m.bavakutty@gmail.com
Former Director, DLIS, Kannur University

ABSTRACT

In the new digital scenario, research works and publications are progressively born digital. This compels institutions and organizations to develop a single platform that can better represent and disseminate their institutional outcome available to a wide range of people. Here comes the idea of institutional repositories which presents intellectual output of the organization in a well specified manner. This paper discusses the concept and issues related to institutional repository and the role of librarian in an institutional repository. Paper also focuses on the services that can be offered through institutional repositories and a brief look at the reason behind building up institutional repositories using Dspace open source software is also provided.

Keywords: Institutional Repository, Role of library professionals, Dspace, Issues and Challenges

1. INTRODUCTION

Now most of the academic libraries are building institutional repositories (IR) which collect the intellectual output of the institution. Institutional Repositories contains faculty generated pre-prints and post-prints, technical papers, research reports, conference proceedings, theses and dissertations and other text based scholarly works. (Walters, 2007)¹ Beyond these kinds of items IR can contain multimedia objects, audio/video webcasts etc. Library professionals have to be technically competent in order to manage these new technologies used in the libraries. IRs allows global visibility for an institution's scholarly research and provides open access to institutional research output.

2. INSTITUTIONAL REPOSITORY

In the view of Clifford Lynch, the Executive Director, Coalition for Networked Information in the US, a University based Institutional Repository is a set of services that a University offers to the members of its community for the management and dissemination of digital materials created by the institution and it's community members (Lynch, 2003)². IR is described by SPARC as "Digital collection that captures, preserves the institutional output of a single University or multiple institutions. (Raym, 2002)³. Institutional Repositories are the most recent development in a series of systems intended at managing digital content. IRs can hold library materials and special collection materials. According to Lynch, IR includes "Collaboration among librarians, information technologists, archives and record mangers, faculty and university administrators and policy makers". IR results opportunities and challenges for the library professionals. (Lynch, 2003)⁴

3. CONTENTS OF INSTITUTIONAL REPOSITORIES

Institutional Repositories are created by academic institution in order to manage the intellectual output of the institution. These output includes research reports, theses and

dissertations, pre-prints and post-prints, conference proceedings, lecture notes, models, annual reports, data sets, learning objects, visualizations, web pages etc. Walters identified four major categories of intellectual output of an academic institution:

1. Faculty and research scholars communication (Journal articles, conference proceedings, pre/post prints, research reports, technical reports etc.)
2. Student intellectual output.
3. Learning objects and other multimedia based works.
4. Digital research data sets.

In the new academic scenario, libraries try to create, manage, preserve and disseminate the resources and make them widely acceptable through the creation of Institutional Repositories. (Walters, 2007)⁵ According to Herry and Anderson, following are the characteristics that make IRs differ from other digital collections:

1. Content is deposited in a repository by the creators, owners and so on.
2. Repository architecture managers manage the content and the metadata.
3. Repository software offers a minimum set of basic services- put, get search.
4. Repository must be sustainable, trusted, well supported and well managed. (Herry & Anderson, 2005)⁶

4. ISSUES RELATED TO INSTITUTIONAL REPOSITORIES

Institutional Repositories are generally filled with scholarly material of academic members. For the development of IRs, Dspace, Eprints etc. are identified as the leading softwares. (Lynch & Lippincot, 2005)⁷ Theses, dissertations, journal articles, conference proceedings, are the major contents of an IR. IRs allow authors/creators to deposit the materials by themselves, it arises the greatest problem that the authors are reluctant to deposit the work themselves. (Ismail, Yaacoh, & Kareem)⁸ Pickton and Barwick have pointed out following potential barriers in the implementation of Institutional Repositories;

1. *Difficulties in generating content*

The prime most difficulty in developing an IR is the difficulty of getting the works of academic community. Lack of time, reluctance to self-archive, lack of knowledge about the technology etc. are the reason behind this. Uncertainty about copyright and intellectual property rights etc. also prevent them for making available their work in IR before it gets published traditionally.

2. *Support and commitment*

For the smooth running of IR, it is necessary to get the support and commitment from the management and academic staffs, which is difficult to sustain in most situations.

3. *Cost*

Since IRs can be developed by using open source software it is easy to start, but the recurrent cost may be higher including staff costs for developing guidelines, training, IT consultancy etc. (Jain, Bentley, & Oladrian)⁹

4. *Lack of incentives*

Lack of incentives makes the academics feel reluctant to provide their scholarly output. The only way to improve the functioning of IR is to promote the benefits it offers to the academic community. (Pickton & Barwick, 2006)¹⁰

5. ROLE OF LIBRARIANS IN AN INSTITUTIONAL REPOSITORY

Librarians are facing a new challenge with Institutional Repositories, since IRs promotes self archiving and the librarians have to settle with this new aspect of the information landscape. Suzi Allard has identified the following emerging roles and responsibilities of librarians;

1. Understand the IR software

Librarians need to have working experience of the software, so that they can best design and process at their institution according to the requirements.

2. Oversee project management and planning of local implementations of IRs

Librarians have an important place in the success of an IR. They can take the stewardship of the IR if they are involved with the IR from the initial planning stage so that they can identify the issues that may occur in the access and preservation of the collection.

3. Provide guidance to define collections

Librarians have to help the academic community to create collection development guidelines, their role being of an expert who decides what should be included in the IR.

4. Create metadata standards

In Institutional Repository authors self archive their work along with metadata. The librarians have to determine the metadata standards that should be used by each community.

5. Review submission to assure quality of content

Librarians in some IR do not review the submission because they won't stifle author's contributions.

6. Train the authors to use IR.

Training to authors in the submission of articles, and topics related to types of documents that can be easily maintained in the digital environment, guidance concerning metadata etc. will be very beneficial. (Suzi, 2005)

6. SERVICES OFFERED BY INSTITUTIONAL REPOSITORY

Clifford Lynch in 2003 defined university based institutional repository as “a set of services that a university offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members”.(Openoasis)¹²

Services that can be offered through IR of an academic institution is listed below:

1. Scholarly Publication:

IRs can include journals and research articles of the institution. Faculties, research articles, scholars, students, staffs etc. can contribute their article to the repository.

2. **Rules and Regulations:**
Rules and Regulations of the institution, technical reports, orders, video of events etc. also can be added to the IR.
3. **Teaching and learning materials:**
To support teaching and learning activities, lecture notes, study materials, audio/video presentation laboratory guide etc. can be added to the IRs.
4. **Connecting to faculty / Researchers home pages and blogs:**
Giving link to faculty /researchers/student's home page, blog etc. will facilitate interest to use IRs to know more about the works and authors.
5. **Discuss Group/Mailing List:**
Discussion groups and mailing lists provide a platform to the users to discuss with each other on different interesting topic on their research. Everyone can suggest improvement to repository developer for developing/improving repository.
6. **Alert Services:**
Setting up Alert services for authors on the number of hits /downloads /views that they have received for their article will boost them to deposit more in repositories.
7. **Links to Other Repositories:**
Providing links to repositories of other universities will be beneficial for users of IR to dig out more from one platform. (Mallikarjun & Mharana)¹³

7. BUILDING IR WITH DSPACE

Increasing demand for scholarly information and its need for wider accessibility resulted into the need for IRs which represents the intellectual outcome of the academic institution that can be accessed by a wide range of people. To build IR, several open source softwares like Dspace, Greenstone Eprints etc. are available. Among these, Dspace, an open source software is widely accepted by the academic community to build IRs. A census conducted in United States by CLIR in 2007 found that Dspace is the preferred Institutional Repository software among the surveyed population. (Juli, 2008)¹⁴

Dspace is an open source Digital Repository software developed jointly by MIT libraries and the Hewlett Packard company in 2002. Being an open source software, it can be downloaded and run by anyone, and can amend the software to meet the institution's specific needs. Dspace platform allows the collection management and dissemination of a wide variety of digital objects including books, articles, theses, audio/video objects, images, research data sets etc. Dspace provides a way to manage research works and publications in professionally maintained repository to give user greater visibility and ease of access over time. (Juli, 2008)¹⁵

8. BENEFITS OF DSPACE

1. Largest community of users and developers worldwide

Many organizations and institutions use Dspace to manage their digital data. It is used mainly to build IR by most of research libraries.

2. Free open source software

Dspace is an open source software, its code is licensed under the BSD open source license. So that any institution or organizations can use, modify the code according to their requirement without paying.

3. Customizable to fit the needs

Dspace allows the users to customize the work and feel of Dspace website and it allows choosing the default language, since it supports over twenty languages. Customization of metadata is also available in Dspace. Even though Dublin core is the default metadata format, it is possible to swallow other metadata schemes such as MARC and MODS. One can decide the browsing field such as author, title, data etc in Dspace.

4. Manage all types of digital content

Dspace supports almost all types of file formats which includes; PDF, AIFF, audio, FMP3, BMP, HTML, GIF, image/ png, JPEG, -Latex, MARC, Microsoft excel, Mathematica, Microsoft PowerPoint, Microsoft project, Microsoft word, MPEG, MPEG audio, photo CD, Photoshop, photo script, Real audio, RTF, SGML, Tex, Tex dvi, Text, TIFF, video, QuickTime, Wav, word perfect, XML.

5. Used by Educational, Government, Private and Commercial Institutions.

Dspace is not only used by academic institution but also it is widely accepted for museums, state archives, journal repositories, commercial companies to manage their digital assets. (Juli, 2008)¹⁶

8. CONCLUSION

Success of an IR depends upon the content included in it. Librarians should take stewardship to give exposure to the contributors. Authors should be the first concern in deciding repository services and marketing its services. Librarian should take responsibility to convince the contributors about the benefits they get from archiving research work in it.

REFERENCES

1. Walters, T. O. (2007). The NEW Academic Library Building Institutional Repositories to support changing scholarly and research process. *ACRL Thirteenth National Conference*. Baltimore.
2. Lynch, C. (2003). *Institutional Repositories: Essential Infrastructure for Scholarship in the Digital AGE*. ARL: A Bimonthly Report, No 226.
3. Raym, C. (2002). *The case for Institutional Repositories: A SPARC position paper*.
4. Lynch, C. (2003). *Institutional Repositories: Essential Infrastructure for Scholarship in the Digital AGE*. ARL: A Bimonthly Report, No 226.
5. Walters, T. O. (2007). The NEW Academic Library Building Institutional Repositories to support changing scholarly and research process. *ACRL Thirteenth National Conference*. Baltimore.
6. Herry, R., & Anderson, S. (2005). *Digital Repositories Review*. UKOLN and AHDS.
7. Lynch, C., & Lippincot, J. K. (2005). Institutional Repository Deployment in the United States as of early 2005. *DLib Magazine*, 2 (9).

8. Ismail, M. A., Yaacoh, M., & Kareem, S. A. (n.d.). Institutional Repositories: Review and Management Perspective. pp. 333-338.
9. Jain, P., Bentley, G., & Oladrian, M. T. (n.d.). Retrieved from <http://www.ais.up.ac>
10. Pickton, M., & Barwick, J. (2006). Retrieved November 7, 2015, from <http://magpie.lbro.ac.ok/dspace/handle>
11. Suzi, A. (2005). The Librarian's Role in Institutional Repositories : A Content Analysis of the Literature. *Emerald Insight*, 33 (3), 325-336.
12. (n.d.). Retrieved November 5, 2015, from <http://www.openoasis.org>
13. Mallikarjun, D., & Mharana, B. (n.d.). Scholarly Communication through Institutional Repositories. *Eprints* .
14. Juli, T. (2008). Building Institutional Repository with Dspace. *Planner 6th convention*, (pp. 102-114).
15. *Ibid*
16. *Ibid*

Design and Development of a Special Collection on Fukushima Nuclear Accident Using Greenstone Digital Library Software

Kavi Upreti

kavi@aerb.gov.in

Atomic Energy Regulatory Board, Mumbai- 400 094

ABSTRACT

This paper explains about the design and development of a special collection of references on Fukushima nuclear accident named as 'Fukushima- Key References' using Greenstone Digital Library Software. Digital library management systems like Greenstone can be used to develop a specialized collection on a specific subject. Fukushima Dai-ichi nuclear power plant accident was held in Japan on March 11, 2011 as a result of Tohoku earthquake and tsunami. This was one of the biggest nuclear disasters after Chernobyl (1986) of Ukraine and Three Mile Island (1979) of USA, which was of the major concern of the nuclear industry as well as the general public. After Fukushima nuclear accident enormous news and information was generated worldwide and debate started to phase-out the nuclear power. Compilation of key references on Fukushima nuclear accident would be of great importance to the nuclear regulators of the AERB for future research, study and to learn the lessons from this accident as the information required will readily be available online through AERB Digital Library.

Keywords: Digital libraries, Greenstone Digital Library Software, Fukushima Nuclear Accident.

1. INTRODUCTION

Digital libraries are an outcome of the revolution in computing, telecommunications and information systems. Calhoun (2014) concluded that, "Key developments from 1965 to 1990 in computer and information science, telecommunications and networks, online publishing, personal computer ownership, libraries, archives and other professional communities- not to mention internet and web – prepared the ground for an ambitious digital library research and development agenda."

The concept of Digital library has been remained one of the most discussed topics among the librarian community since last twenty five years. Modern information and communication technology has revolutionized the way of designing and development of digital libraries. According to Candela, Castelli, and Pagano (2011), "...Research and development activity on digital libraries started in the early 1990s, with the Internet proliferation, and that Internet has created unprecedented possibilities to discover and deliver human knowledge." Witten, Bainbridge and Boddie (2001) observed that "During the second half of the 1990s, comprehensive software systems for creating digital libraries are not widely available." The development of digital libraries gain the momentum after the year 2000 with the availability of various digital library management systems like Greenstone, D-space, E-Prints, D-List, CONTENTdm etc. Candela et al. (2011) stated that "Digital libraries are undergoing a continuously evolving process, influencing all sectors where knowledge has to be created, stored, transmitted and used."

Digital libraries are organized collections of digital information (Lesk, 1997). The Digital library management systems like Greenstone present an easy to use, customizable architecture to create online digital libraries. With these institutions/organizations can

disseminate their research work, manuscripts, or any other digital media for preservations and world over dissemination of digital items. Digital libraries can also be used to compile information on a particular theme or special subject. Therefore, a special collection of references on Fukushima nuclear accident is designed and developed using Greenstone digital library software for AERB Library.

The objective of this paper is to show that how GSDL software is used to design and develop a special collection of references on Fukushima nuclear accident. The information resources included in this collection are key references published on Fukushima Dai-ichi nuclear accident that was held in Japan on 11 March 2011 as a result of Tohoku earthquake and tsunami. This was one of the major nuclear accidents after Chernobyl accident (1986) of Ukraine and Three Mile Island accident (1979) of USA, which was of the major concern of the nuclear industry as well as the general public all over the world. After Fukushima nuclear accident enormous news and information was generated worldwide and debate started to phase-out the nuclear power. Compilation of key references on Fukushima nuclear accident would be of great importance to the nuclear regulators of the AERB for future research, study and to learn the lessons from this accident as the information required will readily be available online through AERB Digital Library.

2. DIGITAL LIBRARY

Digital libraries are organized collection of digital information resources in whatever form which provide options to search and browse the collection through various means on the intranet, internet or on any storage media. It is said that digital library means different things to different people. So, there are many definitions of the digital library.

According to Digital Library Federation (1998), "Digital libraries are organizations that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by a defined community or set of communities."

It is observed by the experts that the term "Digital Libraries" corresponds to a very complex notion with several diverse aspects and cannot be captured by a simple definition. However, the shortest and simplest definition of a digital library would be that it is an organized collection of digital information resources accessible over a network.

3. DIGITAL LIBRARY MANAGEMENT SYSTEMS (DLMS)

DLMS are the software used to design and develop the online digital library. With the help of these systems a non-specialist can also be able to design and develop a digital library as there is less need of expertise in using these systems. The DLMS provide tailor-made solutions to the librarians for organizing their digital contents.

According to Candela et al. (2007), "A Digital Library Management System belongs to the class of "system software". As is the case in other related domains, such as operating systems, databases, and user interfaces, DLMS software generation environments may provide mechanisms to be used as a platform to produce Digital Library Systems."

Tramboo, Humma, Shafi, and Gul (2012) stated that "Digital Library management system provides the appropriate framework both for the production and administration of

Digital Library System by incorporating functionality essentially fundamental to Digital Libraries, and also provides provision for integration of additional software that provides more refined and advanced functionality. Digital Library can thus be established by setting up and deploying a Digital Library Management System and then loading or harvesting content. This approach largely simplifies and reduces the effort required to set up a Digital Library that promises a guaranteed better quality of service.”

With the help of DLMS software institutions/organizations can disseminate their research work, manuscripts, or any other digital media for preservations and world over dissemination of digital items. Some of the examples of popular DLMS are:

- DSpace
- Greenstone
- EPrints
- D-List
- Open DLib
- CONTENTdm

4. GREENSTONE DIGITAL LIBRARY SOFTWARE (GSDL)

The GSDL software is produced by the New Zealand Digital Library Project at the University of Waikato, and developed and distributed in cooperation with UNESCO and the Human Info NGO. It is a suite of software for building and distributing digital library collections on web or on any external media such CD/DVD and USB flash drives for the use of end users. Greenstone is very popular software for designing and developing digital library among librarian community.

Greenstone has two separate interactive interfaces, the Reader interface and the Librarian interface. The Librarian interface is a Java-based graphical user interface which is used in the back end by the Librarian or the Administrator to design and develop the Digital Library. It provide options to gather material for a collection, enrich it by adding metadata, design the searching and browsing facilities that the collection will offer the user, and build and serve the collection. End users can access the digital library through the Reader interface i.e. front page of the digital library, which operates within a web browser.

5. DESIGN AND DEVELOPMENT OF THE COLLECTION

Greenstone v2.86 for Windows is used for designing the AERB Digital Library and a special collection of references on Fukushima nuclear accident named as ‘Fukushima- Key References’ is developed. The Librarian interface of the GSDL provides various features for designing and developing collection on Digital Library. The following steps were taken to design and develop the collection using the Librarian Interface of the GSDL:

5.1 Gathering of Information Resources

The idea of developing this collection came from Chairman, AERB who suggested making a special collection of references on Fukushima nuclear accident with the documents readily available with him in print form. There were total 43 documents available in the collection.

5.2 Scanning of Information Resources to PDF Form

After collecting the all 43 documents, next step was to convert them in to digital form into PDF documents. Therefore, first those items which are already available in electronic form from the internet have been searched and downloaded. For those documents which were not available electronically were scanned using Toshiba e-studio 255 multifunction machine.

5.3 Importing Information Resources

All 43 items in PDF form are imported into the Fukushima- Key References collection newly created at AERB Digital Library using Greenstone Librarian interface.

5.4 Enrichment of the Document

After importing all documents into the Fukushima- Key References collection, each document is enriched with attaching metadata like title, publishing authority, type of document, year of publishing, language, form etc.

5.5 Design of the Collection

Design feature of the GSDL Librarian Interface provides option to create search and browse index. Search index for title and browsing index for title, publishing authority, type of resource and year were designed for searching and browsing the collection on user interface.

5.6 Creation

This feature provides option to create and build the collection.

5.7 View

The build-up collection can be viewed by clicking Preview Collection button which takes us to the actual site of the developed collection. The URL of the site should be noted and informed to the users of the collection for future use.

Ongoing to the actual site of the collection, we see the following view:

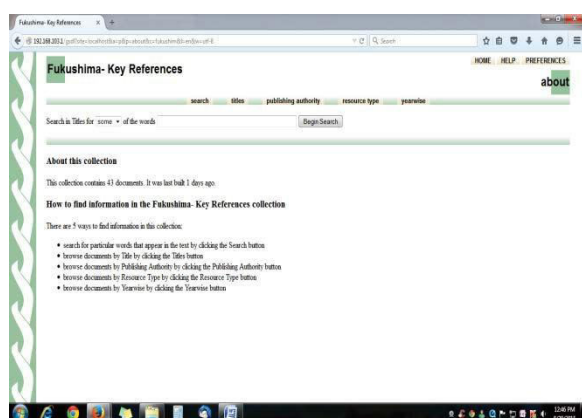


Fig.1.Fukushima-KeyReferences:Main Page

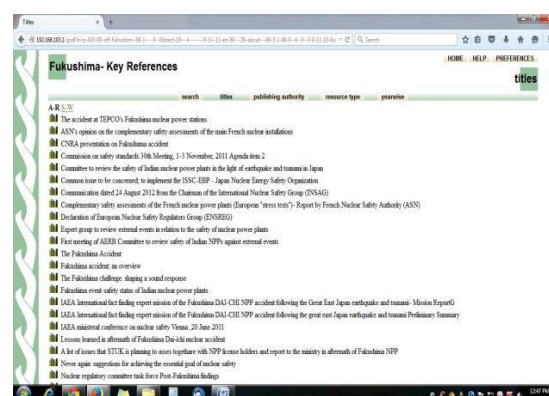


Fig.2. Title wise list of the publications



Fig.3. Publishing Authority wise list

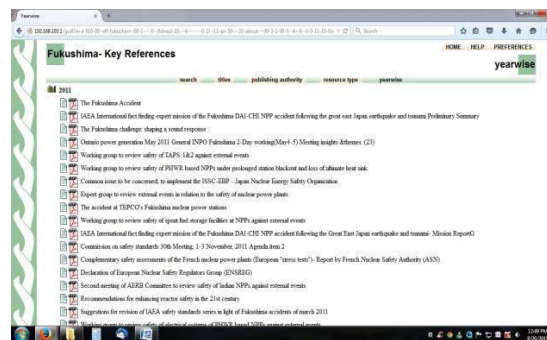


Fig.4. Year wise list of publication

6. ABOUT THE COLLECTION

After Fukushima nuclear accident large number of news and information was generated worldwide and this number is continuously increasing day-by-day due to new facts and detailed reports. Recently, the IAEA Director General's Report on the Fukushima Daiichi Accident, along with five technical volumes on this topic by international experts, has just been publicly released on August 31, 2015. A google search made at the time of writing this paper on Fukushima accident gives 18,60,000 results. Going through such a big number of results and to find out the relevant and useful information is a daunting task. However, on searching the same term on IAEA's INIS online database gives about 8,000 results originated from different countries in different languages which could be more reliable and authentic.

Therefore, having a small number of most relevant and important key references on such an important subject would provide clear picture to the expert of nuclear and radiation safety to understand the reason and root cause of the accident, various issues associated with it and learn the lessons from the disaster. Lessons learned from the Fukushima accident will further improve the safety of nuclear power plants by understanding what happened, and why, so that the necessary lessons learned can be acted upon by governments, regulators and nuclear power plant operators. Compilation of such information is also important for management of tacit and explicit knowledge as it contains information about various expert groups, working group, task force and committee along with other explicit sources of information. The papers contained in this collection are mainly reports, conferences, working group, committees etc. The information contained in this collection is published by various international and national organizations like IAEA, USNRC, AERB, ASME, STUK, ASN, JNES, WENRA, ENSREG etc. which shows the importance of this accident for world community. Therefore, designing and developing a collection on such an important topic would be of great importance to the nuclear regulators of the AERB for the future research, study and to learn the lessons from this accident as the information required will be readily available in electronic form through AERB Digital Library.

There are total 43 Key References available in the collection. These resources can be searched and viewed by titles, publishing authority, resource type and year. There were total 15 publishing authorities and 12 resource types.

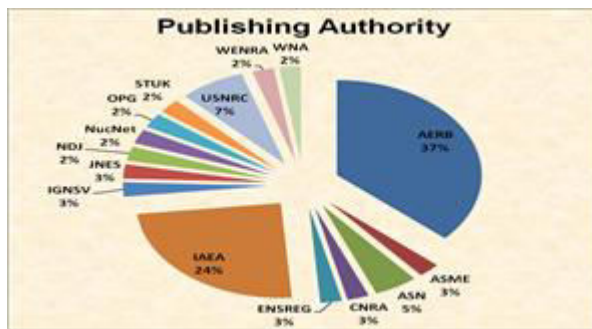


Fig. 5. Number of Publications (%) by each Publishing Authority



Fig.6. Number of publications (%) in each Resource Type

7. ADVANTAGES OF USING GREENSTONE SOFTWARE

- Collection is made available online on AERB's intranet.
- Collection can be searched and browsed by title, publishing authority, type of resource etc.
- Collection can be enriched by adding more information resources any time.
- More browsing indexes can be added if required anytime later.
- Collection can be publish and distributed on CD/DVD or USB flash drive.
- There is no any additional cost required as it is an open-source software.
- This software is very user friendly.
- Multiple users can access the collection simultaneously.
- Documents are preserved in digital form.
- It saves space of the library and time of the users.

8. CONCLUSION

As the amount of online content grows, Internet users' attention span decreases. This brings an acute need for social and technological solutions that enable users to select the most important and relevant information (Batorski, 2011). Digital libraries are technological solutions to this which can fulfill the user's requirement. Digital libraries are like lighthouses in an ocean of information. They could be an important source of relevant, reliable and authentic information by organizing and filtering information resources meticulously with the consult of subject experts. Greenstone digital library software provides option to customize the collections in variety of different ways to fulfill idiosyncratic requirements of every collection. The user interfaces of the digital libraries are universally based on metadata therefore they have the advantage over other interactive systems.

Acknowledgement

The author is very thankful to Shri S.S. Bajaj, former Chairman, AERB for his valuable suggestion to design and develop this special collection and providing the key references. Author is also very thankful to Shri K. Srivasista, Director, Resources & Documentation Division, AERB for his guidance.

REFERENCES

1. Batorski, D. 2011. An ocean of information: Information overload faced by Internet users. *Focus on the Internet* Academia No. 3(31), pp24-26.
https://www.academia.edu/1896375/An_Ocean_of_Information._Information_overload_faced_by_Internet_users (accessed on 11/10/2015)
2. Calhoun, K.2014. Exploring digital libraries: foundations, practice, prospects. Neal-Schuman, Chicago.
3. Candela, L., Castelli, D., Pagano, P., Thanos, C., [Ross, S.](#), Ioannidis, Y., Koutrika, G., and Hans-Jörg, S. 2007. Setting the foundations of digital libraries: The DELOS Manifesto. *D-Lib Magazine*, 13(3/4).
4. Candela, L., Castelli, D. and Pagano, P.2011. History, evolution, and impact of digital libraries. *E-Publishing and Digital Libraries: Legal and Organizational Issues*. IGI Global, 2011. 1-30.
5. Idiegbeyan-Ose, J., Nduka, S. C., Adekunjo, O. A., and Okoedion, I. 2015. An assessment of digital library functions and services in Nigerian academic libraries. In S. Thanuskodi (Ed.),

Handbook of Research on Inventive Digital Tools for Collection Management and Development in Modern Libraries (pp229-241). Hershey, PA: Information Science Reference.

6. Lesk, M.1997. Practical digital libraries: books, bytes & bucks. Morgan Kaufmann, San Francisco.
7. Rajasekharan, K. and Nafala, K.M. 2007. Building up a digital library with Greenstone: a self-instructional guide for beginners. Library & Information Division, Kerala Institute of Local Administration.
8. Tramboo, S., Humma, Shafi, S.M. and Gul, S. 2012. A Study on the Open Source Digital Library Software's: Special Reference to DSpace, EPrints and Greenstone. *International Journal of Computer Applications* 59(16), pp1–9.
9. Witten, I.H., Bainbridge, D. & Boddie, S. J. 2001. Greenstone: open-source digital library software with end-user collection building. *Online information review*, 25(5), pp288-298.
10. Witten, I.H., Bainbridge, D. and Nichols, D.2009. How to build a digital library, 2nd ed. Morgan Kaufmann Publishers Inc., San Francisco, CA, USA.
11. Witten, I.H., Bainbridge, D. 2005. Creating digital library collections with Greenstone, *Library Hi Tech*, Vol. 23 Iss: 4, pp541– 560.

LIST OF ABBREVIATIONS

AERB	Atomic Energy Regulatory Board
ASME	American Society of Mechanical Engineers
ASN	The French Nuclear Safety Authority
CNRA	Committee on Nuclear Regulatory Activities
ENSREG	European Nuclear Safety Regulators Group
IGNSV	Informal Group of Nuclear Safety Veterans
IAEA	International Atomic Energy Agency
INIS	International Nuclear Information System
JNES	Japan Nuclear Energy Safety Organization
STUK	Radiation and Nuclear Safety Authority Finland
NDJ	The National Diet of Japan
NucNet	The Independent Global Nuclear News Agency
OPG	Ontario Power Generation
USNRC	United States Nuclear Regulatory Commission
WENRA	Western European Nuclear Regulators Association
WNA	World Nuclear Association

Access to Information and Acquisition of Knowledge in Electronic Environment Era

Nirupama Warriar¹ and J. Shivarama²

¹*nirupama.warrier2014@tiss.edu*

²*j.shivarama@tiss.edu*

Tata Institute of Social Sciences, Deonar, Mumbai-400 088.

ABSTRACT

Libraries throughout the world originated with the basic idea of organizing collections of documents. The libraries have always acquired the relevant resources, organized them, preserved them and have made them available to the users whenever required. With the rise in information technology, the forms of these resources have undergone a continuous change from print media to the present day web 3.0 based web resources. Correspondingly, the present day librarians have realized the importance of changing with times and are adapting to the latest upcoming technologies and systems. This paper attempts to portray the changing nature of information retrieval in libraries and the fact that library professionals have to upgrade themselves in order to remain relevant.

Keywords: Information Retrieval, Digital Library, Information Technology, Semantic Web, Ontology, Laws of Library Science.

1.1 INTRODUCTION:

Libraries of modern times have constantly undergone various modifications, be it in terms of collection, services, users, storage media, etc.,. During earlier times information was mostly available in books and journals and the readers were provided with the sources available in the library. It was up to the user to find out the information required by them. At present, due to the impact of information technology, which has led to information explosion, the information required by the user is spread out in many formats and at various geographical locations.

1.2 INFORMATION AS KEY FOR ACQUISITION OF KNOWLEDGE:

'Information' is something which informs, in other words it can be said to be an answer to any question. Any information received is valuable as it enables the receiver to evaluate and make changes according to the information received. Information was earlier available in the traditional print media in the form of books, scholarly journals, newspapers, magazines, etc. As a result of digitization, came in the concept of electronic libraries which included print and electronic versions of the documents. Information was stored in formats like CD, DVD, etc. Consequently many of the sources started becoming available only in the form of electronic documents. This concept of digital libraries which came into existence was a total change from the formerly existing traditional libraries. A digital library is not only digitization of the physical resources but also effective and proper organization for easy access. With the introduction of Internet/ Intranets, the concept of remote access to the contents and services of library's collection with the help of electronic network gave rise to the virtual library. The characteristic of a virtual library is that the documents are necessarily in the electronic format with no corresponding physical collection and which are spread out in various geographical locations that can be accessed from any workstation. Thus, the transition is the technological development with Web1.0 being the 'read only method of communication,' Web 2.0 being the 'read-write-and share and currently, Web 3.0 era, where information is also available online in a variety of digital formats. These materials

include web pages, PDF documents, e books, multimedia, etc., and the change is from read-write to read-write-share and execute.

The term information has undergone a massive change in terms of its meaning as well as its usage in today's world. The librarian is always an essential part of the library. Librarians are information specialists, whose main aim is to fulfill the information needs of library users. Irrespective of the requirements of the users, librarians were always well equipped with all the traditional library functions like cataloguing, classification, reference services, etc. Now the role of the librarian has been enhanced as it is necessary to compile the information available in various sources and to provide them in a manner as required by the user. Librarians are always in direct contact with users seeking diverse information. As far as the librarians are concerned accessing the information which is available in various formats and at various places, is not sufficient. The effectiveness lies in putting forth the information across the users efficiently.

With the advent of the information and communication technology (ICT) there has been effective changes not only in the sources of information, but there also has been drastic changes in the roles played by the information specialists. The library professionals are constantly trying to adapt themselves to the technological changes. This would enable them to provide better and more effective services to the users. Presently the library and information professionals need to adopt an interdisciplinary approach in their profession. In addition to enhancing the library skills, they should also highlight various other aspects like updating their computer knowledge, honing managerial skills, learning about computer networking, etc. In the present day scenario, the library professionals are expected to have the following wide range of skills. They are:

- Build up a strong base by acquainting with the various existing information resources.
- If working in a specialized library, the library professional needs to get a good hold over the concerned subject area, and as well need to continuously update the upcoming developments in the particular field.
- The library professionals should adopt the policy of change management as due to the innovations in technology there is an increasing need for change in the various facets of library science also.
- The librarians should understand the growing importance of digital/electronic resources and should find out ways and means to extract the relevant information. They should also be able to guide the users in handling these resources.
- Traditional library skills of cataloguing and classification should be employed in today's libraries focusing on the various requirements by the users in today's networked environment.

Information retrieval is the act of obtaining resources relevant to an information need from a collection of information resources.

2. ACCESS TO INFORMATION FROM TRADITIONAL ERA TO DIGITAL ERA:

The five laws of library science proposed by Dr. S.R. Ranganathan in 1931, who is widely regarded as the father of modern library science is still considered as the basic foundation for a library system to function efficiently. His five laws have provided powerful guidance for generations of librarians. For the purpose of evaluating various library programs, formulating policies and implementing strategies, these laws are respected and referenced even today, more than 80 years after its publication. An expansion of these laws in terms of today's technological advances was given by Michael Gorman and Walt Crawford in 2005-2006. Very recently on the occasion of the 123rd birth anniversary of Dr. S.R. Ranganathan on 12th August, 2015 Dr. B. Shadrach from India has proposed the following and re-written five laws of library science which are applicable to all in this digital era.

They are:

1. Knowledge is for use in 'all' forms.
2. Every citizen has the right to access this universe of knowledge.
3. Every piece of knowledge is for access by 'all' without discrimination of any kind.
4. Save the time of 'all' knowledge & information seekers.
5. A library is the one that evolves with time to achieve all of the above laws.

Interestingly, a research was conducted by OCLC on user behavior and the findings from the research have been brought out under the research publication namely 'Reordering Ranganathan: Shifting user behaviors, shifting priorities. It mentions how the five laws of library science are relevant even today as it was in 1931. In today's times information is abundantly available in multiple formats and in a variety of settings. This has resulted in rethinking the ways in which these laws can be made applicable in various libraries. The researchers believe that it's time for a change in the focus and emphasis with regards to these laws. Views of various librarians, library researchers and information scientists had been obtained to understand the changing nature of the five laws and how these laws are being put in practice today. A suggestion for reordering of the laws has been given by the researchers which denotes how the digital and web revolutions have transformed the relationship with the academic community, resources and services. Accordingly, the reordering of the laws is as follows:

i. 'Save the time of the reader' – The main aim of the library staff should be to make provision for easy retrieval of information. This will require the library to move from the perspective of an institutional resource to a network resource.

ii. 'Every person his or her book' – The interpretation of the law in present times is that the librarians have to reach out to new skills, new services and new collaborations to anticipate the user requirements in the present digital environment.

iii. 'Books are for use' – It is a known fact that even during Ranganathan's time the main aim of having books was not only for stock collection purpose but accessing the contents and making them widely available to the users. Even today the emphasis should not be only in making the digital materials physically available but the necessary infrastructure should be made available to access them. The librarians should also have the technical knowhow to assist the users and should be able to reach up to the users' expectations.

iv. 'Every book it's reader' – The users must be able to locate the relevant information, should be able to access it and should also be able to use it to their full potential whenever required. Networking is the key to this and librarians should also make efforts to make their services socially sharable through various social networking sites.

v. 'A library is a growing organism' – During earlier periods growth of a library was in terms of books, staff and readers. Librarians should always remember that they are a part of the service industry. In today's times, the definition of growth of library includes electronic materials, digitization efforts, upgraded services and new kinds of infrastructure for remote access.

Librarians should accept that change is constant and should be prepared to accept the challenges.

Irrespective of the type of the library, the most important function to be performed is that of information retrieval. The library professionals cannot stick to the age old methods of making various catalogue cards, preparing lists, maintaining registers, etc. All these have to be implemented in the present day scenario. Over a period of time, library automation, digital library, content management, & reference management softwares such as KOHA, D space, Drupal & Mendeley etc., have been developed exclusively for the library professionals which have reduced the manual labor and have made the routine library activities much easier. This has enabled the librarians to effectively use their time and the existing resources to conduct various

kinds of research and make better informed professionals. For the purpose of information retrieval a subject specialist librarian can no longer rely completely on keyword searches. Advanced methods of information retrieval need to be employed to make the process effective. Moreover presently the information that is available on the web is in the form of HTML which is designed for human understanding and not for machines. Library professionals understand that user-friendly information retrieval techniques need to be introduced. Library professionals should thus think about the concept-based information retrieval method as a means of improving the search strategy. In concept-based information retrieval model, set of words, names, noun-phrases, terms, etc., are mapped to the concepts they encode. Here, the semantic search comes into the picture where a particular search is performed by connecting data.

“Semantic web is not a technology, but a philosophy.” It is collection of information linked in such a way so that they can be easily processed by machines. The purpose of the semantic web is to make the semantics of information and services available on the web interpretable and understandable to machines so that user requests can be more accurately satisfied.

The semantic web is an idea where it would be possible to extract information from the web at large. “ *The semantic web is not a separate web but an extension of the current one, in which information is given well-defined meaning, better enabling computers and people to work in co-operation*” (Berners-Lee et.al., 2001). There are various languages that are used and the language most often used is called the Resource Description Framework (RDF). RDF is a standard model for data interchange on the web.

Semantic web is based on ontologies. Ontologies are created by the mapping of various concepts. Thus, ontologies appear to be a useful method for moving from keyword-based to concept-based information retrieval system. In simple words an ontology is an organizational system designed to categorize and help explain the relationships between various concepts of science in the same area of knowledge and research. An ontology gives relationship between items in different categories in a graph model.

3. USE OF SEMANTIC WEB FOR LIBRARY SERVICES :

The semantic web provides a framework to make technologies more feasible for library services. Libraries need to make their web pages using the semantic web technology. This can result in better Web OPAC searches as the semantic web technology is understandable by computers and can therefore perform searches in a standardized manner.

Semantic web based reference services could be provided in combination with humans and machines. By using the semantic web technology, publicizing the information services become easier.

Information sharing and resource sharing can be easy and more useful. This can be made possible between libraries that have developed their semantic web pages. Intelligent searches can be performed as semantic web will not provide information only based on keyword search but will also conduct the search by understanding the means of the words and its connections just as humans would do.

For the above library services to be made effective, the library professionals should acquire the latest IT skills for digital libraries and understand about ontologies for effective dissemination of information.

Some of the actual applications of ontologies and semantic web from the practical point of view are given below.

4. THE NATIONAL ONTOLOGY LIBRARY SERVICE - ONKI.

ONKI is a major objective of the national semantic web ontology project FinnONTO. The main aim is to develop a semantic web ontology infrastructure on a national level in Finland. ONKI is used for publishing interlinked, collaboratively created ontologies and vocabularies in a centralized way. A solid, commonly agreed open infrastructure would make it much easier and cheaper for public organizations and companies to create interoperable intelligent contents and services on the coming semantic web.

The main focus is on ontology publishing and using them in indexing and information retrieval. Most ontologies are freely available for users and ONKI Living Lab - an open lab for testing the latest semantic web technologies in practice, is made available. Currently, over 10,000 people are using ONKI each month.

5. ONTOLOGY TOOLS FOR DEVELOPING AN ACADEMIC INFORMATION SEARCH SYSTEM :

In this particular paper 'Emerging of academic information search system with ontology based approach' authors Zaid, N.M. and Lau, S.K. present a comparison of various ontology tools for developing an academic information search system at a local university in Malaysia to search in the local language context (Bahasa Malaysia). This search system is expected to assist the inexperienced research students for searching academic resources in the local language. This search is expected to solve the dual problems the students face firstly the language barrier which limits the students to conduct a keyword search in foreign language (English) and secondly, due to limited research experience the queries often result in irrelevant searches.

6. CONCLUSION :

The above factors have also made the library professionals believe that they should prepare themselves anticipating the various changes that technology can bring in. The librarians should have a flair for continuous learning and thinking creatively.

The library professionals should understand that the basic principles of librarianship like cataloguing, classification, reference service, etc. will always exist and it's up to the librarians to adapt to the changing technologies and repackage the information as required by the users. It was earlier believed by academicians and other professionals that the position of the librarian would become redundant with times. The truth is that the librarian has been raised to a more prominent position in any organization. This is due to the various responsibilities that they have to handle to deliver the contents by connecting to the right kind of information. It is very essential for library professionals to stay focused, be multi-disciplinary in approach by becoming competent in the various areas of library science, management, computer applications and others.

A report about the University of California Digital Library draws this conclusion:

“Experience indicates that, despite the availability of intelligent systems, increasing remote access will also increase demands for service, both online and face-to-face” (University of California Library Council, 1996).

REFERENCES :

1. Connaway, L.S. and Faniel, “Reordering Ranganathan: Shifting user behaviors, shifting priorities”, I.M. OCLC Research, Dublin, 2014.
2. G. Biswas, “Changing role of librarians in digital era and need of professional skills, efficiency & competency”, National Seminar of Library and Information services in changing era, pp. 128-136, 22-23 January 2009. (National Seminar)
3. Hashim, L. and Mokhtar, W., 2012. Preparing new era librarians and information professionals: Trends and issues. *International Journal of Humanities and Social Science*, Vol. 2, No. 7, pp. 151-156.

4. Macgregor, G., E - resource management and the semantic web: applications of RDF for e-resource discovery. *The e-resources management handbook*, pp. 1-15.
5. Singh, G. and Jain, V., 2012. Information retrieval (IR) through semantic web (SW): an overview. *Confluence 2012 – the next generation information technology summit*, pp. 114-118.
6. Sreenivasulu, V., 2000. The role of a digital librarian in the management of digital information systems (DIS). *The electronic library*, Vol. 18, No.1, pp. 12-20.
7. Viljanen, K., Tuominen, J., and Hyvonen, E., Ontology libraries for production use: The Finnish ontology library service ONKI, *Semantic computing research group (SeCo)*.
8. Zaid, N.M. and Lau, S.K., 2014. Emerging of academic information search system with ontology based approach. *Procedia – Social and behavioral sciences*, 116, pp. 132-138. 10112
9. https://en.wikipedia.org/wiki/Information_retrieval
10. <http://www.yourdictionary.com/ontology>
11. <http://www.seco.tkk.fi/projects/finnonto>

Voyage towards Green Libraries: A Great Revolution

Kavitha J. R.

kavithajrp@gmail.com

CSIR - National Institute for Interdisciplinary Science and Technology,
Thiruvananthapuram, Kerala - 695 019

ABSTRACT

This paper deals with the importance of green libraries in the modern world furnished with advanced scientific and industrial innovations. Such state-of-the-art technologies never examine the negative impacts they produced on the environment. In this stance, libraries can play a leadership role by envisaging green library movement in the community since they enjoy an esteemed position in the society. Green libraries are being built up all over the world realizing the significance of environmental sustainability. Through this article, it is intended to describe green libraries in detail by stressing the various methods used to make a library green, operations in green libraries including green library practices, green library collections and benefits of designing green libraries.

Keywords: Green libraries; Environmental Sustainability; Energy Efficiency; Green Library Collections

1. INTRODUCTION

The contemporary society is accustomed with dynamic, rapid and sophisticated technologies which hardly consider their impacts on environment. Amidst the intense competition of developing and propagating advanced technologies among all domains, we may probably forget to think of environmental sustainability which leads to perpetual and profitable development contemplating our future generations. It is time to think about a transition which altogether safeguards our environment in all aspects along with augmenting conscientious momentum in every facets of our country. It not only brings environmental sustainability but also asserts gradual, progressive landmarks boosting our economic pace. In this regard, there are few points to be considered including construction of ecologically sustainable buildings, waste disposal, energy consumption, water conservation etc. The massive awareness programs about the strategies to be undertaken to realize environmental sustainability can be attained through libraries as they act as the hub of knowledge in the society. Libraries can actively take part in this movement by presenting a model which envisages the planning of green library buildings. It does not mean that the existing libraries should be thoroughly revamped to green libraries. But it highlights the idea of certain renovations to existing libraries which will act as footsteps to going green and entire shift to new library buildings architecture. Absolutely, these kind of radical changes can not only play a great role in achieving environmental sustainability but also inculcate a new vision among the people provoking every citizen about the necessity of such a movement which accounts for the effective utilization of natural resources.

Libraries are symbols of sustainability. They are committed with the duty of preserving and conserving venerable knowledge for making use of coming generations. Since libraries are in a high profile position in the community, they can actively take part in green library movement by focusing the aspects of construction of new green library buildings, refurbishing of existing library buildings, alteration of the prevailing library operations to ensure environmental sustainability and planning of community awareness programs emphasizing the benefits of designing and running green libraries. Through this article, an attempt is made to describe green libraries in detail by stressing the various methods used to make a library green, operations in green libraries, green library collections and benefits of designing green libraries.

2. WHAT ARE GREEN LIBRARIES?

The concept of green libraries emanated in early 1990s'. The main interest of green library movement is to downsize negative impact of the buildings towards the environment. Green libraries are libraries which are focusing on reducing the negative impact on the environment and maximizing the environmental quality by means of careful selection of location, use of natural construction materials and biodegradable components, liable waste disposal and conservation of natural resources (air, energy, water, vegetation). The concept of green library is a multifaceted

concept. It encompasses green buildings, green operations and practices, green programs and services, green collections, green information systems etc. A green library not only perceives a green building, but also involves a green mission. Likewise green library embraces not only the green architecture and renovation of existing library buildings but also sustainable, improved library operations and activities and educating the user community about the requirement of such feasible environmental practises. The 3 R's namely Reduce, Reuse and Recycle can be recognized as a tagline for a green library as it is a successful terminology to reduce the negative impact of the building on the environment. Initially, there may be huge expenditure for the construction of a green library building compared to traditional library buildings but the later running costs and added benefits to the community and environment makes it a lucrative venture.

3. THE NEED FOR GREEN LIBRARIES

The outrageous rise in the population is a pressing problem for the contemporary world which calls for a proportionate increase in resources comprising of space, air, water, shelter, food etc. It is right of the every citizen to utilize these natural resources in a beneficial manner considering the future generations too. Energy conservation plays an indispensable role in this regard. Along with this, another haunting problem is the effective waste disposal and strategies for recycling the used products. All these matters are targeting on environmental sustainability.

Libraries are the centers for lifelong learning. They provide users with the needed information which set up them to make informed decisions. Libraries are the best places to practice models of sustainable design, proceeding with actions for reduced energy consumption and educating the users about their obligations to attain environmental sustainability. As the gateways of knowledge, libraries are vested with the duty of assisting the users in finding their required information in a format which is accessible to them. Due to the unprecedented rise in the information as well as information sources available in various forms and formats it becomes a laborious task for librarians to cope up with. The abundance of print information sources and the escalation of prices will intensify the issue to further extent. In this juncture, libraries have to spent more space for print resources which is a crucial affair for present-day libraries. All these events focus attention towards the design of green library buildings.

4. THE DESIGN OF A GREEN LIBRARY

There are many elements which constitute a green library. The prime consideration should be given to the efforts to decline the negative impact of the building on the environment and positive endeavors should be followed as much as possible to maximize positive impact on the environment. The practice of using natural and renewable resources, adopting effective ways of handling water, air, earth without causing pollution, endorsing appropriate methods for energy conservation, integration of vegetation and greenery at indoors and at the site etc. will contribute a green image to a library.

In order to strengthen green library initiatives, there have been green library certifications in the global level. Among them the most prominent ones are LEED (Leadership in Energy and Environmental Design), BREEAM (Building Research Establishment Environmental Assessment Methodology) etc.

4.1 LEED

Leadership in Energy and Environmental Design (LEED) is a set of rating systems for the design, construction, operation, and maintenance of green buildings, homes, and neighborhoods. The LEED certification system is developed by the United States Green Building Council, a non-profit organization in the United States in the year 2000. It is a point based rating consisting of 100 base points. The number of points a project gains determines the level of LEED certification of that project. According to this certification system, the buildings are classified as certified(40 - 49 points), silver (50-59 points), gold (60-69 points), or platinum (80+ points). The LEED groups various design elements into five categories comprising of site selection, water conservation, energy conservation, building materials and indoor air quality.

4.2 BREEAM

BREEAM stands for Building Research Establishment Environmental Assessment Methodology. It is a popular leading design and evaluation method for sustainable buildings conceived in 1990. It inspires designers and stakeholders to think about low carbon and low impact design to curtail the energy demands generated by a building. This technique applies recognized measures of performance, which are set against established benchmarks, to assess a building's specification, design, construction and use. They consist of features related to energy and water use, the internal environment (health and well-being), pollution, transport, materials, waste, ecology and management processes.

Along with these rating systems, there are other benchmarks to delineate a green library system. Besides being an environmentally sustainable building, libraries can act as strong educators of green library movement through the implementation of eco-friendly library management operations, maintenance of green collections, eco-friendly user services and eco-friendly activities boosting ecological sustainability. While planning green library buildings, the following aspects should be considered.

Use of natural building materials and furnishings having capable of recycling

Application of refurbished materials and products

Flexibility in building design

Use of double panel windows

Installing solar or geothermal energy systems

Employment of water harvesting systems

Natural ventilation

Raised floor systems

5. METHODS FOR MAKING A LIBRARY GREEN

Planning for a green library is an integrated process. For the successful design of a green library, actions should be taken carefully from the initial steps which are related harmoniously. This means the various components of green library architecture are associated to each other in every operation. As mentioned earlier, LEED groups these components into five categories as given below.

5.1 Site selection

As already know, for the construction of an ecologically sustainable building the selection of a proper site plays a vital role. The location should have the potential to augment positive impact to the environment. Regarding site selection, the different factors to be considered are affordability of the plot to soil erosion, presence of green vegetation in the vicinity and the location should be centered on a densely populated area. Also the people can able to reach the library through public transportation facilities. The authority should give preference in parking lots to vehicles which consumes less energy while driving. In any way, these sorts of practices will inspire the other people to employ energy efficient modes of transportation.

5.2 Water conservation

Through the adoption of numerous methods, water conservation can be effectively implemented to achieve environmental sustainability. In this stance, proper site selection plays an important role. If the site is chosen properly, the run-off water may be utilized to irrigation purposes. The application of sensor taps and dual flush toilets will dramatically reduce water consumption in green library buildings. It would be better to prefer underground tanks for water storage. The use of drought resistant plants or indigenous plants, shrubs, grasses and trees not only save the amount of water consumption but also complements greenery to the site.

5.3 Energy conservation

Energy efficiency is a key indicator of sustainable buildings. It can be accomplished through various strategies by the utilization of renewable energy resources. The renewable energy resources reduce greenhouse gas emissions, decrease the demand on conventional energy resources and profitable in the long term. Since the outside environment lays significant consequence on energy efficiency of a building, the execution of passive design principles proves to be more convenient. Even though, the adoption of passive strategies varies according to the locations chosen, they are effectively exploited to utilize solar energy and wind turbine systems. These applications take advantage of managing temperature and to maintain natural lighting and ventilation. On the contrary, the active design strategies involves more technologically advanced solutions using renewable energy resources. Thus an ideal method to attain energy efficiency is the skillful implementation of the passive as well as active design principles. Besides these, the application of green IT solutions comprising of energy efficient servers, printers, photocopiers, computers etc. will contribute more towards energy efficiency.

5.4 Building materials

For the construction of a sustainable building, the following aspects substantiate key attention. The selection of materials should contribute as little waste as possible.

Choose the materials which are manufactured without causing damage to the environment.

The materials opted are able to reuse or recycle in other construction processes.

As the nonrenewable energy resources seem to decline over their consumption, the investment on renewable energy resources yield better results. There are some points to be admitted while planning a green library building. They are summarized below.

5.4.1 Carpet tiles

Carpet tiles can be produced from recycled materials and it helps to reduce waste particles by replacing large areas of carpet within the building.

5.4.2 Low embodied energy materials

The use of low embodied energy materials will help to minimize the negative impact of the building towards the environment and it accents to cut off CO₂ emissions as well as waste emissions.

5.4.3 E-Crete

E-Crete is a geopolymer concrete made up of fly ash and slag. Both fly ash and slag are by-products of other manufacturing processes. The use of E-Crete considerably reduces the amount of embodied CO₂ of traditional concrete by 60 percent. And it helps to suppress artificial quarrying which crucially affect the environmental sustainability.

5.4.4 Solar hot water systems

There are two types of heaters namely active systems and passive systems. The active systems use an electric pump for the circulation of fluid while passive systems are lacking pump. Solar water systems are beneficial to the environment and it will contribute a more to achieve environmental sustainability.

5.4.5 Indoor air quality

Concerning the design of a green library building, indoor air quality has a prominent role as users spend more of their time at indoors. With the invention of air conditioning, the buildings are set to be air tight. The absence of ventilation stick to lot of problems including the generation of pernicious toxins that can cause serious damage to human respiratory system. The volatile organic compounds contained in the paints, carpets etc which will make up the library are detrimental to living beings. So it is imperative to prefer materials containing less volatile organic compounds to strengthen indoor air quality. The carbon dioxide (CO₂) people breath into the atmosphere is another toxicant. To iron out this issue, CO₂ monitors can be established to determine safe levels of CO₂. The green library buildings should be designed in a way that

facilitates recycling of air. Through the materialization of these strategies indoor air quality of a green library can be protected which will hand over added benefits to the health of the people who conceive it and to maintain ecological sustainability.

6. HOW TO MATERIALIZE A GREEN LIBRARY?

There are numerous aspects to be considered for the realization of a green library. It not only confines to building aspects but also envisions productive, sustainable green practices in day-to-day activities. Libraries are the best places to expose the green mission by taking a leadership role in the community by initiating the motto 'lead by example'. It is not so easy to realize a green library at once. The results of the efforts to envisage a green library will found to be success if and only if the respective authorities ensure the implementation of sustainable, progressive, collaborative, relentless, and sequential activities which altogether contribute a green mission not only to library but also to the entire society in which the library strives. Some steps are listed below as an aid to this green program of the library.

6.1 Formation of a green team

The creation of a green team facilitates in formulating a basic framework for the design of a green library. They are concerned with the duty of directing and executing the overall activities to encompass a green library. The green library team may consist of library staff members, library users, interested employees from the public and any people who willingly accept to take part in the green program of the library.

6.2 Communicate the green mission of the library to the community

For any program to be a success, collaborative efforts from all the stakeholders are mandatory. Since library is a public institution which educates and inspires its users to become informed citizenry, it is obligatory from the part of the library to intimate its green propaganda before the public. For this purpose, different ways can be adopted such as display of bulletin board notices, release of newsletters among the public, publicity through posters and carrying on frequent staff meetings for the appraisal of the progress made and recommendations for future improvement etc. The formulation of a green policy statement for the library is necessary for overall improvement of the green programme since it will act as a blue print for subsequent activities.

6.3 Identification of causes of wastes and inefficiencies

Through vigilant observation and monitoring, gathering of existing information concerning the sources of waste and other inefficiencies such as disposal costs, utility bills and significant purchases can be done. To detect lights on in the vacant rooms, trash in recycle bins, leaking water taps etc. a facility walk through may be conducted. As a result of these worthy activities, these kinds of delinquencies can be eliminated to certain extent.

6.4 Setting up of environmental goals

As cited earlier, the framing of a well written, clearly stated green library policy statement can instigates library staff members and users to be aware of the long-term green mission of the library. And this mission oriented statement helps them to actively participate in the activities which envision a green library. Establishment of sustainable, environmental goals and its long term implementation by safeguarding our natural resources such as air, water, earth and more reliance on renewable energy resources and cautious usage of conventional energy resources etc. mobilize a sudden thrust to the library's green movement.

6.5 Identification of improvement opportunities

The requisition for better, versatile, doable suggestions from the part of library staff members and users contributes new ideas for further modifications in this direction. It would be better to conduct a search on internet to identify the various green techniques and strategies employed by the libraries in foreign countries in their journey towards 'going green'.

6.6 Build understanding and support from higher authorities

To obtain satisfactory, far-reaching outcomes for the efforts of the library to make it green, support from the higher authorities is essential. In this moment, it is necessary to instil a clear understanding in the higher authority about the foreseen, long term goals of the library in order to uphold environmental sustainability and its far sighting profits considering our forthcoming

generations.

Even though, these steps outline a green library initiative, the affection and sanctity for the nature and its resources stands forehead apart from all other factors in the journey of 'going green' to maintain environmental sustainability.

7. SUSTAINABLE PRACTICES IN GREEN LIBRARIES

Since libraries are not-for-profit organizations, they are constantly struggling with budgeting issues. In order to attain cost efficiency in all aspects, it is necessary to embrace green practices in libraries. The ultimate tenet of a green library is to practice sustainability in its all operations which are going on. For the sake of achieving this prime goal, it will be credible to analyse how we can put into practice these green operations.

Waste management is a daunting problem in the contemporary society which causes crucial issues if it is neglected carelessly. It would be better to reuse or donate the items instead of disposing them. Segregation of the waste materials and providing opportunities for onsite – recycling of the collection helps to control hazardous dumping of waste materials. The detrimental effects of plastics on the environment are widely acclaimed. So it is obligatory to refrain from the usage of plastic materials. As an alternative to plastics, paper bags and cloth bags will serve the purpose. Reduction in paper consumption and minimizing the number of print copies is a sustainable practice endorsing a green library. The use of duplex printers, routing of print copies rather than making multiple copies, reuse of papers, using recycled papers etc help to minimize paper consumption. Electronic / digital communication complements paper communication methods and definitely it mobilizes the green initiative of the library. It is worthwhile to practice shared e-mail folders as searchable repositories of information feasible for any future references instead of using paper files. Besides, the approach of using electronically completed forms minimizes paper consumption to a great extent.

In an effort to attain environmental sustainability, selection of products with recyclable contents is necessary. For cleaning purposes, it is advantageous to use eco-friendly cleaning products as a substitute to toxic chemical cleaners. It is profitable to construct stairs in multi library buildings rather than elevators. The activities such as turning off the lights in vacant rooms, installing energy efficient lighting methods like solar lighting systems, set computers to sleep mode or turn off when not in use and purchase of the computers with LCD monitors etc boosts energy efficiency. In case of any complaints, the attempt to procure new computers should be turn aside and the unusable computers are to be repaired and the acquisition of Energy Star qualified equipment's aids to accomplish energy efficiency which attributes a green library.

8. GREEN LIBRARY COLLECTIONS

In the journey to embrace a green library, diligent collection development decisions enhancing sustainability plays an inevitable role along with the factors discussed above. It is the duty of the library to store the collections which instigate the community about the necessity of implementing green practices not only in libraries but also in their household too. Absolutely, this kind of routines helps the library to meet the green objectives with perpetual outcomes through community collaboration. Besides, the extension activities conducted by the libraries such as seminars, book exhibitions etc. focusing on the importance of sustainable practices to be perceived by every countrymen helps to envisage the goal of environmental sustainability more efficiently.

While planning green library collections, three aspects are to be taken into consideration. The first one is the procurement of the materials whose content educates and appraises green library practices, the second factor to be dealt with is the de-selection process of collections highlighting reusing and recycling of the materials and the last one is the selection of a material format determining whether it is print or electronic respecting the green motto to reduce the carbon foot print an institution makes. The problem of minimizing the library's carbon footprint is the most complicated and opposing one in deciding the material format of the collection. Carbon footprint means the total amount of greenhouse gas emissions caused by an organization, event, product or individual. The carbon footprint of a library is the sum of all emissions of CO₂ (carbon dioxide),

which was induced by library activities in a given time span. Usually the carbon footprint is calculated for the period of one year. So in order to produce sustainable outcomes, it is necessary to minimize carbon footprint which is the exclusive backwash of manmade activities.

The purchase of reading materials with environmental themes benefits the readers to be cognizant of their commitment to protect the environment from hazardous effects. Besides, distribution of bulletins and newsletters on green living culture and environmental issues will persuade the users to accompany with green practices with the objective of realizing a green globe. Further, organizing outreach program and workshops on adopting green practices awake the community more quickly to be enlightened with the green doctrine of the library.

Regarding de-selection of library materials, the common practice is to remove the items from the collection which are either outdated or worn out. However, in order to step with green library movement, the emphasis should be given to recycling/reusing of materials. Book sales and giveaways are better remedy concerning to this aspect which contributes ancillary income to the library and an intervention to enhance the library's community relationships. With the emergence of information society, there is an unprecedented growth in multimedia and electronic resources like CD's, DVD's, cassettes, tapes, audio books in the library which are hard to dispose. Desperately, these forms of electronic waste products are hard to recycle than recycling/ reusing of books and magazines.

The format which decides the physique of the document such as print or electronic is a problematic concern. There have been long disputes in relation with their impact on the environment referring to carbon footprint. There are conflicting viewpoints regarding their environmental proximity. Both have positive as well as negative impacts. For production of papers, plenty of trees are being harvested every day. On the whole, production of papers, publication and their transportation consumes more energy. It accounts for the upsurge of carbon foot print. In favor of minimizing carbon foot print, it is paramount from the part of publishers to involve in green print initiative programs by using recycled papers and harvesting limited number of trees.

The environmental impact of electronic resources is determined by their electricity consumption. For example, a Google search on the internet causes between 1g-10g CO₂ emissions rely upon the time spent. Likewise, billions of searches are carried out every day to find information on the web including library catalogs, databases, institutional repositories, e-resources etc. It is estimated that a typical computer working for a day produces 494 Kg CO₂. Besides the electricity use driven by the electronic resources, they are also accounted with the increased paper use. Most of the library users are tend to print the articles or their required information on papers which definitely increases the carbon foot print.

9. BENEFITS OF DESIGNING GREEN LIBRARIES

In order to maintain our environment and its resources lively, it is imperative to take care of it from precarious effects of human made developmental activities. So it is inevitable from the part of every citizen to live in a more sustainable manner. As libraries are the places where knowledge accumulation and knowledge dissemination, two treasured activities simultaneously occurs, they can play a leading role in the society by actuating initiatives for green libraries. The added benefits underlying in designing a green libraries are the following.

Green library buildings reduce environmental impacts and contribute sustainability.

It promotes public safety and health.

Green libraries save expenses through the efficient use of energy, materials and water.

It deprecates the volume of waste materials and its disposal costs.

Green libraries strengthen community relations.

10. CONCLUSION

The role of green libraries in maintaining environmental sustainability is pivotal. Libraries can perform a leadership role in the community by initiating green library movement along with educating the community about the key advantages it brings out to our environment as well as to all living beings as libraries enjoy a distinguished position in the society. Green libraries minimize the negative impact on the environment by regulating a natural environment and providing a healthy atmosphere to all its customers. Librarians can act as instructors by instigating the users about the importance of green practices and operations and encouraging them to become sustainable thinkers. Through sustainable thinking, the users are informed of how to become green during searching, choosing, using and communicating information. Sustainable thinking not only encompasses information aspects but also involves every action which is related with nature. Through such collaborative, mindful efforts from the part of all the stakeholders, it is not arduous for setting up of a green library.

REFERENCES

1. Hauke, P., & Werner, K. U. 2013. Going green as a marketing tool for libraries: environmentally sustainable management practices. In *IFLA WLIC 2013*. Singapore. Available at <http://library.ifla.org/147/1/086-hauke-en.pdf>
2. Hauke, P., Grunwald, M., & Wilde, A. 2005. Green libraries coming up! National and international initiatives fostering environmental sustainable libraries and library services. Available at https://www.ibi.hu-berlin.de/de/studium/studprojekte/buchidee/bi12/bob14_fulltext_hauke_grunwald_wilde.pdf
3. Monika, A. (2008). The Green Library Movement: An Overview and Beyond. *Electronic Green Journal*, 1(27). Available at <http://escholarship.org/uc/item/39d3v236>
4. Connell, V. (2010). Greening the library: Collection development decisions. *The Journal of the New Members Round Table*, 1(1), pp. 24–35. Available at <http://www.ala.org/nmrt/sites/ala.org.nmrt/files/content/oversightgroups/comm/schres/endnotesvoll1is1/3greeningthelibrary.pdf>
5. Greene, K. 2009. *Greening your library: What you can do*. Illinois. Available at <http://www.epa.state.il.us/p2/presentations/greening-your-library.pdf>
6. Jankowska, M. A. 2008. A call for sustainable library operations and services. *C & RL News*, pp. 323–324.
7. Vijayalakshmi, B. 2013. Green library - An overview. In *International Conference Proceedings* (pp. 97–100). Bengaluru: Dharmaram Publications. Available at <http://www.liscom.org/Content%20Page.pdf>
8. Logan, A., Braithwaite, E., Binks, L., Hogarth, L., & Wilson, S. 2010. *Tomorrow's green library*. Available at http://www.plvn.net.au/sites/default/files/report_tomorrows_green_library.pdf
9. Green library - Wikipedia, the free encyclopedia. Available at https://en.wikipedia.org/wiki/Green_library
10. Hauke, P. 2015. How to become/ How to identify a green library? Standards for certification. Presented at the IFLA World Library Information Congress, Cape Town. Available at library.ifla.org/1237/1/095-hauke-en.pdf

Digital Information Security for Academic Libraries: An Overview

J. Shivarama¹ and Vaishali A. Dawar²

¹*j.shivarama@tiss.edu*

Tata Institute of Social Sciences, Deonar, Mumbai.

²*vadawar@gmail.com*

Narsee Monjee College of Commerce and Economics,
JVPDS, VileParle (West), Mumbai.

ABSTRACT

The libraries collect, process and disseminate information to all its users whenever they require it. In this process the user must receive the right information at right time. The threats to information make it necessary for the librarian to take the necessary care to protect the information so as to receive the authentic and integrated information by the right person at right time. By way of information security the librarians can take necessary care of the information in their possession. This article gives the overview of information security for digital information in academic libraries along with the information security standards and explains about the threats to information, security controls, aspects of information security management, factors in digital information security, goals of Information Security and tools for analyzing information security.

Keywords: Information Security, Digital Information Security, Information Security Standards

1. INTRODUCTION :

The role of Information security is protecting the assets of an organization. The assets of any library is its collection and records. The information is generally provided into two major forms – print and non- print. Both these forms have different sets of precautionary and security measures as per the material requirement. The print form of information has comparatively simple procedures of security, prevention, infrastructure and well defined mechanism for limiting the cost of security. The non-print material available in various formats can majorly be defined in two groups – digital and analog. Both of these have limited shelf life as compared to print form. The information available in these non-print forms also have various regulations for preservation and security according to their formats and contents, but the cost involved is high and the process is more complicated than print formats.

Every organization is vulnerable to all kind of technological jargons and technical threats, for every technology they rely on. In case of library starting from collection, storage, process and dissemination, every step needs information security. The problems with information security are mainly noticed when the attack on it is attempted and detected. Hence information security represents a significant management challenge for the libraries.

Besides, both print and non-print documents have their own limitations. But the importance of digital documents information security is increasing due to limitless geographic access by means of Internet. The information security practices cannot be applied effectively if the information providers as well as end users do not understand the importance of such policies and applications and/or either resist or do not adhere to these regulations. Hence there is a need for the training of information security to staff as well as the end users at the same time of information literacy. This shows that information security depends on three components –people, process and technology. This all is making legal, ethical and professional issues more complicated. The information security is a complex issue and Figure -1 shows the reasons for this complications.

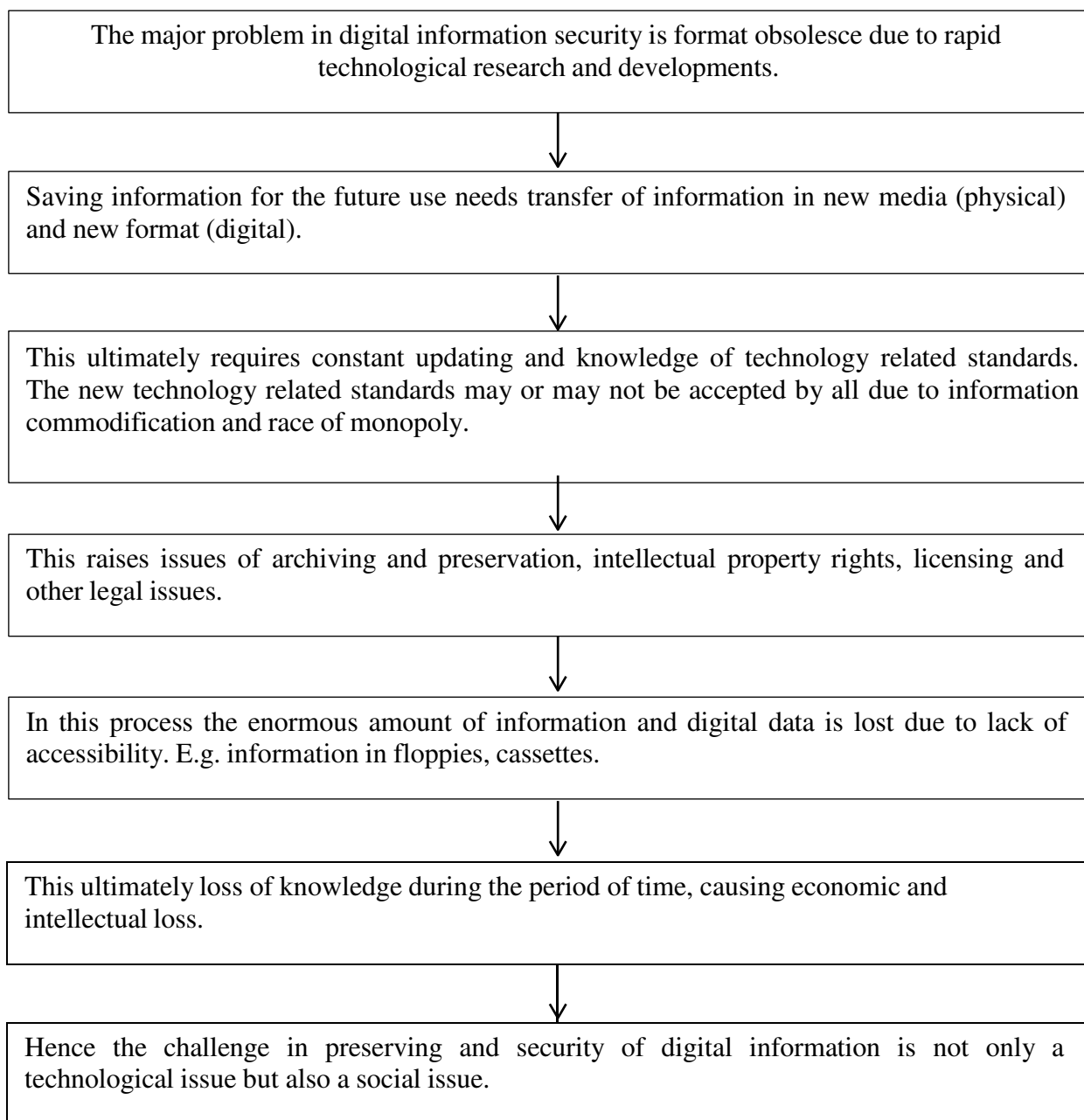


Fig1. Reason for complications in information security.

The Figure -1 shows the need of library to have a comprehensive polity for digital archiving and preservation along with clearly stated role of the librarian in it, staff training, disaster recovery plan, besides all the administrative issues related to information security attributes stated in the definition of information security i.e. confidentiality, integrity and availability (also known as the C.I.A Triad). The heart of information security CIA Triad - confidentiality, integrity, availability (also called as the fundamental concepts of information security) are more of social issues than technical issues. Hence information security rules, regulations, guidelines, standards are based on suitable sociological, psychological and philosophical theories, besides the technical aspects.

2. INFORMATION SECURITY :

Federal Information Security Management Act of 2002, Clause 3542, United States Code, Subchapter III—Information Security ⁽¹⁾ stated *Information security* means protecting information and information systems from unauthorized access, use, disclosure, disruption, modification, or destruction in order to provide—

- (A) integrity, which means guarding against improper information modification or destruction, and includes ensuring information nonrepudiation and authenticity;
- (B) confidentiality, which means preserving authorized restrictions on access and disclosure, including means for protecting personal privacy and proprietary information; and
- (C) availability, which means ensuring timely and reliable access to and use of information.

Information Security management is a process of defining the security controls in order to protect the information assets.

3. NEED FOR INFORMATION SECURITY:

The information security essentials explain about the threats to information, security controls, aspects of information security management, factors in digital information security, goals of Information Security and tools for analyzing information security. Looking into the 'Digital India' project a program to prepare India for a knowledge future, the libraries must seriously take into consideration information security management.

In libraries we need to handle information systems profoundly besides the print material. This needs us to be aware of information security threats and how to protect the resources from various kinds of threats. The threats to information can cause damages or losses in many ways from small information to entire system destruction. These damages or losses can affect the confidentiality or integrity of data and non-trust on the information system or some other dangerous impact. The information security is vulnerable when computer is stand alone with system software as well as when computer is in network i.e. intranet and internet both. Every day new threats are emerging, making the users of information to be alert and know how to handle the situation effectively. It is necessary to know in advance these threats, their sources and its effect on the information system and to know how to keep the information system more safe and secure and protect it.

3.1 Threats to Information security:

A threat is a person or event that has the potential for impacting a valuable resource in a negative manner. A vulnerability is that quality of a resource or its environment that allows the threat to be realized. In system and network security, the threats remain present but are mitigated through the proper use of security features and procedures. Mitigation is any effort to prevent the threat from having a negative impact, or to limit the damage where total prevention is not possible, or to improve the speed or effectiveness of the recovery effort.⁽²⁾

The threats to information security can be *classified* into three categories –

Natural Threats: threats caused by Natural calamities such as floods, quakes, tornadoes, temperature extremes, hurricanes, storms etc.

Intentional Threats: computer crimes such as unauthorized access, espionage, identity theft, hacking, malware, phishing, spams, etc.

Unintentional Threats: include the unauthorized or accidental modification of software, deletion of an important file, tripped over a power cord, etc.

In another way the potential "security concerns" are divided into four categories:

Environmental concerns such as lightning, dust and sprinkler activation,

Physical concerns such as theft, vandalism and trip hazard,

Site-Support concerns such as electrical power, telephone service and climate control and

Technical concerns such as improper system operation, malicious software and line tapping.

There are four primary classes of threats to network security⁽³⁾ –

Unstructured threats: from inexperienced individuals using easily available hacking tools

Structured threats: from hackers who are more highly motivated and technically competent

External threats: from individuals or organizations working outside the institution

Internal threats: from individuals or organizations working inside the institution

In the multi-dimensions threats classification model ⁽⁴⁾ a security threat can cause one or several damaging impacts to systems that we divide them into seven types: Destruction of information, Corruption of information, Theft or loss of information, Disclosure of information, denial of use, Elevation of privilege and Illegal usage.

3.2 Security controls:

To fully protect the information during its lifetime, each component of information processing system must have its own protection mechanisms. In depth security measures are necessary, where if any measure fails, one can use another defensive measure immediately. All the information security policies and standards have three levels or layers– physical, personal and organizational. ⁽⁵⁾ Hence there are three types of security controls - administrative, logical and physical.

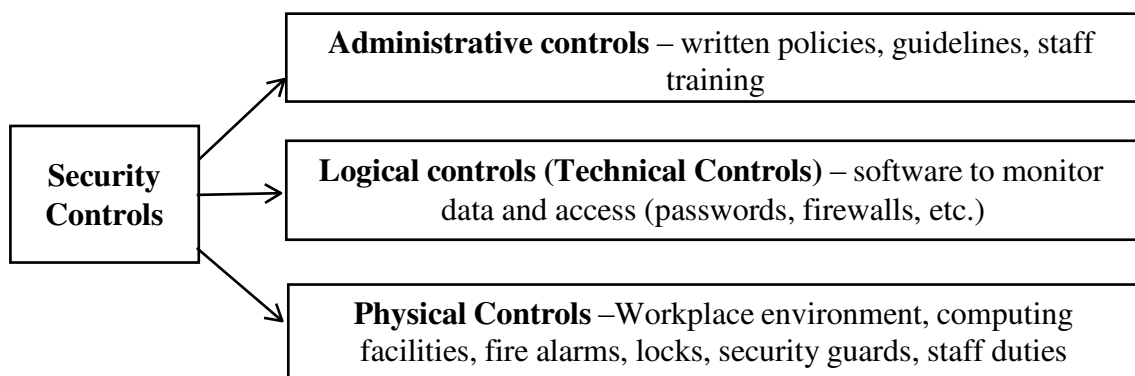


Fig.2 Types of Security Controls

3.3 Information Security Management:

The decision making about the security requirements and applications is done two aspects of information security management, which are –

1. Assessing the risk i.e. exploit the potential vulnerabilities of an information causing any kind of harm to it and to the organization.
2. Managing the risk i.e. finding and applying precautionary and preventive measures to the assets.

Establishing an inventory of assets along with identification of applicable threats vulnerability is the first important step in Information Security Risk Management. For any kind of security the four approaches are considered, which we are also called security classification, shown in figure -3. Depending on the classification of the security problem the solutions are decided.

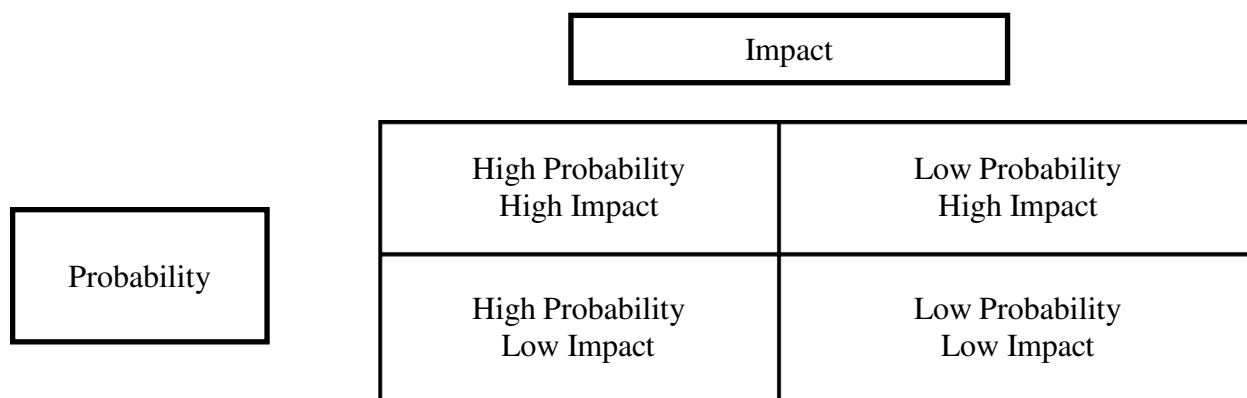


Fig. 3 Aspects of information security for decision making

The Impact in figure -3 is related to the degree of success of an incident, considering what aspect of the organization is affected with what probability of an information asset. This is useful for an organization to decide their risk reduction strategy. Taking into consideration the Network Economics, the better way to solve network security problems is to make security administration more user-friendly or plug-and-play. ⁽⁶⁾

3.4 Various factors in digital information security:

The main factors in digital information security are – hardware, software, database, network, management, environment/infrastructure.

1. *Hardware* includes redundancy of hardware parts, compatibility of hardware parts, stealing, external devices.
2. *Software* includes redundancy of softwares or software version or programmes, compatibility of software applications or system
3. *Database* includes vulnerability, data loss in transmission, integrity, backup etc. issues.
4. *Network* includes mainly communication related issues such as virus, encryption, firewall, hacking, intruders or unauthorised access, licensing, etc.
5. *Management* includes problems directly related to human resources such as information literacy, staff training, human errors, security standards and guidelines, etc.
6. *Environment/ infrastructure* – humidity, flood, earthquake, etc., which can cause great damage and difficult to recover.

Digital information systems is composed of hardware, software and communication. In a library the digital information security is required to be considered at these three major components – collection, storage and metadata (processing), dissemination/ communication (services). The details about the same is explained in figure -4.

3.5 Goals of Information Security:

The Referene Model of Information Assurance and Security (RMIAAS) promotes a comprehensive approach to information assurance and security. This model gave a set of goals of information security (well known as ‘IAS Octave’) as –

- Confidentiality
- Integrity
- Availability
- Accountability
- Auditability
- Authenticity/ Trustworthiness

Non – repudiation
Privacy

This IAS –Octave is also known as an extension of CIA Triad.

3.6 Tools for analyzing information security:

The companies while creating operating systems also create information security tools for safeguard of that operating system. These tools come along with the operating system software free of cost. These tools help to determine vulnerabilities in endpoint devices and network. E.g. Knoppix Security Tools Distribution, Microsoft Baseline Security Analyzer (MBSA). These tools are also made by third party companies for protecting the systems with some cost, e.g. Symantec Endpoint Protection, McAfee, AVG, Avast, Norton, etc.

4 ROLE OF DIGITAL INFORMATION SECURITY IN ACADEMIC LIBRARIES:

Mr. Ronald Reagan, former President of the United States, had said in 1989 that information is the oxygen of the modern age. ⁽⁷⁾ Information is the basis of competition, which has a definite advantage over the other competitors. Without information no profit-based or non-profit based organization can function. Information security is top concern for organizations, specially academic institutions, from where a lot of personal information and research data is accessible. It will be very dangerous if this kind of important information falls in wrong hands.

In today's high-tech environment, we are all becoming more dependent on computers and networks for storing and sharing information, which is ultimately making information more prone to insurity. Without adequate security measures the sensitive data is always at risk, specially when the system is connected to network or internet. In universities information is accessible to all faculties, university staff, students and other university stake holders. In addition it is also available to the third parties like contractors, vendors, consultants, outside researchers, etc. Every university must have a 'Information Security Board' who can classify every information related to university as restricted, sensitive and public, based on which the authorities can decide upon which information can be accessed by whom, so as the functioning of the university can be efficient and effective and save the reputation and save university from financial losses. For this purpose many universities have functional and up-to-date and legally protected Information Security Policies and regular information audits.

Significances of information security in academic libraries are:

- Safeguard investment in computerisation, which is very high.
- Minimize risk of damage, theft, subersion or sabotage.
- Protection from unauthorised access, modifications, disclosure or destruction.
- Safeguard users' personal information from theft and misuse.
- Safeguard critical research data, personal information of scientists, staff and students, and sensitive information from criminals and terrorists.
- Compromised information leakages can cause on research grant receiving from various organizations and also will affect on distinguished professors seeking university employment as it affects and questions the reliability of university's information security. Whereas effective security measures enables trust and stability.

5 INFORMATION SECURITY STANDARDS:

The security management is generally decided at three levels i.e. physical, personal and organizational levels.

- Under Section 72 – Penalty for breach of confidentiality and privacy, 72A of the (Indian) Information technology Act, 2000, disclosure of information with the person's consent is breach of the lawful contract and is punishable. Data protection is governed by the “contractual relationship” between the parties. But government has rights to monitor or decrypt any information including information of personal nature in any computer resource. Under IT Act, 2000 tampering with computer source documents is also punishable.
- British Standard BS7799 - This was originated by the United Kingdom Government's Department of Trade and Industry (DTI) in 1995. It was published in two parts-
 1. best practices for Information Security Management (1995)
 2. Information Security Management Systems - Specification with guidance for use (1999).
This part is focusing on implementation of information security management system.

ISO adopted it in the year 2000 as ISO/IEC 17799, "Information Technology - Code of practice for information security management." Then it was revised in June 2005 to finally become ISO 27000 series.

- ISO 2001 – an International Standard for establishing, implementing, operating, monitoring, reviewing, maintaining and improving an Information Security Management System.
- ISO/IEC 27000 Series numbering “ISO27K” is reserved for Information Security Management. This is derived from British Standard BS7799 .
 - ISO/IEC 270001:2005 – Information Security Management System - Requirements
 - ISO/IEC 270002:2005 – Code of Practice for Information Security Management
This has 11 specified controls –
 1. Security policy
 2. Organization of information security
 3. Asset management
 4. Human resources security
 5. Physical and environmental security
 6. Communication and operations management
 7. Access control
 8. Information system acquisition, development and maintenance
 9. Information security incident management
 10. Business continuity management
 11. Compliance
 - ISO/IEC 270001:2013 is an information security standard published on 25th September 2013 jointly by the International Organization for Standardization (ISO) and the International Electro technical Commission (IEC). The joint committee is known as ISO/IEC JTC 1/SC 27. It has ten clauses covering
 1. Scope of the standard
 2. How the document is referenced

3. Reuse of the terms and definitions in ISO/IEC 27000
4. Organizational context and stakeholders
5. Information security leadership and high-level support for policy
6. Planning an information security management system; risk assessment; risk treatment
7. Supporting an information security management system
8. Making an information security management system operational
9. Reviewing the system's performance
10. Corrective action

In this new standard more emphasis is given on measuring and evaluating performance of organization's ISMS, i.e. organizational context of information security.

- OECD (Organization For Economic Cooperation and Development) Guidelines (set of 9 Principles) for the Security of Information Systems and Networks. WPISP (Working Party on Information Security and Privacy) helps the organizations for Information Security policy making for the organizations.
- GAISP – Generally Accepted Information Security Practices byISSA (Information Systems Security Association).
- Payment Card Industry Data Security Standard
- COBIT – The Control OBJECTives for Information and related Technology
- BSI 2010 (British Standard Institute) – Information Technology Security Techniques
- ISF (Information Security Forum, uk) plays a significant role in the fight against growing threats to information in public sector organizations.

6 CONCLUSION:

Access to information in academic libraries is open for diverse kind of users, which makes the implementation of information security challenging. Being a vital asset to the university, they must have legally protected information security policies, measures and regular audits for information security, which can safeguard the important information from the unwanted intruders.

The effect on confidentiality, integrity and availability of information causees damage to university reputation, which ultimately cause financial loss and loss of dynamic researchers. Hence information security is the responsibility of each and every stakeholder of the university, including its management and governance.

Securing information means securing it physically as well as digitally. Managing information security is a challenging task for universities, as they are research centres and much of the resaerch in India is done here. The international standards provide much soughted help in this management by offering process framework and controls needed. To reduce the incidents harming security of information the staff shouls be well trained and the institution must have legally protected and well documentedd Information Security Policy and it should be strictly implemented. Regular security audits also help to increase confidence of staff handling the information security process,

REFERENCES:

1. E-Government Act of 2002. PUBLIC LAW 107-347—DEC. 17, 2002. Federal Information Security Management Act of 2002. [Online] [Cited: October 10, 2015.] <http://www.gpo.gov/fdsys/pkg/STATUTE-116/pdf/STATUTE-116-Pg2899.pdf>.
2. NASA. Information Technology Threats and Vulnerabilities. [Online] [Cited: October 4, 2015.] http://www.hq.nasa.gov/security/it_threats_vulnerabilities.htm.
3. Vulnerabilities, Threats, and Attacks. [Online] [Cited: October 4, 2015.] <http://www.lovelytool.com/files/vulnerabilities-threats-and-attacks-chapter-one-7.pdf>.
4. Jouini, Mouna, Rabai, Latifa Ben Arfa and Ais, Anis Ben. 2014. *Classification of security threats in information systems*. 5th International Conference on Ambient Systems, Networks and Technologies (ANT-2014). Procedia Computer Science 32. pp. 489 – 496.
5. Sattarova, Feruza Y and Kim, Tao-hoon. 2007. IT Security Review: Privacy, Protection, Access Control, Assurance and System Security. *International Journal of Multimedia and Ubiquitous Engineering*, 2(2), pp. 17-32.
6. Anderson, Ross. Why Information Security is Hard :An Economic Perspective. [Online] [Cited: July 28, 2015.] <https://www.acsac.org/2001/papers/110.pdf>.
7. Associated Press. 13 June 1989. *Reagan Urges 'Risk' on Gorbachev : Soviet Leader May Be Only Hope for Change, He Says*. Los Angeles Times. [Online] [Cited October 21, 2015.] http://articles.latimes.com/1989-06-13/news/mn-2300_1_soviets-arms-control-iron-curtain

The Space Saving and Role of Mobile Library

C.K. Das

libckd@iacs.res.in

Department of Library, Indian Association for the Cultivation of Science
Jadavpur, Kolkata-700 032, India

ABSTRACTS

The knowledge access and education is a fundamental right of every human. The mobile library exclusively gives us the information in multifarious area and its offered variety of services to the users. Today, library is open to all users they can search their reference these by, fulfilling their requirements. The mobile library is a fully learning tool, that includes e- readers loaded with actual required resources of books, journals, documents, database, maps and others reading materials etc. In this context the trained and skilled professionals of library have engaged in solving the problems by digital resources till college level. Thus it should help in the various field of science and technology, information communication and management through electronic media. It's extended the services towards networking, literacy program and also development of awareness to protect the human right in rural area.

Key words: knowledge access, exclusively, multifarious, e-readers and electronic media.

1. THE CONCEPT OF MOBILE LIBRARY:-

A library carrying resources through van to outside users or a public library providing services by the mobile van in rural area. A library on the vehicle those have to provide service far from the city and its open for all users there is no age restriction. The mobile library is a part of public library that by provided all public library facilities and services to the readers.

2. HISTORY:

It has been observed that the first mobile services have started in African and Arabian country. India has started this type of service in the year 1953 with a special designed vehicle. At that time the said services provided specially visually and physically handicapped peoples. After some time the demand and popularity of readers it's has started for common peoples.

3. BASIC REQUIREMENTS:

Before starts the services first needed to selection of the place by the professional, brief survey of the concerned area, economic & social backgrounds along with the following parameters.

- Geographical feature
- Local Administration: Head of Area, MLA, Panchayat Pradhan etc.
- Population: Male /Female ratio
- Education label: School: Primary, Higher Secondary label, Co-ed College: Degree or post graduate label Subject Study, Training Centre or Institution
- Economic condition: Cultivation, Industry and employment scope
- Hospital and Health Care Centre
- Population (Male and Female)
- Distance from the nearest library and city head quarter
- Interest of Local People
- Suitable Timings of local peoples
- Social Activities
- NGO Service available
- Shortest Route of the selected service place
- Arrangement of Electricity or lighting source

- Security and softy of service peoples.
- Available of Networks

After observation of the above points we can proceeds for the next steps which are most important of mobile library service.

3.1.Arrangement of vehicle:

The prescribe minimum size of van 5.5x12.5 feet with both side sliding doors and windows and other part of glass fixed properly to avoid the dust particles, sunlight, rain water and jerks. The pilot of said van must be have basic mechanical knowledge of vehicle

3.2.The next steps of the service

To procured the official permission from local authority/in-charge of the concern place like Principal of school/Panchayat Pradhan/Councilor and settle the time and date before to provide the services as convenient.

3.3.Selection of Man powers:-

Normally required about two or three professionals in a team. The qualification of the library professional should be maintain accordingly.

- The professionals must be qualified in the field of library and information Science plus sound knowledge in computer activities.
- The professionals have also basic operating knowledge of electronic equipment's like LCD projector, handling of laptop, reprographic/ scanning machine and audio-video and sound systems etc.
- Well prepared to interact with local people in respect of current affairs.
- Capable to organize various educational programs, seminars/conference, Workshop, exhibition and documentary films show.

4. OBJECTIVE

The principle objective of mobile library to increase the literacy ratio, adult and children education program and provide the library extension services those who are not able to come in the public library due to long distance, transport problems, financial hardship or physically challenge person etc.ples can get the information according their requirements, particular reading materials, employment information, govt.plan – development program, education and training related guidelines etc.

Advantage of mobile services: - There're so many advantages available in this service and also auxiliary to remove the darkness of illiteracy and insist to grow the reading habit. The comparatively this service are very chief and more convenient as there are lack of administrative complicity, no requirements of infrastructures, more manpower and funds, furniture as well as more convenient to the readers they gets the books/reading materials as per their actual demands and acceptable friendly and also they can also spear their time according to the routine.

It has been observed that the utility of mobile library is more perspicuous to convey the current information, technology, research progress, agriculture growth, future plan of govt., awareness issues and employment related information etc. to extend the service in rural area as well as connect with the Country. In some time such a service provide by the non-government organization in public interest.

5. A Comparatives Table of Membership & Lending data from the South 24 Parganas (W.B.) during the Year 2013-14

Table. 1 In Public Library-New Membership

Male	Female
34	31

Table. 2 Nos of Users

Male	Female
79	66

Table. 3 In Mobile Library- New Membership

Male	Female
43	57

Table.4 Nos of Users (Mobile Library)

Male	Female
88	92

6. CONCLUSION:-

The concept of library content is changing with unprecedented speed. After a series of information explosions and predictions on a paperless society the production of print materials has not ceased. The right information to the right person at the right time is still a far off dream even though technology is available. Issues of semantic web are high .Information is at the fingertips of each individual. It is available anywhere and anytime. If so, is there any necessity for a library? The present library scenario of our country, we need adoption of modern technology, fitness and match with current methods and change the content according to space management of library.

REFERENCE:

1. Paul T. and John C, Green Chemistry (Ref.book.2012)
2. Proceeding Auro University, Surat, Gujrat(2013)
3. Novell Net Ware NIIT,New Delhi, Current reference from Oxford University Press
4. M.G.Inst.of Management, Bangalore (Proceeding 2012)
5. Annual Report Govt.of West Bengal(2013-14)
6. All India Council for technical Education, New Delhi(31st August ,2012)

Virtual Reference Services: Models and Standards

Harsh Bardhan Arya¹, Jyoti Rani², Dr. Sandeep Kumar Pathak³, Prof. J. K. Mishra⁴

¹*harshmlis@gmail.com*

Tata Institute of Fundamental Research Mumbai-400005

²*Jyotiraniruhela@gmail.com*

NASSDOC, ICSSR, New Delhi- 110001

³*pathakkgp@gmail.com*

Indian Institute of Science Education and Research Bhopal-462066

⁴*jmishr@gmail.com*

DLIS, Dr. Hari Singh Gour University Sagar-470003

ABSTRACT

The paper presents the brief introduction to virtual reference services, issues of integrating virtual reference services into libraries and the approaches of integration. Communication modes of virtual reference services with their issues are also presented. During this paper we discuss about standards, quality, virtual research agenda and general digital reference service model digital reference model. It has also been analyzed that, there are several issues in digital reference model and virtual reference model.

Keywords: Virtual Reference Service, Models, Standards, Digital Research Agenda, Topology, General Virtual Reference Model, Digital Reference Model, Virtual Reference model 1.0, Virtual Reference model 2.0, Two Dimensional Model of Virtual Reference Service 2.0.

1. INTRODUCTION

Virtual reference refers to a network of expertise, intermediation and resources together set at the disposal of a person seeking answers in an online environment. The field of virtual reference touches on issues of metadata, human intermediation in a networked environment and assessment of quality of networked resources. Yet virtual reference has remained primarily the province of practicing librarians and educators, while virtual libraries have maintained strong roots in Computer science and Information retrieval.

The beginning of reference service is generally attributed by Samuel Swett Green, who in 1876 published the first article on helping patrons use the library. While it is doubtful that Green actually invented the idea of reference service for library users, he was the first to speak publicly about the concept and was the first to discuss it in writing. While the term “reference” did not evolve until several decades later. The publication of Green’s article helped to popularize the new concept of reference service. Green introduced four prime functions for the reference librarian. These functions remain the basic components of reference service today.

- Instruct the patron how to use the library
- Answer the patron queries
- Aids the patron in selecting resources
- Promotes the library within the community

Many changes have taken place since the publication of the first article by Green on reference services. Growth and development of the reference service from the earliest times until the mid-twentieth century is detailed by the Samuel Rothstein. Others have followed changes in reference service through the 1990’s. Many new models, new tools and new ideas have been discussed, implemented, and accepted into practice. However, despite all of these changes, the basic functions of reference service have remained essentially constant.

1.1 Background Virtual Reference

The virtual reference field has two progenitors. The first is traditional library and information science (LIS), particularly LIS practice. The second major contributor to virtual reference is the category of Internet services known as Ask A services, or expert question/answer sites.

1.2 Library Reference

Virtual references as an examination of the librarian's role in a digital environment begin with e-mail reference efforts. These efforts extended the traditional core reference function of the library past the reference desk to the desktop. Patrons were able to ask reference questions and consult with trained librarians through e-mail. Still & Campbell provide excellent examples of early e-mail reference studies. This thread of virtual reference examined issues such as the role of the librarian in cyberspace, the impact of distance service on the traditional reference interview, evaluation, and new skills needed by the information professional.

1.3 Ask-A-Services

The second progenitor to the current virtual reference arena is that of Ask-A-Services. Ask-A-Services (so-called because services trend to take on names such as Ask-A-Scientist, Ask-A-Teacher and so on) are expert based question and answer services. Ask-A-Services use networked communities of experts to answer questions via the Internet. Ask-A-Services have been extremely popular on the Internet, and have given rise to a separate set of issues concerning system development and scalability.

2. REASONS OF MOVING TRADITIONAL REFERENCE TO VIRTUAL REFERENCE SERVICE

Some of the reasons due to which people start moving from physical libraries toward digital libraries are as follows.

- The user need to go to the reference desk physically in the traditional reference service while not is the case in virtual reference service.
- In traditional reference service people cannot access to the information other than library timings while in virtual reference service people can gain access to the information at any time.
- In traditional reference service same resources cannot be used simultaneously by a number of users, while not is the case in virtual reference.
- In traditional reference service searching resources is somewhat difficult while in virtual reference service the user is able to use any search term (word, phrase, title, name, and subject) to search the entire collection.
- The traditional reference sources are limited by storage space, while virtual reference source have the potential to store much more information.

The terms reference virtual library, virtual reference services, web-based reference services and electronic reference services, digital reference services are used interchangeably as terms with similar meaning. Digital reference services refer to a network of expertise, intermediation and resources put at the disposal of a user seeking answers in an online/networked environment. A digital reference occurs when a question is received electronically and responded to electronically.

3. DIGITAL REFERENCE RESEARCH AGENDA

A great deal of research and development is being done in the digital reference arena. These include demographic and attitudinal studies, case studies, question analyses, and system design research. This section outlines some broad-based areas of research that have become part of the virtual reference development.

In 2002, a symposium was organized to bring scholars and practitioners together to identify what was known about virtual reference, and to propose what virtual reference research still needed to be conducted. Special effort was made to include virtual library researchers in the symposium. The outcome of the symposium was a research agenda. This agenda, represented in figure 1 below, defined a series of areas for investigation (question components) and a series of “lenses” or perspectives from which these areas could be investigated.

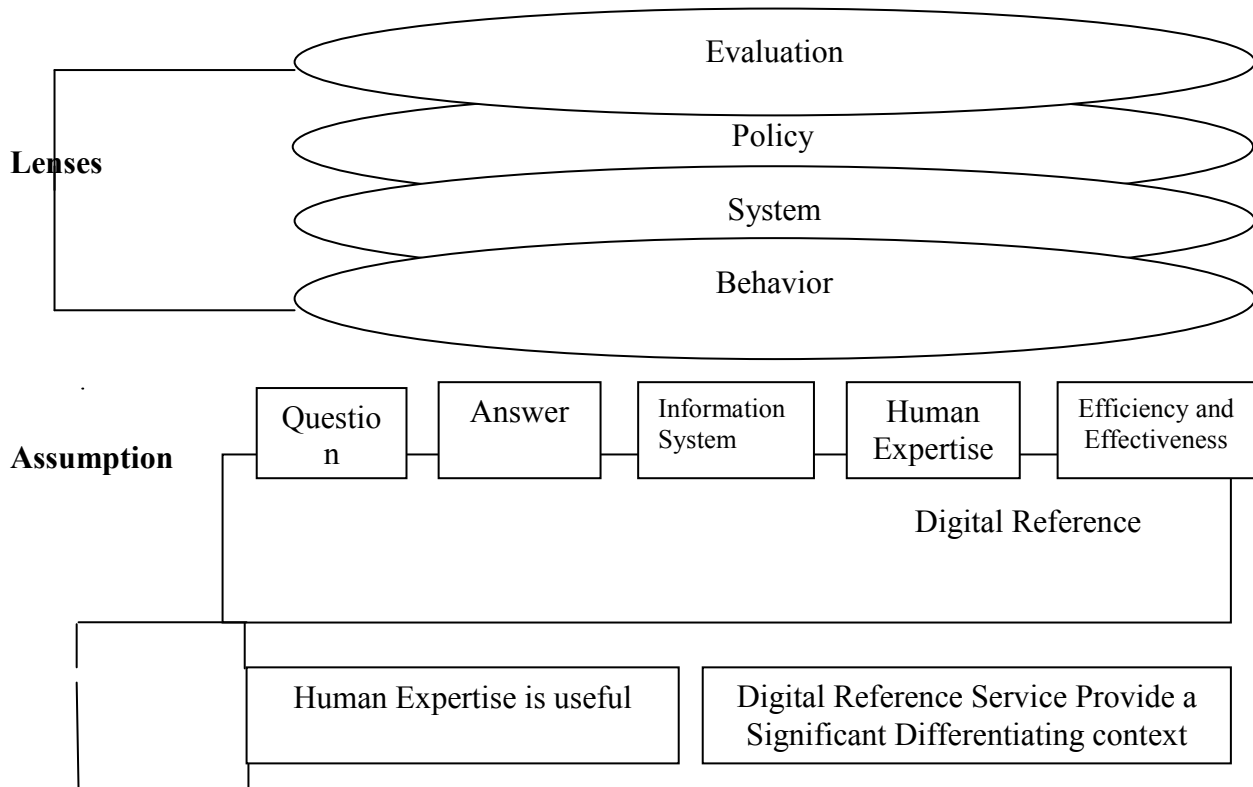


Figure1: Digital Research Agenda

Some of the question areas have been well examined. For example, extensive work has been done on virtual reference information systems (see the General Digital Reference Model below), questions & answers, and efficiency and effectiveness (see Quality Study below). A great deal of research still remains to be done in storage and reuse of answers (so called knowledge bases), and in the provision of an empirical base for the appropriate role of human expertise.

4. VIRTUAL REFERENCE TECHNICAL STANDARDS

With the emergence of multiple digital reference software solutions (QABuilder, 24/7 Reference, Question Point, Docutek, Live Person, Virtual Reference Toolkit, etc.) there comes the need for a technical means of passing a question or answer from one system to another in a vendor agnostic method. Work on this began with the Question Interchange Profile (QuIP), and has since been continued as the NISO NetRef standards effort.

This standard bundles a question and associated metadata for transport from one virtual reference system to another.

4.1 Quality in Virtual Reference

A quality standard is a specific statement of the desired or expected level of performance that should be provided regarding a service or some aspect of that service. A quality standard can be measured to determine the degree to which that standard is in fact being met. A quality standard defines the level of performance that an organization is willing to accept for a particular service or activity. Quality standards are important because they:

- Encourage library staff and administration to discuss and come to agreement on what constitutes “quality” for a specific service;
- Provide clear guidance as to the expected quality that a particular service or activity should offer;
- Educate staff – and especially new staff – as to the expected quality of service that should be provided;
- Recognize that there may be differing acceptable levels of quality for different aspects of digital reference services; and
- Provide a basis for rewards and demonstrating/reporting accountability.

Quality standards are not performance measures. A performance measure might be “correct answer fill rate” whereas the quality standard might be “the digital reference service will have a correct answer fill rate. While not specifically spelling out all possible quality standards, the study proposes six Quality Standards that appear to span specific circumstances and domains:

- Courtesy: The behavior of the library or institution’s staff
- Accuracy: The “correctness” of answers provided by a digital reference staff
- Satisfaction: Users’ determination of their success in interacting with the digital reference service
- Repeat Users: The percentage of users that re-use a service after first encounters
- Awareness: The population user group’s knowledge that the service exists
- Cost: The cost per digital reference

The study assumes that each of these standards will have a strong qualitative component. However, to fully define these standards, the study created five types of performance measures that can be used to determine success in meeting quality standards better:

- Descriptive Statistics and Measures: Statistics and measures to determine the scale and scope of a digital reference service.
- Log Analysis: Statistics that can be derived from analysis of logs generated by web and digital reference software packages.
- User Satisfaction Measures: Statistics and metrics seeking to understand the user view of a digital reference service.
- Cost: Measures that gauge outlay of financial resources to run an ongoing digital reference effort.
- Staff Time Expended: Measures to determine staff time dedicated to digital reference

5. HUMAN INTERMEDIATION INTO VIRTUAL REFERENCE SERVICE

The use of human intermediaries within an information system is more than simply a tradition in the library world. Reference, particularly the opportunity to talk with information professionals, is seen as a core function of a library. Years of practice have shown that human-to-human communication is important in helping a user identify an information need and find the most appropriate resources to answer that need. According to the Library and Information Technology Association (LITA), a division of the American Library Association, putting a human face on the virtual (digital) library is a key need. “It’s time to put a human face on the virtual library. What’s the crucial factor in the success of the non-virtual library? The people who work there and serve the user! What do libraries emphasize on their Web sites? Resources, collections, facts with no human guidance or presence! On many library Web sites, the user is hard-pressed to identify the staff, whose names, if they’re there, are five levels down. The human factor is still important.”

There are specific means for integrating a digital reference service into a larger digital library. It is proposed that there are 5 means of integration:

- Human Intermediation as Guide: What separates virtual reference from other question answering systems is the inclusion of human expertise. In this role (the predominant role in current digital reference systems), the human intermediary guides users through resources and services provided by a digital library. The human intermediaries act as experts in the

digital library itself. This is the closest analogy to traditional face-to-face library reference. The output of the digital reference system is a series of references and referrals.

- Human Intermediation as Synthesizer: This role is similar to intermediary a guide, but here the expert is drawing data from the virtual library (and beyond) and creating a new product in the form of a synthesis (or pathfinder). Unlike intermediary as guide, here the expert is exerting judgment and content level skills (rather than simply pointing a user to a resource). Here the output of the digital reference system is an answer.
- Digital Reference as Collection Developer: This role works in conjunction with the other roles. Here the intermediary, in the process of responding to a user question, identifies gaps in the digital library collection. By pointing out what resources are not available to answer a given question, the intermediary can begin a process of resource creation by some other entity within the digital library. In this role, the output of the digital reference system is a list of needed resources.
- Digital Reference as Resource Creator: The intermediary can also go beyond simply identifying gaps; the intermediary can fill those gaps. Through the creation of a pathfinder, original research, or some fully developed resource creation process, the intermediary can help in populating the digital library itself. Referred to as “reference authoring,” the reference function drives the digital libraries growth and scope. This model was used in the AskERIC service, and can be seen in the QA Builder software discussed above. The output of this role is digital library objects that can be used independently of the digital reference service.
- Digital Reference as Annotator: This is a similar role to resource creator, but here the objects created are not independent, but are comments and annotations to extend digital library objects.

6. WHAT ARE MODELS?

Models are perceived in many different ways, sometimes causing ambiguities in understanding them. For example, models are defined as simplified representations of reality, instruments or tools of research, precursors to theories and exemplars or analogies to something else with similar properties.

Kaplan’s (1964) description of the model is most often used to characterize the relationship between digital reference and traditional reference services. Here, the model is defined as an analogy in which one entity has properties of another; thus **A** must be like **B** in some way. Using this notion of the model, the analogy is made that digital reference services (**A**) are modeled after traditional reference services (**B**). This means that practices such as the reference interview, triage staffing, and the method of question analysis for evaluation are borrowed from traditional reference services and represented in the practices of digital reference services. Based on traditional reference services, such a model can help to guide and develop the practices of digital reference services, for, according to Lankes and Kasowitz digital reference is too new to define best practices for itself.

6.1 Objectives of Virtual Reference Models

The objectives are followings:

- Evaluation of existing virtual reference services.
- To investigation of building improved model for virtual reference services that facilitates the users and librarians.
- Enhancement of the ready reference to overcome the existing deficiencies in virtual reference service.
- Investigation of storage and reuse of answers issue and improvement in the existing virtual reference services.
- Enhancement of the existing general process model of virtual reference services to overcome the deficiencies in existing virtual reference service model or building an improved digital reference service model.

- Investigating the technique through which the system efficiency improves and patrons quickly get response.
- Investigating the technique through which automating the answering mechanism and reducing the digital reference librarian work load.

7. TOPOLOGY DIGITAL REFERENCE SERVICE

For answering the reference questions, various communication modes are introduced, such as synchronous, asynchronous and collaborative networks, researchers try to explore that which one communication mode is preferred by the reference librarian and which one is preferred by the users. The virtual reference service communication modes can be broadly divided in to three categories. These three communication modes are asynchronous mode, synchronous mode and collaborative networks. The details of these three communication modes are as below;

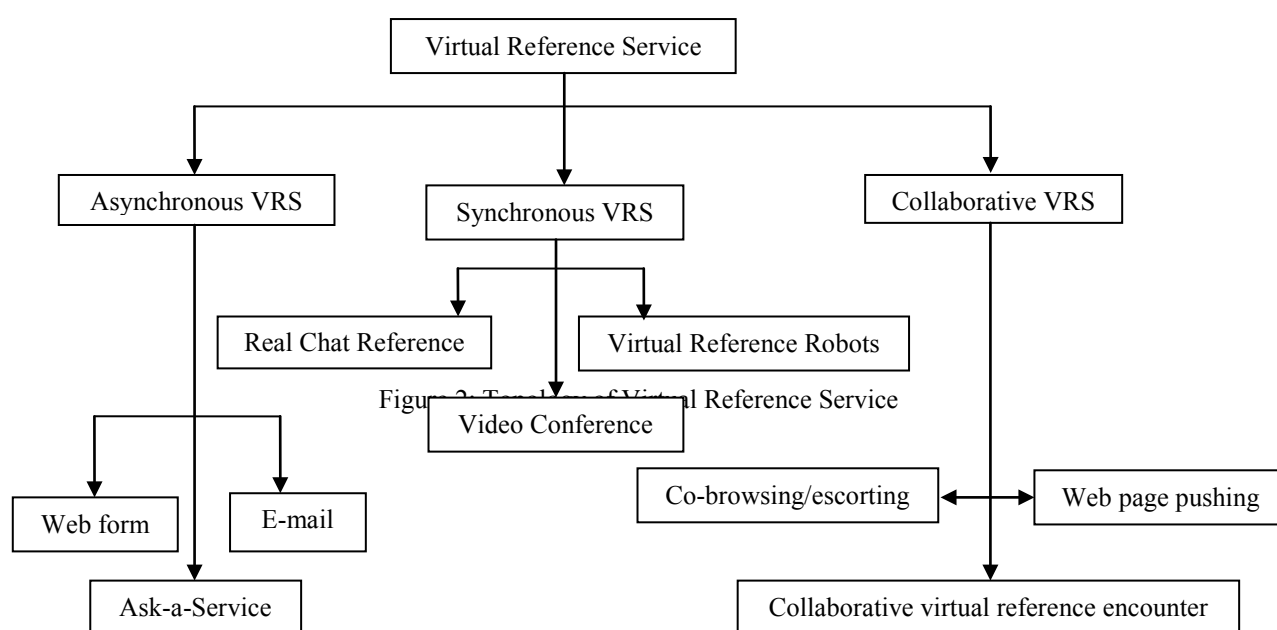


Figure 2-10 Topology of Virtual Reference Service

7.1 Asynchronous Mode

In Asynchronous Mode, where there is a time delay between the question being posed and the answer being given. Asynchronous transactions generally take the form of email, web forms Ask-A-Services.

a. E-mail: Email whereby a user sends a question or a request to the librarian or a specifically designated reference service section via regular e-mail. The user supplies whatever information he or she feels is necessary. The librarian may ask for clarification if necessary, and sends the answer in a return e-mail, or through telephone or fax. E-mail reference service is popular from the users' perspective because it is widely available, it does not require additional software, it is non-threatening and nonintrusive, and the question can be stated in the user's own style of language. From the librarians' perspective, e-mail-based reference is easy to implement, and no extra training is required.

b. Web Forms: Nowadays web form communication are commonly found in library services, Ask A Librarian, can be initiated only from a designated web site, where patrons must respond to specific queries in addition to asking their questions.

c. Ask-A-Services: Ask-A-Services are traditionally corporate-sponsored web sites that allow patrons to ask questions and receive answers for free, from public information located mainly on the World Wide Web or from networks of field experts.

There are benefits of the asynchronous communication mode, but it also presents several challenges. For example reuse and storage of questions, time delays, normally librarian required 2 to 3 days for answering the patrons question in depth, and miss understanding the questions asked by the patrons. Misunderstanding the question is because of lack of structure interview that must be taken from the patron by the reference librarian.

7.2 Synchronous Mode

Synchronous mode, which take place in real-time with an almost immediate response to a query or a request. Synchronous transactions generally take the form of Real Chat reference (Text-based Chat), Video Conference (Web Cam Services), Digital Reference Robots.

a. Real Chat Reference (Text-based Chat): In text-based chat or Instant Messaging, reference librarians and patrons can communicate with each other in real time on the Internet using special text-based software, such as Instant Messengers (AOL, Yahoo, Hotmail, and Google Talk), conference rooms, and chat rooms. In these communications there is a split web screen, on one screen the patron types a question and can instantly see the reference librarian's response on the second screen. Reference librarians can call up web pages or other electronic references to search for the necessary information. Chat technologies enable the patron's to communicate on the internet with others in real time. Chat technology have been used to provide digital reference service as far back as 1995, when the Internet Public Library experimented with a type of text based chat environment called MOO (Multi-user Object Oriented).

b. Video Conferencing or Web Cam Services: In this form, digital reference includes the visual element, which may be a solution to the communications problems inherent in the more test based services. Reference librarians and patrons are able to use both text and verbal communication for reference transaction. Instead of a window for the textual exchange, there is a window in which librarians and users can see each other while conducting a face to face interview.

c. Digital Reference Robots: The robots basically use artificial intelligence to respond to the patron's questions. The best known example is Ask Jeeves, available on Internet.

As real-time communication mode introduces many benefits to librarians and patrons, it also presents several challenges. For example, librarian must regularly organize real-time patron demand with those of walk-in, reference librarian and other staff must be trained to use selected real-time tool, and constant technical support must be offered to maintain the system, and accuracy of the answer is also very important in real-time reference.

7.3 Collaborative Mode

The other format of digital reference service is collaborative digital reference service (CDRS), where more than one library collectively offers reference services using any of the above communication modes. Many virtual libraries, virtual reference services and organization have recognized the benefits of offering virtual reference service through collaborative services. So they share their queries with each other using the internet and other technologies. The collaborative virtual reference service, operated by the library of congress is an international network of libraries, museums, Ask a services that use a help desk system to route questions to appropriate institutions based on member profile. Collaborative mode transactions generally take the form of Co browsing/escorting, Web page pushing, Collaborative virtual reference encounter

a. Co-browsing/escorting is an application-sharing feature found in Web contact centers such as Question Point, and Tutor.Com. Co-browsing is sometimes referred to as *collaborative browsing*, *follow-me*, or *escorting*, and it typically involves remote features that allow librarians to take control of users' browsers, thus allowing them to escort users around the Web. Everywhere the librarian goes the user goes, thus allowing the user to see the librarian's desktop. In some technologies co-browsing is a two-way feature, whereby librarians allow users to lead co-browsing activities while librarians follow. Coffman provides good discussions on three types of co-browsing (URL pushing co-browsing, proxy server co-browsing, and application sharing).

b. Web page pushing also a form of co-browsing, allows librarians to send live Web pages to the user's desktop (with active links) as opposed to screen shots (with dead links), which are copies of windows from the librarian's desktop. Web pages open up in users' browsers with new pages replacing old ones.

c. Collaborative digital or virtual reference encounter refers to collaborative activities between the user and librarian that extend beyond the reference interview. Such activities include co-browsing, escorting, and Web page pushing activities between the user and librarian during digital reference, enabling the user and librarian to jointly view resources such as the online public access catalog (OPAC), online databases, and related resources. Collaborative activities may include computer-mediated instruction and/or demonstrations between the user and librarian. These digital reference encounters may be positive or negative for the user.

Collaborative digital reference services provide many benefits, such as allowing individual institutions to share knowledge and resources, increasing hours of service, and providing right to use a larger collection of knowledge resulting from digital reference service. However, workload and resources sharing with other institutions can also present challenges, such as ensuring the consistency and quality of reply, reaching agreement in developing procedures and policies, and configuring technology that can be best accessed and used by each participating group.

8. GENERAL DIGITAL REFERENCE MODEL OR GENERAL VIRTUAL REFERENCE MODEL

The General Digital Reference Model, pictured in Figure 3, is a general process model developed through an empirical study of high-capacity digital reference services, primarily in the math/science area. The model provides a means of understanding digital reference services as information systems (either as part of a digital library or as a separate, self-contained service).

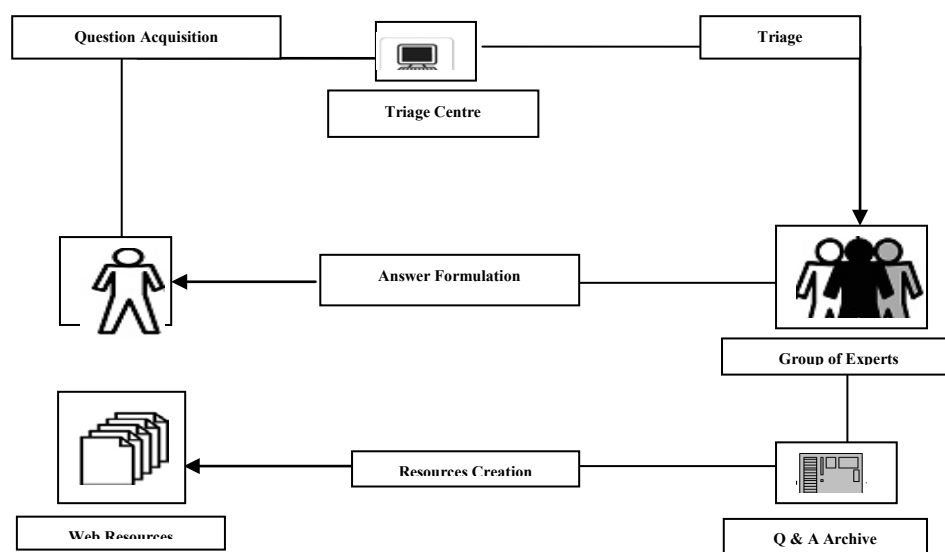


Figure 3: General Digital Reference Model

The model consists of 5 steps:

1. Question Acquisition refers to the taking of a user's questions from e-mail, web forms, chat, or embedded applications. This area of the model concerns best practice in "online reference interviews" and user interface issues.
2. Triage is the assignment of a user's question to a process or topic expert. This step may be automated or conducted via human decision support. Triage also includes the filtering of repeat questions or out-of-scope questions.
3. Answer Formulation includes the expert's determination of factors for creating "good" answers such as age and cultural appropriateness. Answers are also sent to the user at this point.
4. Tracking is the quantitative and qualitative monitoring of repeat questions for trends. Tracking allows the creation "hot topics", and may indicate where gaps exist in the collection(s).
5. Resource Creation concerns the use of tracking data to build or expand collections and better meet users' information needs within and outside of the digital reference process.

Every asynchronous digital reference system uses this simple model. This model is for the existing state of art in asynchronous digital reference, i.e., email and web based digital reference only.

8.1 Limitations

As general process model represents the existing asynchronous digital reference, but there are some issues involved in general process model, which Shahzad identified during his literature studies. The issues of the general process model are as below;

- In general process model there is no mechanism for storing and reuse of questions and answers, neither this model discusses the importance of this mechanism.
- Second issue is much closer to the first issue and that is due to absence of mechanism of storing and reusing questions, when a patron came with same question that was answered before in past by reference librarian, he/she again made efforts for answering the patron's question which increases the workload of reference librarian.
- Due to absence of knowledgebase, reference librarians have to made efforts for compiling answers for repeated questions which decreases the efficiency of the service.
- Final issue is that a very important service of traditional reference desk is ready reference; this service is not present in general process model neither discussed.

9. DIGITAL REFERENCE MODEL OR VIRTUAL REFERENCE MODEL

Digital Reference Model, as in figure 4, is an improved model of general process model. It is developed by Shahzad through an empirical study of high-capacity digital reference services. The model provides a means of understanding digital reference services as a mechanism of storing and reusing questions, when a patron came with same question that was answered before in past by reference librarian, he/she again made efforts for answering the patron's question which decreases the workload of reference librarian. Very important service of traditional reference desk is ready reference; this service is not present in general process model neither discussed (Shahzad, 2009) which is present in proposed Digital reference model.

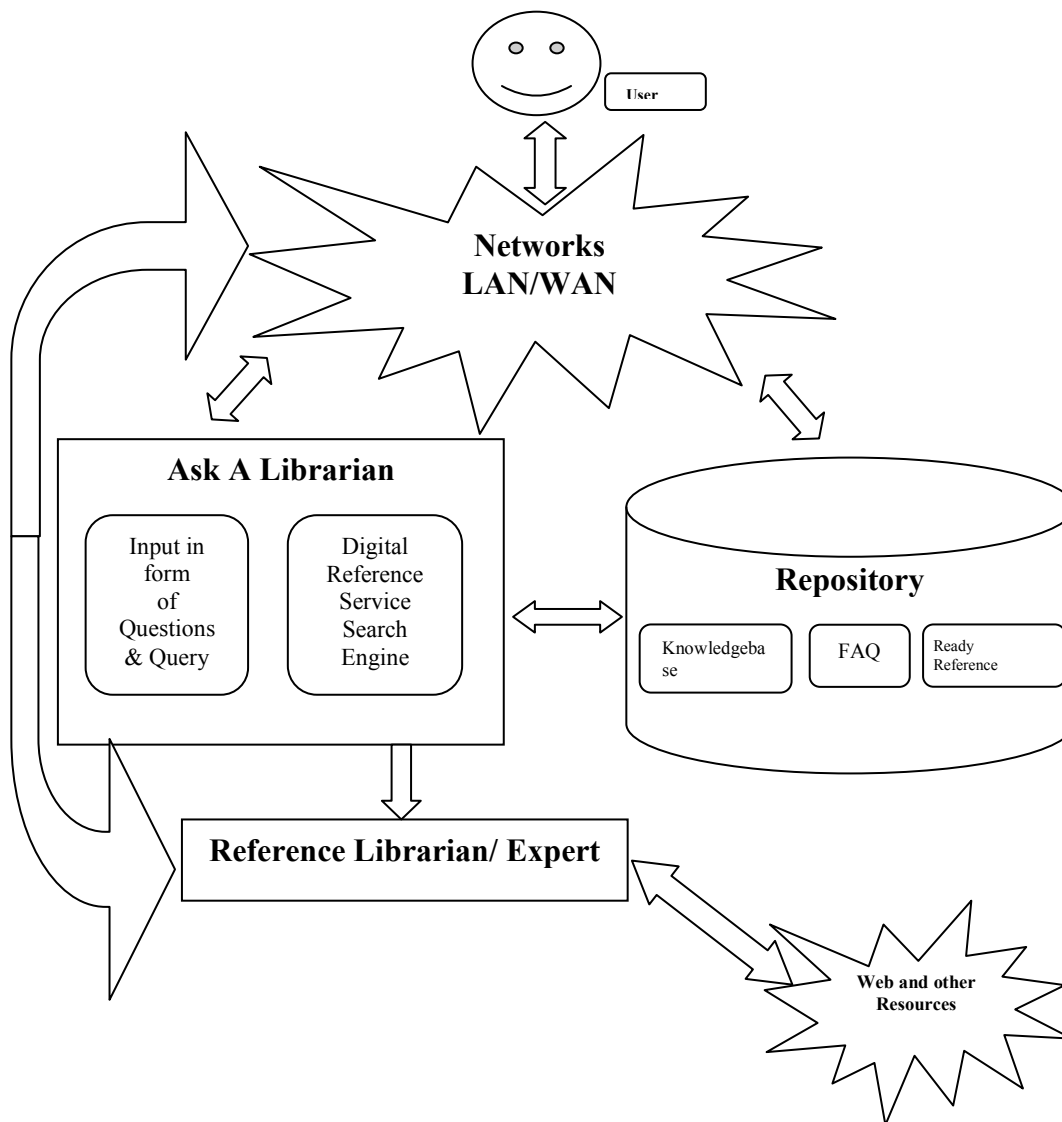


Figure 4: Structure of Model for Digital Reference Service Proposed by Shahzad

9.1 Components of the Digital Reference Model

The components of our digital reference service are discussed one by one in sections below;

- *Digital Reference Service Search Engine*: DRSSE is search engine which takes the users questions automatically from the web form and search for the answer in the knowledgebase, FAQ, and ready reference and after searching presents the results to user.
- *Knowledgebase*: Knowledgebase is the repository where questions and answers are stored and reused for the future use.
- *FAQ*: FAQ stands for the frequently asked questions; FAQ is archive of the answers to questions most commonly asked by new users. FAQ is used for reducing the number of frequently asked common questions.
- *Ready Reference*: Ready reference is repository where the answers for the factual questions are stored. Dictionary, encyclopedia, and bibliographic dictionary are the components of the ready reference.
- *Reference Librarian*: Reference librarian is the person who answers the user's questions. Reference librarian is responsible for managing the digital reference services.
- *User Interface*: User interface is virtual component of the digital reference service. Because these all above components are linked with user interface.

Digital reference service is one of the virtual services provided by digital libraries. This describes the issues of digital reference services and proposed a solution to overcome these issues. For this purpose improve the existing general digital reference model for digital reference services. In digital reference model incorporate some virtual components. These incorporated components are

knowledgebase, digital reference service search engine and ready reference. The structure of these incorporated components is discussed in detail. By incorporating these vital components in digital reference services improves the digital reference services and overcomes the storage and reuse issue, increases the efficiency of the service and reduce the workload of the reference librarian.

10. VIRTUAL REFERENCE SERVICE 1.0 MODEL

The Virtual Reference Service 1.0 Model, pictured in Figure 5, is a simple process model developed through using of web 1.0 tools in virtual reference services, provide high quality reference service, primarily this model use in academic intuitions'. The model provides a means of understanding virtual reference services as information systems. This model consist 5 steps almost like general process model provide by lankes 2004. This model is used in asynchronous virtual reference system. This model is for the existing state of art in asynchronous virtual reference, i.e., email and web based virtual reference only.

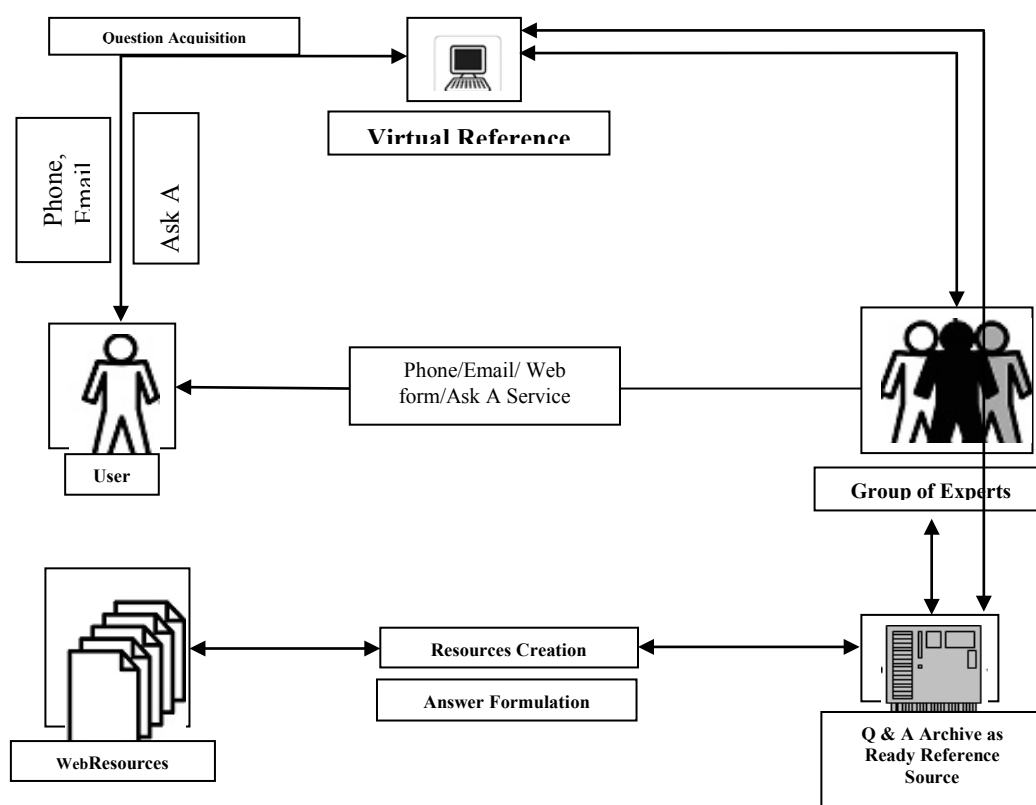
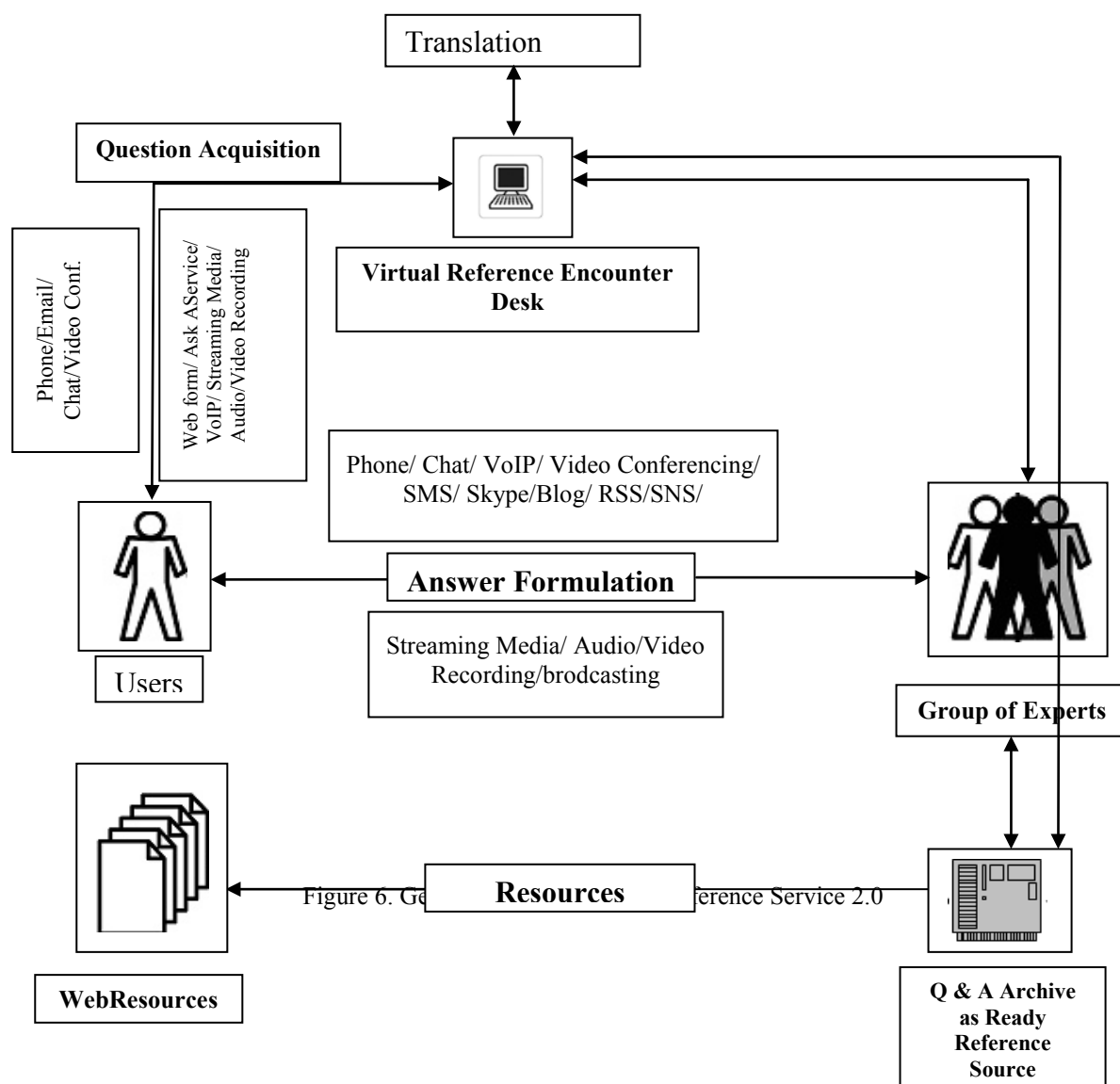


Figure 5: Virtual Reference Service 1.0 Model

11. GENERAL MODEL OF VIRTUAL REFERENCE SERVICE 2.0

The virtual reference service 2.0 model pictured in figure 6 a process model development through web 1.0 to web 2.0. Web 2.0 provides reference service to remote users. This model is used in information centers/research institutes. This model provides to understanding virtual reference and information system and model consist six steps question, question acquisition, refers to virtual reference desk, answer formation, tracing of repeat question and resource creation. The model is used in asynchronous and synchronous for the existing stage of virtual reference service.



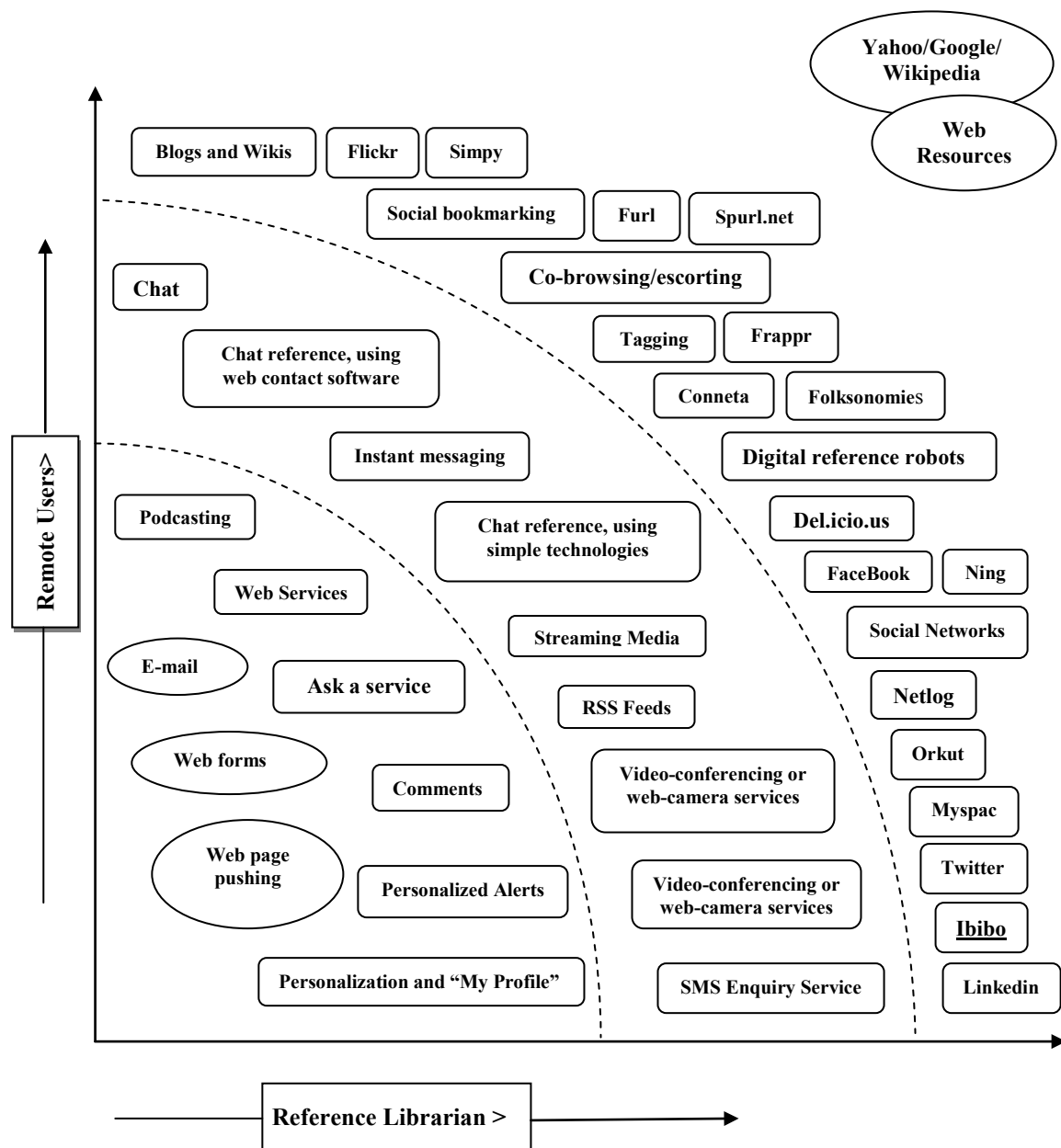


Figure 7: Two Dimensional Model of Virtual Reference Service 2.0

This is a conceptual model of reference 2.0 and library 2.0 as demonstrated in fig. 6 is intended to capture major rudiments and constituents when web 2.0 tools are introduced into reference services, even though the model was visualized two dimensionally, the actual relationship among user, librarian and resources. On the other hand, the reference 2.0 model we proposed is only initial step towards our efforts to fully explore the applications and implementation when web 2.0 and library interacts.

13. CONCLUSION

A reference service obligation to serve its remote users is recognized and well appreciated. Knowledgebase is an important part of digital reference service for reusing and storing the questions and answers for the future reuse.

Currently the existing digital reference services available for answering the patron's questions, are not storing and reusing the patron's questions and answers. By analyzing the questions of the patrons in digital reference services we conclude that these patron's questions are repeated questions, and these questions can be stored and reused for the future use. The existing services just

gets the questions from the patrons and reference librarian answer the questions and process ends here.

Due to absence of the mechanism of storing and reusing the questions reference librarians and patrons both suffer, librarian made efforts for compiling the answers for repeated questions, and user have to wait till reference librarian provides the answer. So today's digital reference services need to incorporate knowledgebase in their systems, for improving their service efficiency, and reducing the workload of librarian, and for quick response to the patron's repeated question. It can be also concluded that for providing the answers for the ready reference factual questions, reference services must also incorporate the ready reference section in their services.

REFERENCES

1. Arya, Harsh Bardhan & Mishra, J.K. 2011. Oh! Web 2.0, Virtual Reference Service 2.0, Tools & Techniques (I): A Basic Approach. *Journal of Library & Information Services in Distance Learning*, 5(4), pp.1–23.
2. Bennett, B. 1998. Pilot testing the KidsConnect service. In Lankes, R. and Kasowitz, A. (Ed), *AskERIC starter kit: How to build and maintain digital reference services* (pp. 147-150). Syracuse, NY: ERIC Clearinghouse on Information & Technology, Syracuse university.
3. Bertot, J. C., McClure, C. R. and Ryan, J. 2001. Statistics and performance measure for public library networked services. Chicago: American Library Association.
4. Carter, David S., and Joseph Janes.2000. Unobtrusive data analysis of digital reference questions and service at the Internet Public Library: An exploratory study. *Library Trends*, 49(2), pp. 251-265.
5. Coffman, Steve. 2003. *Going live: Starting and running a virtual reference service*. Chicago: ALA.
6. David, A. T. 2001. What is the Best Model of Reference Service? *Library Trends*, 50(2), pp. 183-196.
7. David, A. T.1997. What We Do: Reaffirming the Founding Principles of Reference Service. *Reference Librarian*, 28(59), pp. 3-13.
8. Dollah, W. A. K. W. & Singh, D. 2006. Digital Reference Services in Academic Libraries. In Khoo, C. and Singh, D. and Chaudhry, A.S., (Eds). *Proceedings ALIEP2006: Asia-Pacific Conference on Library and Information Education (ALIEP2006)*, pp. 122-135, ALIEP: Singapore. (Conference Proceedings)
9. Elizabeth, B. F., Anne, C. M. and Beth, W. L. 2008. Reference Librarians at the Reference Desk in a Learning Commons: A Mixed Methods Evaluation. *The Journal of Academic Librarianship*, 34(3), pp. 231-238.
10. Francoeur, Stephen. 2002. Digital Reference. The Teaching Librarian. Available at <http://www.teachinglibrarian.org/digref.htm>.
11. Green, S. W. 1876. Personal Relations between Librarians and Readers. *American Library Journal*, 1(2-3), pp. 74-81.
12. Hesse, Mary B. 1966. *Models and analogies in science*. Notre Dame, Indiana: University of Notre Dame Press.
13. Hodges, Ruth.2006. *The impact of collaborative tools on digital reference users: an exploratory study*, The Florida state university: Florida.
14. James, A. S. and John, T. B. 2001. Developing a Model to Provide Digital Reference Services. *Reference Services Review*, 29(3), pp. 172-188.

15. Janes, J. 2000. Digital reference: services, attitudes, and evaluation. *Internet Research* 10(3), pp. 256-8.
16. Kaplan, Abraham. 1964. *Conduct of inquiry. Methodology for behavioral science*. San Francisco: Chandler Publishing Co.
17. Kasowitz, A. S. (2001). Trends and Issues in Digital Reference Services. *ERICDigest*, ERIC Clearinghouse on Information and Technology Syracuse NY. Available at http://eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/19/52/0f.pdf
18. Kasowitz, A., Bennett, B. and Lankes, R. D. 2000. Quality Standards for Digital Reference Consortia. *Reference and User Services Quarterly*, 39 (4), pp. 355-63.
19. Laing, Gordon. 1986. *Building scientific models*. Vermont: Gower Publishing Co.
20. Lankes, R. D. 1999. AskA's: Lesson Learned from K-12 Digital Reference Services. *Reference & User Services Quarterly*, 38(1), pp. 63-71.
21. Lankes, R. D. 2004. The Digital Reference Research Agenda. *Journal of the American Society for Information Science and Technology*, 55 (4), pp. 301-311.
22. Lankes, R. D. 2003a. *Digital Reference*. In Miriam Drake (Ed), *Encyclopedia of Library and Information Science (2nd Edition)*. New York: Marcel Dekker, Inc.
23. Lankes, R. D. 2004. The Digital Reference Fallacy. In Bill Katz (Ed.) Co published simultaneously as *Digital Reference Services* Hawthorn Press: New York.
24. Lankes, R. David (1998). Building & Maintaining Internet Information Services: K-12 Digital Reference Services. Syracuse, NY: ERIC Clearinghouse on Information & Technology.
25. Lankes, R. David, and Abby Kasowitz. 1998. *The AskA starter kit: How to build and maintain digital reference services*. Syracuse, NY: Syracuse University. ERIC, ED 427 779.
26. Lankes, R. D. 2004. The Roles of Digital Reference in a Digital Library Environment. *Commissioned white paper for the International Conference of Digital Library-Advance the Efficiency of Knowledge*. Available at <http://quartz.syr.edu/rdlankes/Publications/Proceedings/DigRefWP.pdf>
27. Lave, Charles, and James G. March. 1993. *An introduction to models in the social sciences*. Lanham, MD: University Press of America, Inc.
28. LITA (1999). Top Tech Trends. Available: <http://www.lita.org/committe/toptech/trendsmw99.htm>
29. Maharana, B. and Panda, K. C. 2005. Virtual Reference Service in Academic Libraries: A Case Study of the Libraries of IIMs and IITs in India. Available at <http://eprints.rclis.org/9358/>
30. Mardikian, J. and Kesselman, M. 1995. Beyond the desk: Enhanced reference staffing for the electronic library. *Reference Services Review*, 23 (1), pp. 21-28.
31. McClure, C. and Lankes, R. (2001). Assessing Quality in Digital Reference. Available at <http://quartz.syr.edu/quality>
32. Morrison, Margaret, and Mary S. Morgan. 1999. Models as mediating instruments. In Mary S. Morgan and Margaret Morrison (Ed.) *Models as Mediators* (10-37). Cambridge: Cambridge Press.
33. Pomerantz, J. 2003a. *Question Taxonomies for Digital Reference*. Dissertation, Syracuse University School of Information Studies, Syracuse, NY.

34. Pomerantz, J., Nicholson, S. Belanger, Y., & Lankes, R. D. 2004. The Current State of Digital Reference: Validation of a General Digital Reference Model through A survey of Digital Reference Service. *Information processing & Management*, 40(2), pp. 347-363.
35. Pomerantz, J. 2003. Integrating Digital Reference Service Into the Digital Library Environment. In Lankes, R. David, Goodrum, A., & Nicholson, S. (Eds.) *The Digital Reference Research Agenda*. Publications In Librarianship, Chicago, IL: Association of College & Research Libraries.
36. Rothstein, S. 1953. The Development of the Concept of Reference Service in American Libraries, 1850-1900. *Library Quarterly*, 23(1), pp. 1-15.
37. Rothstein, S. 1955. *The Development of Reference Services Through Academic Traditions, Public library Practice, and Special Librarianship*. Chicago: Association of College and Research Libraries. ACRL Monograph Number 14. Reprinted by Gregg Press in 1972.
38. Shahzad, Azim. 2009. *Digital reference services models*, M. Phil. Dissertation, Dept. of computer science, Islamabad, Pakistan: Quaid-i-Azam University.
39. Still, J., & Campbell, F. 1993. Librarian in a box: The Use of electronic mail for reference. *Reference Services Review*, 21 (1), pp.15-18.
40. Su, S. S. 2002. Web-based reference services: the user intermediary interaction perspective. In *Gorman, G. E. 2002. The digital factor in library and information services*. London: Facet Publishing.

Changing Priorities of Five Laws of Library and Information Science in the 21st Century

Santosh Biradar¹ and A.N. Bandi²

¹*ssbiradar84@gmail.com*

Narsee Monjee Institute of Management Studies, Mumbai

²*dr.anbandi@gmail.com*

National Institute of Fashion Technology, Mumbai

ABSTRACT

The paper traces the historical background of the laws of library and information science. Enumerates each law with modern approaches for the same. The paper underlines the validity of each law of library and information science in today's digital era. The authors conclude the paper with the empathy of everlasting accuracy of Dr.S.R.Ranganathan's projection of these five laws with re-positioning them the priorities based on their applications.

1. BACKGROUND:

In 1931, Shiyali Ramamrita Ranganathan, a mathematician and librarian who is widely regarded as a founder of modern library science, proposed his Five Laws of Library Science (Ranganathan 1931). His five laws have provided powerful guidance for generations of librarians. As a framework for evaluating library programs, policies and strategies, there is probably not a single document as widely known, respected and referenced even today, more than 85+ years after its publication. The path breaking development in the field of library and information science and services taken new dimensions after 1931. The five laws of library and information science invented by Dr. S R Ranganathan, a mathematician turned library scientist with his experimentation then, based on the practical applications in the domain of library practices and services for the privileged few. The innovative instinct in Dr. S R Ranganathan prevailed over the forthcoming developments in the subject area. The Five laws are presumed to be known as "Library science forecasting" which was being understood by the author thread bear. The primitive library and information science and practices were confined to the upper strata of the society and the significant portion of the society deferred of accessing the information/ knowledge resource like books, newspaper, magazines, notes etc.

An understanding scientific and systematic librarianship in India traced with the formulation of five laws of library science enumerated by Dr. S R Ranganathan in the year 1931. The background of each law traces the historic significances and the procedures adopted by library systems functioning then. The first laws of library science directs the libraries that "books are for use" and not to be kept under lock and key. The second law indicates the "free flow of information" insisting that Every Reader has his/her Book. The Third law projected "Every information is having its users" and no information is ideal. Fourth law gives directions to the Library practitioners to be consolidator of information resources to assist user community in identifying their information needs while saving the valuable time with ready reference guidance. The fifth law underlines the spurt in growth of information resources and its continuity.

First of all, like any philosophy, it is important to realize that merely staring the five laws or even understanding the words-will not automatically lead to enlightenment about the functions of libraries. Although simply stated, the laws demand contemplation and experience before the richness and importance of their invention will reveal the co-existence of their needs.

2. The Five Laws of Dr.S.R.Ranganathan

1. Books are for use
2. Every Reader his or her Book
3. Every Book its Reader
4. Save the time of the Reader
5. Library is a growing organism

As Ranganathan predicted the fourth law "Save the Time of the Reader" has arisen in importance as the requirements for the first three laws have been progressively satisfied. Given the vast array of content being offered through a multitude of information service providers, scarcity of time and attention is one of the most pressing issues faced by the user community today. "Save the time of the reader" has become the most important of Ranganathan's five laws and should be the lens through which is interpreted as useful reading by the users for their wellbeing by enhancing their knowledge.

S.R. Ranganathan invented the term library science. He believed that all human activities were susceptible to analysis using the scientific method and that such a careful examination of the phenomena of library work could lead to the formulation of empirical "laws." However, they are more than mere generalities because they are founded on observation and analysis by a trained mind. (Dr. Ranganathan was originally a mathematician.) He, like the other genius of librarianship, Melvil Dewey, used high intelligence, the scientific approach, and considerable experience in his rethinking of our profession.

First Law: Books are for use

One of the astounding things about Dr. Ranganathan's Five Laws is the depth of meaning compressed into so few words. Such coexistence of characteristic of the western poetry and eastern teaching (secular and spiritual). Even in Ranganathan's days, books were not the only documents collected by libraries, and it is wrong to conclude from his words that books were the only library materials that mattered to Ranganathan most. His essential point was that libraries acquire materials and make them accessible so that they can be used. There is a real difference between libraries and museums. With few exceptions, books and other library materials are important not as objects but for the knowledge and information they contain. Even the maintenance of unused or little-used items in research libraries is justified in terms of potential use. For most collections in most libraries, we must heed this law and value usefulness.

Library will have to build collections not for vanity but for use of keeping the need of user information in mind.

Second Law: Every book it's Reader

"Every item of library material its user" lacks the snap of Dr. Ranganathan's formulation but expresses modern reality better. This law teaches us two lessons. The first is that we do not acquire library materials in the abstract. Each acquisition should call to mind a potential user-by name (if something has been requested specifically) or by type. Both general and specific collection decisions are, of course, dictated by knowledge of the community the library serves. One must take decisions not only on the known community of the present but also on likely future needs and changes in community.

The second lesson is that even the most apt selection choice can be vitiated if it is not backed up by an efficient and user-friendly bibliographic control system. The law works both ways. Acquire only

those things with potential to be used and ensure that library users can quickly locate the material that they wish to refer or use.

Third Law: Every Reader his/her book

This law is the complementary reverse of its predecessor. As with the other laws, we need to see beyond the words for the meaning they embody. Dr. Ranganathan certainly did not mean to imply that all "readers" (library users) are male or that only males are governed by this precept. Nor, again, did he mean that books are the only useful library materials. He did believe that reading is a most important path to learning and wisdom- sometimes unfashionable view among the false egalitarians of today who proclaim that viewing images or manipulating computer data is the intellectual equivalent of the sustained reading of text. Leaving that aside, Ranganathan is telling us that when a library user comes to a library or gains access to library services, certain materials (textual, graphic, and/or numeric) will meet her or his needs. It is our job to ensure that the connection between Library user and material is made and that connection is as speedy and as practical as possible. That is why we select useful materials, create usable catalogs, provide helpful reference service, and do all the other things that add up to total library service.

Another lesson is to be found in the words "every reader." We should never forget that every single member of the community we serve is entitled to access to all collection

Librarian should act as a proactive mediator between the users and library materials.

Fourth Law: Save the time of the Reader

Service-oriented librarians are often hobbled in their ability to serve better because of certain institutional policies. Ranganathan's fourth law is, when properly understood and employed, it acts as a management tool of great utility. A library that examined every aspect of its policies, rules, procedures, or systems with that one simple criterion in mind 'save the time of the library user'- would find the consequent changes transformational.

This is a more complicated process than it might appear. Consider these questions. Would self-charging system be quicker for the user than an efficiently run, well-staffed library circulation desk? Imagine a good service-oriented supermarket. Few would think that its services can be enhanced had the staff of supermarket packed groceries for customers. How can you run a reference desk to deliver quicker and better service without setting up potentially cumbersome queuing systems for in-depth reference service, informational questions, and telephone inquiries? Does the speed and ease of use of academic departmental libraries of others must be paramount in our decision-making process?

We should always bear in mind that the time of library users is precious.

Fifth Law: The library is a growing Organism

It is accepted fact that Libraries do grow and change and will always do so in future. Compact shelving, microforms, and electronic resources might seem to imply less growth or even shrinkage, but there is no evidence that the growth of library collection shrinks. Space continues to be at a premium in most libraries. Books, journals, videos, and sound recordings continue to be published in great numbers, and the slowdown in the growth of many collections has been caused by financial constraints and not the availability of, or demand for, new materials. Change comes along with growth. Healthy growth implies flexibility in the use of library space for academic activities. We need to understand that libraries keep growing and the plan should be in place to augment the changes accordingly.

3. CHANGING PRIORITIES OF FIVE LAWS OF LIBRARY SCIENCE: A PARADIGM SHIFT

Lynn Silipigni Connaway and Rachel M. Faniel in their report mentioned that, during the time of Melvil Dewey and Dr. Ranganathan, the first law, “books are for use,” was the driver. Both of them came from backgrounds in which information scarcity was immense, and protecting the library collections was a priority. Closed stacks were the rule in Dewey’s time, and chaining books to shelves was not uncommon. In a world where publishing was still relatively expensive and copies of prime books were rare, librarians were treated often as gatekeepers than information guides. Dewey specifically developed the DDC to address this issue, inventing a system that is both understandable to the public and not tied to any specific library or librarian’s methods. A classification system is, essentially, a way for anyone anywhere to understand how to access materials. In short, “books are for use.” Books still holds a powerful place in our cultural psyche. Whether a book is read on leather-bound thick sheets of paper or a smartphone screen, the point isn’t (and probably never has been) the medium. When we say, “I just read a great book,” it doesn’t mean that the action of sitting down, turning the pages and moving our eyes over the words. Those actions are the same for every person who ever read a book. What we mean, of course, is that we enjoyed spending time transferring someone else’s thoughts into our own. These same experiences hold true for information or entertainment in any media.

A Facebook like or Tweet about a research presentation or a review on Goodreads transmits the same message: These and the following examples are all, essentially, new ways of saying, “books are for use,” “every person his or her book,” or “every book its reader”:

- Facebook post for a YouTube video;
- Embedded link to a scholarly article in a blog post;
- Good Google search rank on a particular phrase;
- Book cover picture on a Pinterest page.

The difference is that they are for very large, complex and increasingly creative values of reader and book. Applying Ranganathan’s laws to the current environment shows, in fairly stark terms, the difference between the time in which Dewey and Ranganathan worked and the information environment in which we operate today. We have moved from an era of content scarcity to one of incredible abundance and diversity, which is being contributed to by a multitude of channels and contributors. These differences are at the center of what has changed the interpretations of the five laws. The authors furthered that, the five laws of Library Science of Dr. S. R. Ranganathan have been reprioritized and repositioned based on the current trends of dynamic information channels and coexistence of user changing approaches to information needs. As such, the laws of Dr. S. R. Ranganathan proved to be repositioned and the same is depicted below.

Laws	Original Conception	New Conception
First Law	Books are for use	E-Resources are for use, YouTube for watching, Blackboard for learning
Second Law	Every reader his/her book	Every listener/learner his/her iTunes for listening, Photoshop etc.
Third Law	Every Book Its reader	Every Blog, google scholar, wiki, IRs, are having its Readers
Fourth Law	Save the time of Reader	Save the time of listeners, researcher,

Fifth Law**A Library is a Growing Organism**

Based on the above conceptions of the laws of library science, the fifth law remain to be in its predominant position and remaining four laws have changed their priorities. Accordingly, in their report, Lynn Silipigni Connaway and xchel M. Faniel repositioned the laws of library science.

1. Save the time of the reader
2. Every user his/her book
3. Books are for use
4. Every book its reader
5. A Library is a growing Organism

4. CONCLUSION:

Dempsey in his study “inside-out”, library is an inversion of traditional metrics in many ways. Most content is not gathered in a centralized storage area inside the library; it is out there, and the librarians’ job is to help users find it. People don’t come to one location for information; they seek it as part of their information, study, work and entertainment habits, and the library’s job is to engage in those places and moments with its materials and services.

In a world where Ranganathan’s fourth law, “save the time of the reader,” is the most important, our measurements of growth need some “inside-out” thinking too. We need to grow how we think about growth. Discussing, measuring and maintaining it needs to be a continuous process, and librarians may need to pursue challenges that are uncomfortable. A set of nice, simple, linear graphs that show how collections, staff and infrastructure grow over time relative to the size of the communities they serve is comforting. It’s easy to communicate, but it’s fatally flawed.

REFERENCE:

McMenemy, D 2007, 'Ranganathan's relevance in the 21st century', *Library Review*, vol. 56, no. 2, pp. 97-101. Available from: 10.1108/00242530710730268. [17 November 2015].

Panda, K, & Mandal, M 2006, 'Corporate culture in libraries and information centers to promote "knowledge-based business" in IT era', *Library Management*, vol. 27, no. 6/7, pp. 446-459. Available from: 10.1108/01435120610702431. [17 November 2015].

KENNEDY, SD 2013, 'Save the Time of the User', *Information Today*, vol. 30, no. 1, p. 23.

Pandita, R, & Singh, S 2015, 'Research growth in LIS during last decade: a study', *Library Review*, vol. 64, no. 8/9, pp. 514-532. Available from: 10.1108/LR-04-2015-0037. [17 November 2015].

Kochunny, A 2015, 'A Handbook for Corporate Information Professionals Edited by', *Library Review*, vol. 64, no. 8/9, pp. 633-634. Available from: 10.1108/LR-08-2015-0087. [17 November 2015].

Leiter, R. (1996). The five laws of library science. *Paralegal Today*, 14(2), 72-73. Retrieved from <http://search.proquest.com.ezproxy.svkm.ac.in:2048/docview/204953883?accountid=32277>

Quick Response (QR) Codes in Libraries: A Case Study on the Use of QR Codes in the Central Library, NITK

Iranna M. Shettar

imshettar@gmail.com

Central Library, National Institute of Technology Karnataka, Surathkal – 575 025

ABSTRACT

QR codes are two-dimensional matrix barcodes. Last decade witnessed a steady growth in commercial and business oriented usage of these QR codes with the advent of smart and web capable mobile phones. But the movement of using QR codes in Library & Information field is still in its primary stage. This paper explains application of QR Codes in Library resource and service awareness activities. The present study focuses on brief introduction to QR codes along with how it works and its features. It also attempts to explain the use of QR codes in libraries, with special reference to QR code implementations in Central Library, NITK. This paper serves as a guide to all those who want to implement QR Codes in their Library.

Keywords: QR Codes, Case Study, Library Marketing, Smartphones, QR Code generator, QR Code Reader, NITK

1. INTRODUCTION

Quick Response codes or in brief QR Codes, are two dimensional (2D) matrix barcodes that is scanned using exploitation sensible and web capable smart mobile phones having camera, with QR Reader put in as default application, allows one to access some pre-written content such as a web site address, email address, details of things within the catalogue, phone numbers etc.

QR Code is a reasonably 2-D symbology developed by Toyota subsidiary Denso Wave in 1994 with the first aim of being a symbol that is easily decoded by scanner instrumentation at high speed with additional knowledge content than conventional barcodes. Conventional Universal Product Code contains decoded data in one direction i.e. vertically into bars and house in between; whereas QR Code contains decoded data in each the directions i.e. vertical and horizontal direction. QR code is capable of holding additional volume of information than barcode, which is even a whole bunch of times as abundant data.

2. HOW QR CODES WORKS?

Information may be encoded into a QR code by QR Code generator (Some of QR Code generators available online are listed in later part). Data may be easily encoded in to QR codes by using any freely available QR code generators, enter the information to be encoded in to the sphere provided by generators. QR code generators may ask you to enter data to 1 to several Data Fields available, supported what data you're encoding. Once all the information fields crammed with necessary data in correct format QR code generator can publish the QR code for the data, which is able to be in the main in image format (JPEG, BMP, and PNG etc.). This could be used directly on internet or mails in e-format or may be revealed in Print format. It's additionally attainable to disarrange the color and even attainable to feature image in to QR codes to supply creative embellishment.

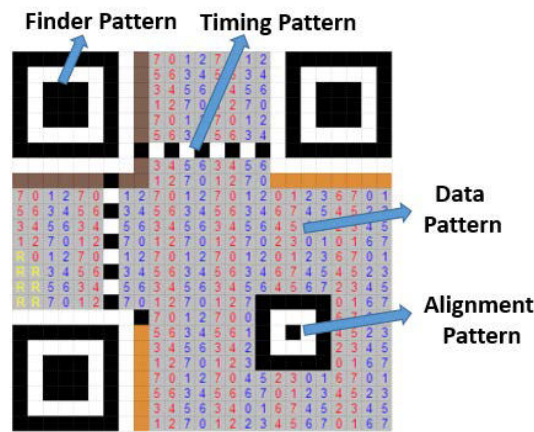


Fig. 1. QR Code Structure

Decoding of those QR codes may be done by on-line QR code decoders associated with any internet enabled good phone that has QR code Reader software package program pre-installed, If not the software may be downloaded from varied sites that are freely available on internet (Some of QR Code readers offered on-line are listed in later part). QR codes may be decoded with on-line decoder like ZXing Decoder on-line, MiniQR, on-line Barcode Reader, Saint Patrick Wied QR Generator, QR Code Generator and Recovery. QR codes can also be decoded with good Phone's Camera by inform towards QR code and scanning with image capture. Then pre-installed QR code reader decodes the QR code and displays content as text or uniform resource locator format. QR Codes additionally prompt your mobile device navigate to an internet page actions like dial variety, send SMS, Save Reminders, save variety to Phone Book etc. Most common QR Code functions are given below:

- Encode phone numbers, text messages, commands and phone data.
- Prompt to direct to open a URL
- Bookmark a site link
- Prompt to form a call from mobile
- Prompt to send a SMS from mobile
- Prompt to begin an email
- Send a vCard
- Store a date in your calendar (to schedule an appointment)
- Return text
- Encryption
- Record geographic coordinates

Some of the QR Codes designed to offer multiple functions from advanced smart phones.

3. FEATURES OF QR CODES

According to Denso Wave, developers of QR Codes:

- Conventional barcode can store a maximum of 20 digits; whereas QR Code can capable to store hundred to thousand-fold of more information.
- QR codes are capable of handling all data varieties, such as Alpha-Numeric, Special characters, Kanji, Kana, Hiragana, binary and control codes.
- A QR code Data storage capacity: Max. 7,089 numeric characters, Max. 4,296 alphanumeric characters, Max. 2,953 binary bytes, Max. 1,817 Kanji, full-width Kana characters or a mixture of all others.

- For QR Codes very little output Size is needed, as QR code carries data both horizontally and vertically. Comparing to Barcode, QR code is capable to store same quantity of data in about one-tenth of the area.
- QR Code has error correction capacity. Even dirty or broken image is repaired and max. up to 30% code will be corrected.
- QR Code is readable from any direction across 360 degree (omni-directional).
- QR Code has got Structured Append Feature, where QR Code is divided into multiple data areas and all the information is stored in multiple QR Code symbols that can be recreated as single data symbols.

4. HOW TO GENERATE A CODE?

There are many QR code generators some are listed below are may not be the best but these are tried by the author:

Kaywa (<http://qrcode.kaywa.com/>), GoQR.me (<http://goqr.me>), QRMobilize (<http://qrmobilize.com>), QR Code and 2D Code Generator by Kerem Erkan (<http://keremerkan.net/qr-code-and-2d-code-generator/>), QR Stuff (<http://www.qrstuff.com>) MyQR (<http://myqr.co/>), Quickmark (<http://www.quickmark.com.tw/En/qrcode-datamatrix-generator/>), BeQRious (<http://www.beqrious.com/qrcode/create>), Bosqweb (<http://www.bosqweb.net/en/QR-code-generator>), QReate & Track (<http://app.qreateandtrack.com/#/create/event>)

5. HOW TO GET QR CODE READERS

Most of the modern day Smart mobile phones available in market come with pre-installed QR Code readers. However one can download the QR Reader software from various App Stores (iOS, Android, Windows) and Desktop version from various online service providers.

6. QR CODES IN MODERN LIBRARIES

With the advent of smart and Web capable mobile devices, we are witness to a steady growth in commercial and business oriented usage of these QR codes. Modern Libraries and its services are best placed to implement application of these QR Codes. These codes are capable to deliver required information to modern day Library users and give them quick access to the information whenever and wherever they want.

Online catalogues to be replaced with these new generation interfaces to reach the expectation of Mobile-Tech savvy library users. ‘Want to know more about the book from library before you check-out?’ Using your smart phone to scan the QR code to read Book review and rating by other readers on publisher sites. QR codes can be most effectively added to the communication as a dynamic component which otherwise non interactive. This is considered as “Cool Stuff” by modern day advertisers and consumers.

Marketing of Library products and services is essential to create the awareness amongst the library users because those who lack of information may not even be aware of these products and services available in your library. QR codes can be used in order to:

- Promote information resources and events;
- Create need for information;
- Manage information explosion;
- Create awareness;
- Information dissemination;
- Connect with user community.

7. QR CODE APPLICATION IN CENTRAL LIBRARY, NITK

NITK is one of the oldest and most prestigious Centrally Funded Technical Institution in India. The Central Library serves 14 departments across campus, and the user community consists of over 5,000 resident students and 300 faculty members. Currently, the library's print collection contains 2.5 lacks items, and the electronic collection includes 14 databases, 6,000 full text e-journals and 5,000 e-books.

Central Library actively involved in promoting its resources and services to the library users to facilitate optimum use. A large number of Web 2.0 tools and techniques are implemented in Library promotions to reach out and engage with the new generation users. Central Library added excitement to the users experience with QR Code implementation in library resources and services. It is helping Library to connect with Users with extended information on resources; showcasing the library services and new resources in creative, inspiring ways and including links to the website and social networks helps to drive awareness and encourages users to share feedbacks and opinions. Some of the Library services or activities that can be coded are:

7.1 Link to websites and online information sources

Central Library provides QR Code for important Websites and online resource links like: Library Website, Online Journal/ Magazines, Online Dictionaries links as well as to Apps, if any available. QR code also allows to bookmark important links, with the bookmark title of your choice.

7.2 QR Codes for Ask your Librarian

Central Library provides QR Codes to facilitate “Ask your Librarian”, which popups new SMS, WhatsApp Message box, new E-mail Message box with predefined librarian's Contact details.

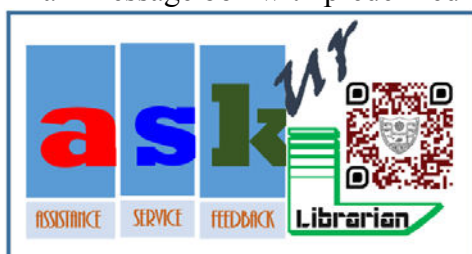


Fig. 2. QR Code for Ask UR Librarian @ NITK

7.3 QR Code for Library WEBOPAC

With Wi-Fi enabled Library, User no longer required computer to use WebOPAC. They require a Smart Phone now to access WebOPAC even in the midst of book stack area. The smartly designed QR Code enables access between Smart Phone and library management server to retrieve real time status of the documents they are searching for.

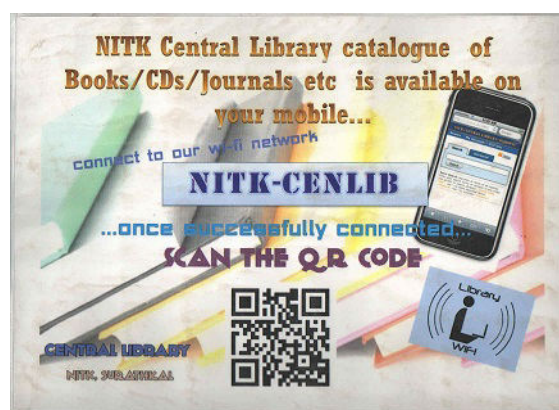


Fig. 3. QR Code for WEBOPAC @ NITK

In case of the title available in online electronic format, book will have QR code for the online eBook to read it on the screen or allow to Bookmark the link.

7.4 QR Codes for Library Outreach / Awareness / Marketing Events

The QR code for an event can contain data for a Library Outreach Programs or Awareness Sessions or other Marketing events like Book Exhibition, Product Trials etc. Event QR codes can be created with basic information like event title, start and end date and time, location, etc. Generated QR code should be published on event poster or even webpage. Event QR codes allow library users to save the event in their Smart phone calendar, which even reminded on the event date, to assure attendance to the event.



Fig. 4. QR Code for User Awareness Event Poster @ NITK

In case, Registration is required for the event online Registration form also can be incorporated along with QR code.

Besides all the above, Library Instructions such as Library Rules, Timings, Contact details, E-mail address, Telephone Number, Links to Library Website, its services page, mainly to the Library Catalogue and even to the specialized bibliographic list, can be linked using these QR codes. As well as these codes save the time of Library users. These QR Codes can be fixed or pasted on any flat surface in the Library like Printed handouts, shelf ends, Web OPAC Desk, Reference Desk, Magazine racks, etc.

8. CONCLUSION

Modern day libraries need to be upgraded with new technologies to cope with modern tech savvy users. Smartphones are becoming most common internet access tool used by current generation. According to a study, India is world's second-biggest smartphone user community with

220million users in February 2016, by surpassing the USA smartphone user base.

QR codes look simple and mostly free of cost to create, but it creates new paradigm and dimensions to the library resources and services. Central Library, NITK is implementing QR codes to reach out user community and create awareness about its resources, services and events. QR code is such great technology which helped Library to cater most crucial user demand for access to information through mobile phones.

To conclude, Libraries need these QR codes to market its products and services; to develop as information dissemination tool and a feedback mechanism. Though the concept of Marketing Library products and services is not new, but marketing through QR codes will be a new and fun-filled activity to the user community as well as for library professionals. Adoption of the QR code in library marketing will help to improve services for users and will enhance the reputation of library and information services and professionals.

REFERENCES

1. Ashford, R. 2010. QR Codes and Academic Libraries: Reaching Mobile Users. *College and Research Libraries News*, 71(10), pp. 526-530.
2. Dobbs, Cheri. 2011. QR Codes in the Library: It's not your mother's barcode!. *Library Media Connection* (August - September 2011), Available at http://www.librarymediaconnection.com/pdf/lmc/reviews_and_articles/featured_articles/Dobbs_August_September2011.pdf (accessed on Dec 21, 2015).
3. <http://www.thehindu.com/news/cities/mumbai/business/with-220mn-users-india-is-now-worlds-secondbiggest-smartphone-market/article8186543.ece> (accessed on Mar 7, 2016).
4. <http://www.qrcode.com/en/about/> (accessed on Dec 17, 2015).
5. Mujumdar, Ramprasad., Ghosh, Smritimoy., and Mondal, Jishnu. "Application of QR Codes in Academic Libraries: With Special Reference to Central Library, Visva-Bharati," Proc. NACLIN 2015, pp. 293-304, 2015 (Conference proceedings)
6. Shettar, Iranna. 2013. QR Codes in Libraries: New Delivery Tool for Library Marketing and Information Dissemination. *Journal of Library Management*, 2(3-4), pp 61-69
7. Sunil, M.V., Harinarayana, N.S., and Kumbar, Mallinath. "User perception towards QR code for libraries: a study," Proc. National Conference on democratization of information using ICT: Role of libraries for social enlightenment. pp. 684 – 695. 2014 (Conference proceedings). Available at <http://eprints.uni-mysore.ac.in/16686/1/user%20perception.pdf> (accessed on Dec 17, 2015).

Use of QR Codes and Other Technologies in Libraries: A Survey

Parvin L.Kureshi¹ and Pralhad Jadhav²

¹*parvin.kureshi123@gmail.com*
Central Water & Power Research Station, Pune.

²*pralhadsha@yahoo.com*
Khaitan & Co., Mumbai

ABSTRACT

This study is based on the assessment survey of QR (Quick Response) code workshop, need for ICT of library and information science (LIS) professionals. The particular purpose of this study was to seek answers to the following questions: What are the ICT-facilities and QR code facilities in library, as well as generation and scanning of QR code, M-technology in library, librarian interested in new technology and its use in library, its use for participants of the workshop. A questionnaire survey was conducted on a sample of 40 professionals working in all types of libraries and information organizations in various cities of Maharashtra. The outcome of this study is that all participants were able to use the QR code in library for providing electronic information services to their users. It is easy to generate, read, customize by the participants. Self-development is seen in librarians through attending *seminars and workshops*.

Keywords: ICT in Library, QR Code in Libraries, Library Automation.

1. INTRODUCTION:

In this 21st Century, the expectations of the users are high. They want information available on their desktops or remotely and on time. Library plays a vital role in providing various type of information to various type of patrons such as students, research scholars, teacher's etc. ICT has introduced a lot of technology in library one of that is QR code (Quick Response Code). This is two-dimensional barcode, first designed for the automotive industry in Japan. QR code is a barcode; it is a machine-readable optical label that contains information about the item to which it is attached. A QR code uses four standardized encoding modes: numeric, alphanumeric, byte/binary and kanji to efficiently store data; extensions may also be used.

The QR code applications include product tracking, item identification, time tracking, document management, and general marketing. A QR code includes black square dots arranged in a square grid on a white background, which can be read by an imaging device like a Smartphone camera, scanner etc. The required data is then extracted from patterns that are present in both horizontal and vertical components of the image.

The QR code system was invented in 1994 by Denso Wave. Its purpose was to track vehicles during manufacture; it was designed to allow high-speed component scanning. QR codes may be used to display text to the user, to add a visiting card contact to the user's device, to open a URI or to create an email or text message. The workshop study and opinion of participants on the use of QR code facilities for providing library services is conducted. The workshop is held at Anjuman-I-Islam, Kalsekar Polytechnic College, New Panvel, Navi Mumbai. Librarians need to update themselves, with the new technologies in order to provide technology enabled services to their techno-savvy users.

2. STATEMENT OF THE PROBLEM:

The present study aims to find the use of QR code facilities for providing library services.

The workshop study and opinion of participants were taken to find out the answers of the following research question:

- How can librarians cope up with new technology?
- What do they feel about use of latest technologies
- QR code facilities and M-technology implementation in libraries?
- Are the library professionals acquainting themselves with QR code and different techniques?

3. OBJECTIVES OF THE STUDY:

- To find out familiarity of participant with ICT or New Technology.
- To identify the library operations performed with ICT.
- To know LIS professional's attitude towards QR code.
- To determine the library services performed with QR codes.
- To know the difficulties faced by librarians in using ICT in libraries.

4. HYPOTHESES:

- All participants are familiar with the ICT facilities and provide excellent e-services to users with help of ICT.
- All participants know how to generate and scan the QR Code with help of Smartphone and online sites.
- Librarian updates themselves through workshop.

5. SCOPE AND METHODOLOGY:

The study addresses QR code workshop participants (Workshop cum Seminar held at Anjuman-I-Islam, KalsekarCollege, and NewPanvel on 12 Mar 2016). The present research adopted census method of sampling i.e. questionnaire was administered to all 40 participants. A structured questionnaire was designed to collect data from the participants regarding the ICT facilities in libraries, availability of the Infrastructure, creation of QR Code and reader, merit and demerits of QR Code, hindrances in implementing QR Code Technology etc.

6. DATA ANALYSIS AND INTERPRETATION:

6.1. General Details of Participants:

The present research data is gathered with the help of questionnaires. Questionnaires are well used data collection tools in LIS research. The total participants of the workshop are 40 out of that 31(61 %) participants have responded the questionnaires. Out of 31 respondents 14 are Male and 17 are Female as showed in below figure:

Table No. 1

Participants	Respondents	%
Male	14	45.16%
Female	17	54.84%
Total	31	100.00%

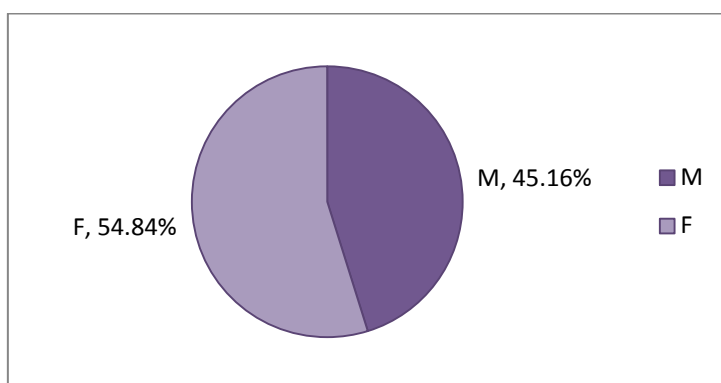


Figure 1: Gender wise distribution of Participants

6.2. Designation of Participants:

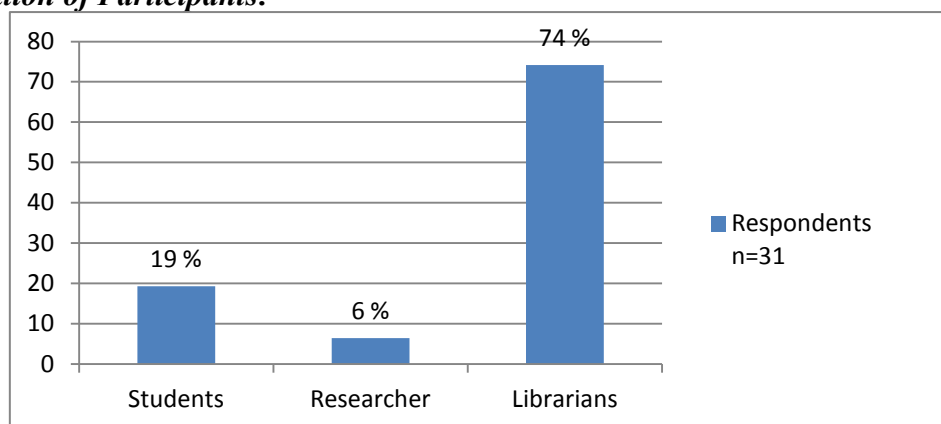


Figure 2: Designation of Respondents

The above figure shows that out of 31 respondents 74 percent of the participants are librarian, the library science students are 19 percent and 6 percent are the research scholars. This data showed that librarians are more participated in enhance skills workshop.

6.3. Age group of participants (Librarians)

Table No. 2

Age group	Respondents	%
21 to 30	13	42
31 to 40	12	39
41 to 50	2	6
50 to 60	3	10
above 70	1	3
Total	31	100

The above data shows that the 21to 30 age group librarians are highly participated in workshop, 39% participants librarians are of age group 31 to 40.Only 3 % librarian above age group 70 participate in the OR code workshop . In 21st Century the librarians are trying to cope with new technology.

6.4. Use of ICT in library:

The below figure shows that the almost 94 percent library have implemented the services using ICT facilities, 6.45 percent library have yet not implemented the ICT facilities in library.

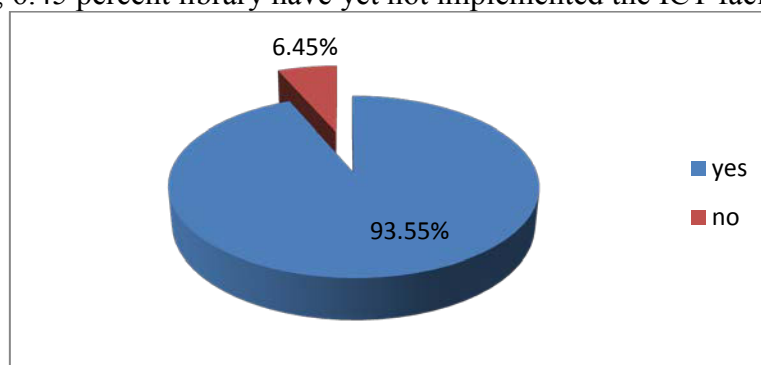


Figure 3. Use of ICT in library

6.5. Library services with ICT Facilities:

Table No. 3

S/N	Lib. Services with ICT facilities	Respondents	%
1	CAS/SDI	22	71
2	Lib. Websites	28	90

3	Referral	8	26
4	EDDS/BBS	1	3
5	ETOC (Ele. Table of Contents)	7	23
6	WebOPAC	23	74
7	Ask-a-Librarian	9	29
8	Virtual Library Tours	2	6
9	Library Portals	9	29

Resp. n = 31

The above data shows that 90 % of librarians used ICT facilities in library Website; the website is play a vital role in introducing the library collection, services, staff, library rules etc. The 71 percent librarians provide CAS/SDI services with help of ICT facilities to their users. 74 percent librarian uses ICT in Web OPAC service. Data shows that librarians are make use of ICT in providing the library services to their users.

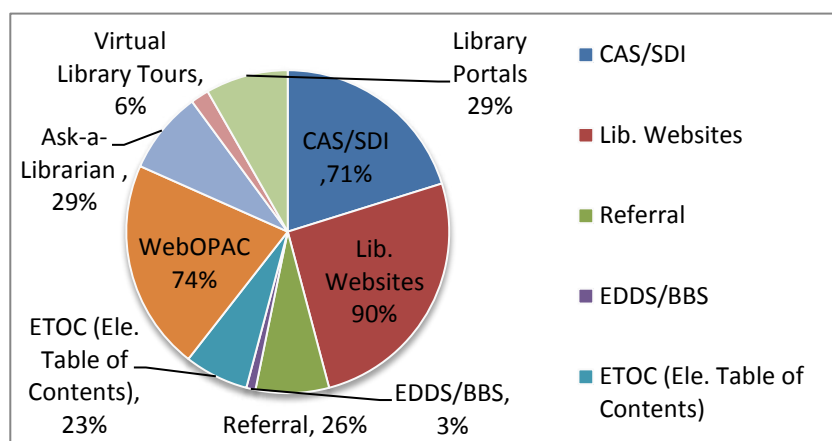


Figure 4: Library Services through ICT facilities

The first hypothesis of this study is tested here “All participants are familiar with the ICT facilities and providing the excellent e-services to users with help of ICT.” All librarians are able to provide the ICT facilities to their users.

6.6. Problem with using the ICT facilities in library

Table No. 4

S/N	Problem Using ICT	Respondents	%
1	Lack of Technical Skills	10	32.26
2	Fewer Infrastructures	22	70.97
3	Budget	25	80.65
4	Training Staff	13	41.94
5	Lack of Computer Skills	5	16.13

n = 31

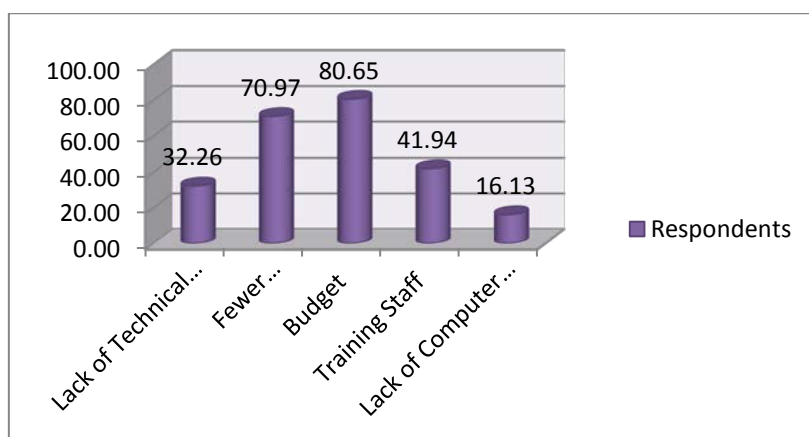


Figure 5 Barrier in application of ICT in libraries

The above figure shows that most of the librarians are facing the budget problem in application of ICT facilities in library almost 90 % (out of 100) libraries having this problem. 80 % library has the inadequate infrastructure. Some of the library do not have budget problem but they are facing another problems such as Training Staff, Lack of Technical skills, lack of computer skills in library staff.

6.7. Awareness about new technology: QR Code in library.

Table No. 5

S/N	Awareness about QR Code	Respondents	%
1	Aware Participants	20	64.52
2	Unaware Participants	11	35.48

n=31

The above table data shows that out of 31 participants 64.52% are already know about the QR Code facilities used in library remaining participants 35.48 % are unaware about this new technology implementation in library.

6.8. The merits of using QR Code Technology:

Table No. 6

S/N	Merits	Respondents	%
1	Easy Access	23	74
2	Easy access to digital resources	28	90
3	Time Saving	23	74
4	Easy to Share	20	65
5	Contains alphanumeric, URL's, Video, Audio information	25	81

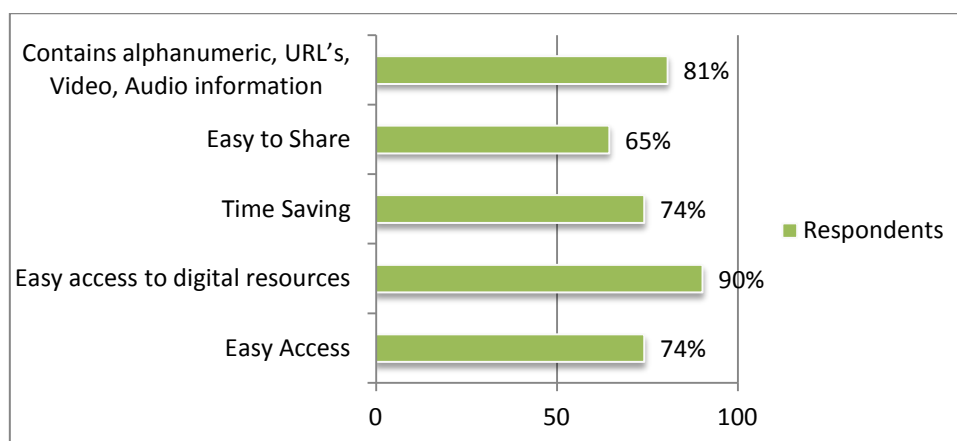


Figure 6. Merits of QR Code

The above Figure shows highly responded merits of QR code used in library. Out of 100, 90 percent librarian agree that QR code facilities easy to access to digital resources and 81 percent librarian are agree the merits, QR Code supports to all type of contains like alphanumeric, URL's, Video ,Audio etc. The Pune University anthem used the QR code, its available on the You Tube.

6.9 Implementation of QR Code in Library:

Table No.7

S/N	Implemented Area	Respondents	%
1	To link the OPAC entries with the location of book	28	90
2	For Providing Library Orientation	25	81
3	Library Map / Stack Guide	22	71
4	For Providing Library Video Tutorials	20	65

The above table shows that 90 percent librarian agree to link the OPAC entries with the location of books. 81 percent librarians are agreed for providing library orientation, 71% respondents are agreed that the QR code is help full for providing library Map/Stack Guide and for providing library video tutorials.

6.10 The hindrances in implementing QR Code Technology in library:

Table No.8

S/N	Hindrances	Resp.	%
1	Less Management Support	25	81
2	Restricted Access to the Electronic / Mobile Devices in the Library Premises	28	90
3	Minimum Technical Infrastructure	21	68
4	Inability of support staff in learning the new technology	17	55

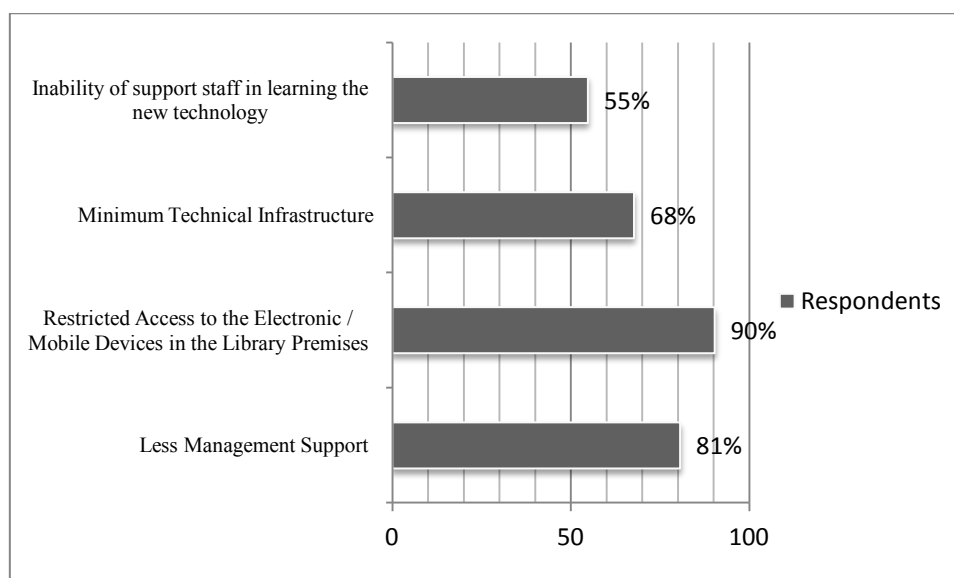


Figure 7. Hindrances of Appl. QR code in Lib.

The above charts shows that the 90% libraries are facing the restricted access to the electronic or mobile devices in the library premises. 81 percent libraries facing the less management support to implementation new ICT or QR Code technology in library. Other hindrances in implementation of ICT and QR code facilities in library are minimum technical infrastructure and inability of support staff in learning the new technology regarding library.

6.11. Generating QR Code:

Table No. 9

S/N	Devices	Respondents	%
1	Smartphone Apps	30	97
2	Online QR code Sites	28	90
3	Desktop Scanner	24	77

The above table data shows that 97 % librarian are generating QR code using Smartphone apps, they are comfortable to create and scan the QR code using Smartphone apps. 90% librarian are use online QR code sties to generate and read or scan the QR code.77% respondents are used desktop scanner for creating and scanning the QR code in library.

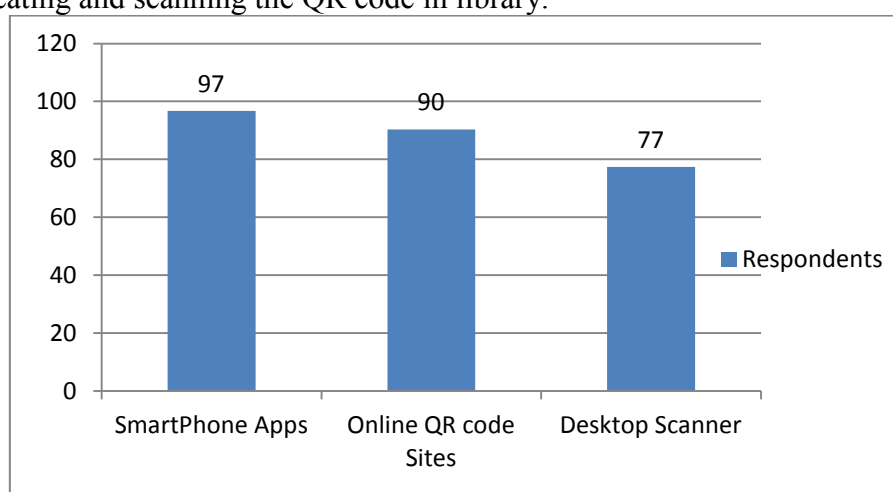


Figure 8.Devices using generating QR Code.

In 21st century, we can say that everyone want to update their self. Now day's librarians are able to use M-technology in library. The second hypothesis of this study is tested here that "All

participants are well in generating and scanning the QR Code with help of Smartphone and online sites.” QR Code is very easy to use, share and affordable.

6.12. QR Code easy to gather real-time statistics on who is viewing and interacting, and when:

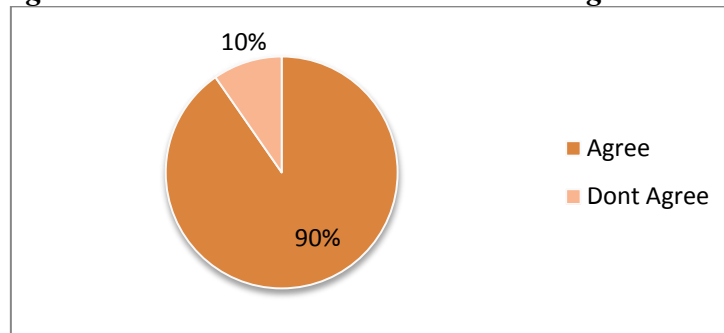


Figure 9.Real Statistics using QR Code

The above pie charts data shows that the 90% respondents are agree that QR Code helps us to take real time statistics on who is viewing and interacting, and when. It’s a plus point for librarians to gather statistics of their services used by their users.

6.13. QR Code provides quick e-services:

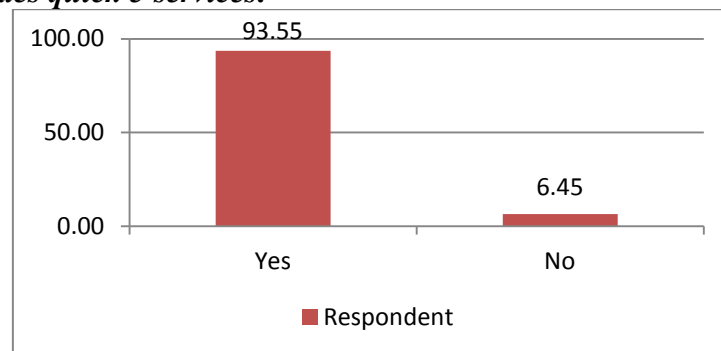


Figure 10. Quick Service provider (QR Code)

The above figure data shows that 93.55 % respondents are agree that QR code facilities provides fast e-services to their users. Only 6.45 percent respondents are not agreed.

6.14. Customization of QR code is easy:

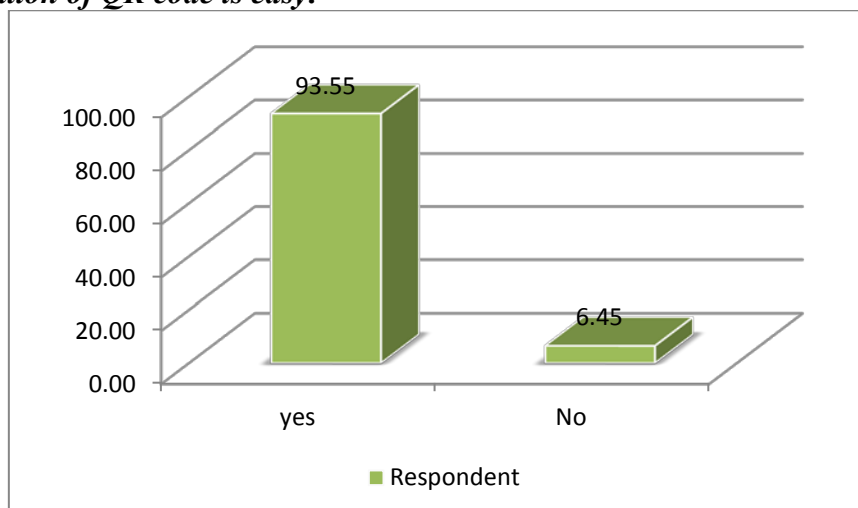


Figure 11.Customization of QR Code

The technical part of any technology is difficult but the above figure data shows that 93.55 percent respondents or librarians are able to do the customization of QR Code, only 6.45 percent respondents are faced some difficulties in customization of QR Code.

6.15. Technical Literacy through Workshop.

Research Que: Do you feel that such type of E-Technical Literacy Program make you able to implementation of new technology in your own library?

The below figure respondents data shows that the all participants are update their self through workshop and able to cup of with new technology coming in library science. They become familiar with new technical things.

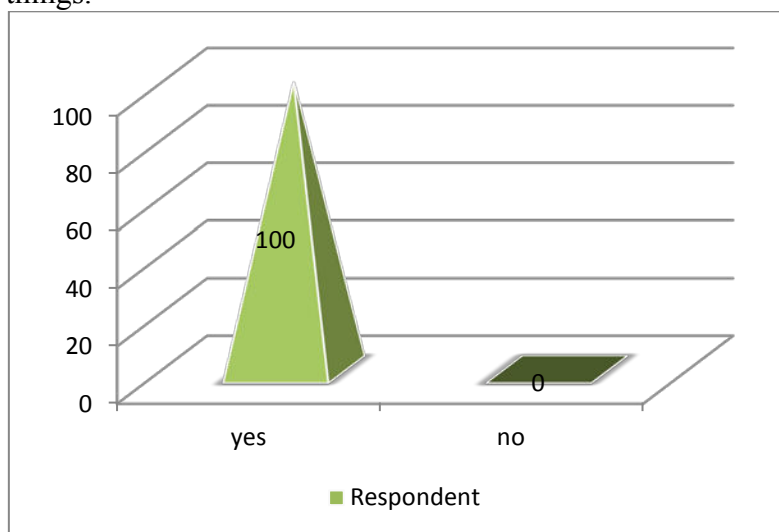


Figure 12. Need of Workshop for update tech. Skills

Last hypothesis of this study is tested that “Librarian updates their self through workshop.” All participants are agree with the above research question that they up-date their skills to participate in such type of workshop.

7. FINDING AND SUGGESTIONS:

7.1. Finding:

- All participants of the workshop are familiar with ICT facilities and they are providing various services to their users with ICT facilities. WebOPAC, library website, library portal are the major services provide by librarians to their users.
- The study is finding that librarians are promoting their user to use ICT facilities of library.
- Due to lack of budget of the library, librarian unable to implement the new technology in the library. The study found that Fewer Infrastructures, lack of technical and computer skills, technology phobia makes error in implementation of ICT facilities in library.
- Librarian’s uses ICT facilities in library for increasing use of library, providing instant services and cope of with new technology etc.
- Most of the respondents have seen the QR Code on the magazine, on product, websites, Newspapers etc.
- Most of the participants are well know the QR Code technology before the workshop. They become known that QR code application in library. They are agreed that QR Code is very easy for access of e-material or documents and identification of documents.
- The study finding is that QR Code facilities is very easy to access of digital resources, time saving technology, easy to share and it store data capacity is more than the barcode. It can store any type of Contains such as alphanumeric, URL’s, Video, Audio information.
- QR code is highly used in, to link the OPAC entries with the location of book, For Providing Library Orientation, Library Map / Stack Guide, For Providing Library Video Tutorials. Research study find out the SPP, Pune University are applying QR Code on the university anthem on YouTube.
- Due to restricted access to the electronic / mobile devices in the library premises, less management supports, minimum technical infrastructure librarians not able to implemented such type of technology in libraries

- The study find out that librarian are used M-Technology in their library. Most of the librarians are using Smartphone to create and scanning of QR Code technology. They feel QR code is more usable and comfortable, beneficial than the barcode.
- The study find out that customization of QR code is very easy for librarians and very easy to provide e-services to users. QR code is help fully to keep library services record through their best feature of easy to gather real-time statistics on who is viewing and interacting, and when.

7.2. Suggestions:

- Increase the budget of library for implementing such type of ICT facilities in library and promote to the use of library.
- Arrange lot of workshop on the new technology implementation in libraries so the library professional cope of with new technology.
- Do not be restricts the mobile/ technical devices use in library premises, its decrease the use of library resources.

8. CONCLUSION:

The ICT or QR code facilities play vital role in providing the library services to their users. Most of the librarian tries to implement new technology in their library so they would like to participate in such type of workshop. QR code is very easy to share or access of electronic resources in the less budgets. While implementing QR Code its necessary to protect the copyrights of documents or resources. As per the data, the female librarians are more interested to learn new technology.

REFERENCES:

- B.T. Sampath Kumar B.S. Biradar, (2010),"Use of ICT in college libraries in Karnataka, India: a survey", Program, Vol. 44 Iss 3 pp. 271 - 282 Permanent link to this document: <http://dx.doi.org/10.1108/00330331011064267>
- FakkirappaKattimaniShivaputrappa R. Naik Ramesh , (2013),"Evaluation of librarianship and ICT skills of library and information professionals working in the engineering college libraries in Karnataka, India: a survey", Program: electronic library and information systems, Vol. 47 Iss 4 pp. 345 - 369 Permanent link to this document: <http://dx.doi.org/10.1108/PROG-07-2012-0041>
- FaranakMohsenzadehAlirezaIsfandyari-Moghaddam, (2009),"Application of information technologies in academic libraries", The Electronic Library, Vol. 27 Iss 6 pp. 986 - 998 Permanent link to this document: <http://dx.doi.org/10.1108/02640470911004075>
- Khalid Mahmood Muhammad Ajmal Khan, (2007),"ICT training for LIS professionals in Pakistan: a needs assessment", Program, Vol. 41 Iss 4 pp. 418 - 427 Permanent link to this document: <http://dx.doi.org/10.1108/00330330710831611>
- Nor Shahriza Abdul Karim SitiHawaDarusRamlahHussin, (2006),"Mobile phone applications in academic library services: a students' feedback survey", Campus-Wide Information Systems, Vol. 23 Iss 1 pp. 35 - 51 Permanent link to this document: <http://dx.doi.org/10.1108/10650740610639723>
- Ojedokun A Ayoku Victoria NwamakaOkafor , (2015),"ICT skills acquisition and competencies of librarians", The Electronic Library, Vol. 33 Iss 3 pp. 502 - 523 Permanent link to this document: <http://dx.doi.org/10.1108/EL-08-2013-0155>
- Peter Williams Hamid R. Jamali David Nicholas, (2006),"Using ICT with people with special education needs: what the literature tells us", Aslib Proceedings, Vol. 58 Iss 4 pp. 330 - 345 Permanent link to this document: <http://dx.doi.org/10.1108/00012530610687704>.

Smart Library for Smart User: Whatsapp Based Services

Rahul R. Hiremath

rahulrh@gmail.com

N.S.S. College of Commerce and Economics,
Tardeo, Mumbai – 400 034

ABSTRACT

The mode of communication is changing rapidly from print to electronic and now the mobile communication. The old mobiles are replaced by smart mobiles with multiple applications. The development of mobile technology from 2G to 4G and Wi-Fi the accessing speed increased drastically; with this the internet usage is also increased. Use of internet for research, social networking, and whatsapp has become the part of life. The libraries are the democratic place where the users are the leaders as user changes the libraries have to change to be relevant and existence in the competitive environment. This paper highlights the user of whatsapp by user community in an academic environment and the various services provided by the library with using whatsapp facilities.

Keyword: Academic Libraries, Library Services, ICT in Library, Smart Library, Instant Messaging, Whatsapp

1. INTRODUCTION:

The mode of communication is changing rapidly from print to electronic and now the mobile communication. The use of mobile phone is more than computer in India. Mobiles are cost effective and easy to carry any were now a days the use of mobile phones for accessing internet is increased rapidly. The Internet and Mobile Association of India (IAMAI) and consultancy KPMG reported that the number of mobile internet users in India is expected to rise to 314 million by 2017, nearly double the 159 million it had at the end of 2014. ("Media Inner | IMAI," n.d.) The use of mobile devices to access the Internet and search for information is growing considerably. Technological improvements such as cell phones, low-cost connectivity and faster data transmission are among the most important factors which have led to the growing use of mobile devices (Abarca Villoldo & Lloret Salom, 2012). The more and more researchers use mobile devices as information tools to search for information. The offering of mobile versions of key research sites, which take every appropriate measure to provide optimised text for screening on a mobile device, has further supported such a development (Murphy, 2010)

For the past few decades libraries have harnessed the power of computers to enhance the quality of information dissemination. The advent of internet related applications for the libraries, especially the Web 2.0 tools and technologies, have triggered another level of change in libraries and in turn have transformed the information horizon into a participatory environment. With changes looming largely in libraries, mobile applications have added their share of innovativeness. (Paul Anbu K. & Mavuso, 2012)

Libraries worldwide engage their users in communication through a number of devices. Most of the library-services are marketed to the users through weekly newsletters, notices, alert e-mails and new arrival information to name a few. The electronic revolution in the library especially in using electronic resources in the library has moved the library users a bit away from the library. The users, instead visiting the library for their information needs, depend more on their computer terminals and general search engines. This has resulted in most of the library services not optimally used by the library users. Following the successful implementation of the engaging users with the SMS alerts project a prototype on creating a SMS-based alert service is attempted, so that any

library which wants to extend its alert service can make use of this prototype. (Paul Anbu K. & Mavuso, 2012)

Andre Becker, Bonadie-Joseph, & Cain found that the more and more students are opting for internet enabled mobile phones to meet their educational needs than on available laptops and desktop computers. (Andre Becker, Bonadie-Joseph, & Cain, 2013). Librarians are always thinking to reach the user as quick as possible for disseminating the information and marketing of library and information centers as mentioned by Vassilakaki that use of mobile technology among students in universities across different countries has increased. Therefore, libraries need to embrace change and offer their services in a mobile environment. (Vassilakaki, 2011)

2. SMART LIBRARY:

The smart library is the one which the services are offered using different media like text, audio, video, etc. on mobile device or hand held device. The smart library services will reach the user instantly on their mobile. Vassilakaki used mobile library to denote information services offered to users through mobile technology (e.g. iPads, cell phones), (Vassilakaki, 2014). The smart library is the mobile library but the only difference is the smart library offers services using the smart applications for smart mobiles with operating systems (OS) installed in the smart phones include Apple's iOS, Google's Android, Nokia's Symbian and RIM's BlackBerry OS.

The smart phones are popular for accessing social media and instant messaging services because of easy to use and time saving feature. Social media is a new tool that allows fast and convenient distribution of information, thus a potential tool (Macnamara & Zerfass, 2012), the young generation is actively participating in the activities of social networking sites (Singh & Gill, 2015). The information communication technology is advancing rapidly, the libraries should adapt the new information communication technology too because the libraries are driven by the user. As the user changes the libraries should change their existence otherwise they will become irrelevant or will lose their importance. The smart phones are become the medium of communication in all age, gender, and education. The libraries should adapt these technologies to become smart library to serve the user in better way.

3. WHATSAPP : INSTANT MESSAGING (IM)

WhatsApp Messenger is a cross-platform mobile messaging app which allows exchanging messages without having to pay for SMS. WhatsApp Messenger is available for iPhone, BlackBerry, Android, Windows Phone and Nokia and those phones can all message each other. WhatsApp Messenger uses the same internet data plan that we use for email and web browsing, there is no cost to message. In addition to basic messaging WhatsApp users can create groups, send each other unlimited images, video and audio media messages. ("WhatsApp :: Home," n.d.) The latest version of Whatsapp has added document exchange as attachment.

As mentioned by Dukic and Chiu in their study that "most participants in our study use mobile messaging apps such as WhatsApp or Line for their daily communication" the students prefer WhatsApp then e-mail to contact the colleagues, because colleagues would not always check their emails. Because they contact colleagues immediately because they use it all the time (Dukic, Zvezdana and Chiu, 2015). WhatsApp for group messages and the messages come up instantly on a handset without the need to open an app as is necessary even with Facebook. Furthermore, many users value the fact that the service is (for now) relatively private, as Facebook, for example, does not have a good reputation for keeping user details to itself (Curwen, 2014)

WhatsApp has much advantage compare to many social media networks, it gives users a closed platform where they can communicate with their acquaintances. In addition, WhatsApp is very simple to send photos and videos. Moreover it does not include advertising, and is a cheaper replacement for SMS as the application is free. Further, it tells you when the message was delivered, and when it has been read, and you also have the option to tell people when was the last time you were online. Furthermore, unlike other messaging services, it does not offer its users opportunities to play games, stream YouTube videos or buy digital stickers. In other words, WhatsApp offers a new platform of interaction that is different from other social networks. (Aharony, 2015)

The majority of students, people are using whatsapp as their instant communication media. (Oghenetega, Erimieleagbon, & Ugeh, 2014), (von Alberti-Alhtaybat & Al-Htaybat, 2016) India is not exceptional to this the students and the staff use Whatsapp more frequently than any other means of communication.

4. WHATSAPP BASED LIBRARY SERVICES AT NSS COLLEGE OF COMMERCE AND ECONOMICS

The smart phones are offering many applications from entertainment to research. There are many research tools available on smart phone platform. The WhatsApp is popularly known as instant messaging service. User can exchange messages, pictures, videos, audio and recently the document exchange feature is also added. The whatsapp becomes a tool for exchanging information. The users are also comfortable and in operating and more and more students are on whatsapp medium so the following services are offered to the user for their convenient on pilot basis.

The library Whatsapp number is displayed in the prime locations of the library and on the notice board the following services are provided to the users under this facility. This number act as virtual librarian the students and staff can contact this number for following services.

5.1 Quick Reference services

The user can ask reference query on this number mentioning their name and the student roll number, the reply will be sent as quick as possible. The results are some time text messages, image or audios, web link, etc. depending upon the query.

5.2 Question papers Delivery

The library has good collection of past year question papers of all the semesters. As we know the question papers are very important for students to know how the questions are asked in the past years. The student can request for the question papers by specifying their personal details and requirements like the semester, subject and the year. The question paper picture will be sent on their number or the same will be e-mails to them if requested by the students. This is very popular among the students.

5.3 NSS Com. Library Group

To promote and give expose to the library services the WhatsApp group of NSS college of Commerce and economics is created including all teaching and non-teaching staff members. The group is named as “NSS Com. Library” and the following services are offered to them

5.3.1 News Alerts

The library subscribing to 6 English and 3 Marathi news papers the newspaper cutting services is provided to the users related to higher education, University of Mumbai, UGC etc. The same newspaper cuttings are photographed and the reference details are added to the picture and sent to the NSS Com. Library group.

5.3.2 New arrivals alert:

Collection development is the regular activity of the library. The new arrival book/s jacket is photographed and sent to the NSS Com. Library group to alert the staff members about the new arrival of the books in the library.

5.3.3 Content alert:

Library is subscribing to many journals as soon as the new issue of the journal arrived the content page of the journal is scanned and sent to the NSS Com. Library for their information with this the usage of the journals is increased.

6 CONCLUSION:

The challenge for academic libraries is to provide mobile access to their services in a way that their users will find suitable for their needs. To ensure this, they need to keep an eye on new developments in mobile technologies, investigate users' needs and wants regarding library mobile services and observe closely how these services are being used. Effective marketing of library mobile services would be important as well. (Dukic, Zvezdana and Chiu, 2015)

The technology is changing, upgrading every day to meet the user need and requirements we need to learn the new changes and adapt these changes to library system to become relevant in the modern word. The government is also initiated program like digital India and adapting new technology in the governance. The user needs comfort at all levels from space to delivery in library so we need to adapt changes within the available resources.

REFERENCE:

1. Abarca Villoldo, M., & Lloret Salom, A. (2012, September 11). How to Mobilize your Library at Low Cost. *LIBER Quarterly*.
<http://liber.library.uu.nl/index.php/lq/article/view/URN:NBN:NL:UI:10-1-113819>. Retrieved from <http://dspace.library.uu.nl/handle/1874/255886>
2. Aharony, N. (2015). Why do students use What's App? – an exploratory study. *Aslib Journal of Information Management*, 67(2), 136–158. <http://doi.org/10.1108/AJIM-11-2014-0148>
3. Andre Becker, D., Bonadie-Joseph, I., & Cain, J. (2013). Developing and completing a library mobile technology survey to create a user-centered mobile presence. *Library Hi Tech*, 31(4), 688–699. <http://doi.org/10.1108/LHT-03-2013-0032>
4. Curwen, P. (2014). WhatsApp? *Info*, 16(3). <http://doi.org/10.1108/info-02-2014-0011>
5. Dukic, Zvezdana and Chiu, D. K. W. (2015). Article information □:How useful are smartphones for learning? Perceptions and practices of Library and Information Science students from Hong Kong and Japan. *Library Hi Tech*, 33(4), 545–561. <http://doi.org/http://dx.doi.org/10.1108/LHT-02-2015-0015> Downloaded
6. Macnamara, J., & Zerfass, A. (2012). Social Media Communication in Organizations: The Challenges of Balancing Openness, Strategy, and Management. *International Journal of Strategic Communication*, 6(4), 287–308. <http://doi.org/10.1080/1553118X.2012.711402>
7. Media Inner | IAMAI. (n.d.). Retrieved March 18, 2016, from <http://www.iamai.in/media/details/3659>
8. Murphy, J. (2010). Using Mobile Devices FOR Research Smartphones, Databases, and Libraries.

- Online Research Library: Questia*, 34(3). Retrieved from <https://www.questia.com/magazine/1P3-2037037881/using-mobile-devices-for-research-smartphones-databases>
9. Oghenetega, L. U., Erimieagbon, O. O., & Ugeh, C. H. (2014). Comparative Study of Social Media (Networking) Usage by Undergraduates in Two Selected Tertiary Institutions of Nigeria. *Research on Humanities and Social Sciences*. Retrieved from <http://www.iiste.org/Journals/index.php/RHSS/article/view/14596>
 10. Paul Anbu K., J., & Mavuso, M. R. (2012). Old wine in new wine skin: marketing library services through SMS-based alert service. *Library Hi Tech*, 30(2), 310–320. <http://doi.org/10.1108/07378831211239979>
 11. Singh, K. P., & Gill, M. S. (2015). Role and users' approach to social networking sites (SNSs): a study of universities of North India. *The Electronic Library*. Retrieved from <http://www.emeraldinsight.com/doi/abs/10.1108/EL-12-2012-0165>
 12. Vassilakaki, E. (2011). Interlending & Document Supply Mobile information services in libraries: a review of current trends in delivering information Mobile information services in libraries: a review of current trends in delivering information. *Library Hi Tech Library Hi Tech Iss New Library World*, 42(3), 412–423. <http://doi.org/10.1108/ILDS-08-2014-0037>
 13. Vassilakaki, E. (2014). Mobile information services in libraries: a review of current trends in delivering information. *Interlending & Document Supply*, 42(4), 176–186. <http://doi.org/10.1108/ILDS-08-2014-0037>
 14. von Alberti-Alhtaybat, L., & Al-Htaybat, K. (2016). Investor relations via Web 2.0 social media channels. *Aslib Journal of Information Management*, 68(1), 33–56. <http://doi.org/10.1108/AJIM-04-2015-0067>
 15. WhatsApp. (n.d.). Retrieved March 18, 2016, from <https://www.whatsapp.com/>

Research Support Services in the Changing Information Landscape

Meghana Sanjeeva

meghana.sanjeeva@ves.ac.in

VES College of Arts, Science and Commerce, Chembur, Mumbai 400071

ABSTRACT

Academic libraries are undergoing evolutionary change as emerging technologies and new philosophies about how information is created, distributed, and shared have disrupted traditional operations and services. It is apparent that as the nature of research is changing so is the support for the research expected to change. Academic libraries have long supported research pursuits of their users. Academic libraries world over and, the University Libraries in particular, are in the process of improving their services which will help boost the productivity of researchers with application of Information Technology for access and delivery of e-content to the fingertips of the users. The rapid proliferation of digital technologies is making it imperative for the Libraries to design new services or realign the older services to meet the user expectations in the changing information landscape. This paper reviews the library web pages of world's top 30 Universities, to determine the type of research support that is extended. It attempts to study the services which facilitate the research productivity of the scholars. The study also offers pointers for a research toolkit for an indicative design of a Research portal for academic Libraries

Keywords: Research Support Services, Academic Libraries, Research portal, Scholarly Communication

1. RATIONALE FOR THE STUDY:

The reputation of a university is primarily based on the quality and output of its research and competence of its researchers.

Libraries have for long played a central role in supporting and facilitating research at all stages. The entire process of research has undergone a change with the advent of new technologies. The networked digital environment has enabled the creation of many new forms of work that are directly accessible to the end users and have offered new resources, tools and means of communication. These changes present challenges and opportunities for information professionals in academic and research libraries. Libraries need to provide support and enable the research community, for their current needs, and have an insight into areas for future support. Understanding and addressing these issues and building services around them is a priority if we are to ensure the relevance of libraries and profession in a changing world

2. INTRODUCTION:

The quest for improvement in research performance is a significantly important to all universities. Success in research is a major component in the various indicators of overall university performance. Hence universities are constantly interested to improve their competitive position in attracting, supporting and promoting the work of high-quality researchers. In times of financial stringency, however, they are also seeking to ensure that support and other services operate both efficiently and cost-effectively. (RIN, UK , 2010)

Traditional academic library services have long supported research. Today nature of research has also changed and so has the process of conducting research. Resources are available at the fingertips of the researchers. Libraries no longer enjoy the monopoly of holding the resources. The value Gateway role of the Library has diminished and is less important to the user now and

the role of the buyer is considered to be more important to the users. (ITHAKA, 2012) Rapid proliferation of digital technologies coupled with increasing user expectations is forcing the libraries to change in numerous ways. There is a dire need to introduce new services and to realign old services to meet the needs of the users.

New players, new forms of publications, new tools, new policies and mandates laid down funding agencies all lead to tremendous pressure for the researcher. Research process and publications, impact and ways of collaboration both have changed so services have to be design keeping in mind this change.

In this changing scenario, the libraries are required to expand the services which they extend understanding these changes. The primary role of the library now is to facilitate the process of research, enhance the productivity and visibility of the researchers.

3. LITERATURE REVIEW:

The sources that made significant contributions to the literature on the of academic and research libraries include the Association of College and Research Libraries' The Value of Academic Libraries: A comprehensive Research Review and Ithaka Report on Faculty survey which are longitudinal studies carried out every four years to assess the faculty and researchers attitudes towards the changing nature of scholarly communication. Ithaka is a nonprofit organization dedicated to helping the academic community use digital technologies to preserve the scholarly record and advance research and teaching. This Ithaka reports important contributions to an understanding of how the digital revolution is affecting academic and research libraries.

RIN (UK) report on Research Support Services and Supporting Researchers were two important reports referred for this study. They helped understand the UK perspective. In addition to these report articles by Kroll and Forsman, Mary Auckland and Staley were found useful for the study.

4. OBJECTIVES:

1. To study the research support services extended by the top ranking Universities of the World.
2. To identify the core and specialized services extended Universities in the changing Information Landscape.
3. To prepare a essential toolkit for University Libraries and a research portal.

5. METHODOLOGY:

A content analysis of the library web pages of top 30 Universities (Q's ranking 2015) (Actual Count 31 as two universities in same rank) was carried out to gather data for this study within 15 days . Quantitative and qualitative data was gathered from the web pages to identify services extended to support the research pursuits of the university faculty and scholars. A marking sheet for data collection was developed and tested on five university library web for pilot study.

Services were classified as Core Services and Specialized services depending on their nature.

6. RESULTS AND ANALYSIS :

Following charts presents the data

The services was classified as Basic Services and Specialized depending on the nature of the services .

TABLE 1 : Core Services

Basic Services/ Core Services										
Seri al No.	Name of the Universities	Federated Research Exhaustiv e Search	Research Guides/ Subject Guides	Informati on Commans	Personalised help for Research	Ask a Librarian	Presence on Socialmedia	IR	Reference Mangemen t	Tutorials work for Information Litreachy
1	MIT	✓	✓	✓	✓	✓	✓	✓ Dspace at MIT	✓	✓
2	Harvard	✓	✓	✓	✓	✓	✓	✓ DASH	✓	✓
3	University of cambrige	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	Stanford University	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	Caltech University	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	University of Oxford	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	University college of London	✓	✓	✓	✓	✓	✓	✓	✓	✓
8	Imperial College London	✓	✓	✓	✓	✓	✓	✓ Spiral	✓	✓
9	ETH Zurich	✓	✓	✓	✓	✓	✓	✓	✓	✓
10	University of Chicago	✓	✓	✓	✓	✓	✓	✓	✓	✓
11	Princeton University	✓	✓	✓	✓	✓	✓	✓	✓	✓
12	National University of Singapore	✓	✓	✓	✓	✓	✓	✓	✓	✓
13	Nanyang Technological University, Singapore (NTU)	✓	✓	✓	✓	✓	✓	✓	✓	✓
14	EPFL (Ecole Polytechnique Fédérale de Lausanne)	✓	✓	✓	✓	✓	✓	✓	✓	✓
15	Yale University	✓	✓	✓	✓	✓	✓	✓	✓	✓
16	John Hopkins Univesrity	✓	✓	✓	✓	✓	✓	✓	✓	✓
17	Coronell University	✓	✓	✓	✓	✓	✓	✓	✓	✓
18	University of Pennsylvania	✓	✓	✓	✓	✓	✓	✓	✓	✓
19	Kings College London	✓	✓	✓	✓	✓	✓	✓	✓	✓
20	Australian National University	✓	✓	✓	✓	✓	✓	✓	✓	✓
21	University of Edinburg	✓	✓	✓	✓	✓	✓	✓	✓	✓
22	Columbia University	✓	✓	✓	✓	✓	✓	✓	✓	✓
23	Ecolle Normade Paris	✓	✓	✓	✓	✓	✓	✓	✓	✓
24	McGill Unierstiy	✓	✓	✓	✓	✓	✓	✓	✓	✓
25	Tsinghua University	✓	✓	✓	✓	✓	✓	✓	✓	✓
26	UCB	✓	✓	✓	✓	✓	✓	✓ Escho	✓	✓
27	UCLA	✓	✓	✓	✓	✓	✓	✓ Escho	✓	✓
28	Hongkong University of Science and	✓	✓	✓	✓	✓	✓	✓	✓	✓
29	Duke University	✓	✓	✓	✓	✓	✓	✓ Duke space R	✓	✓
30	University of hongkong	✓	✓	✓	✓	✓	✓	✓	✓	✓
31	University of Michigan	✓	✓	✓	✓	✓	✓	✓ Deep Blue	✓	✓
		0	0	1	2	0	0	0	0	✓
Not provided by		0	0	3.22%	6.45%	0	0	0	0.00%	✓
Provided by		100	100	96.78	93.55	100	100	100	100	✓

Table 1 : Core/Basic Services

Libraries provided the following services Core Services

1. Federated Search: A single window which enables searching across all the resources of the Library i.e.onlinecatalog, electronic journal databases and other electronic resources that helps maintaining the gateway role of the Library. It was seen as an important tool to facilitate in-depth discovery of resources.
2. Information Commons: The concept of the "information commons" refers to the shared physical space, usually where any and all can participate in the processes of information research, gathering and production. All the university libraries provided these faculties
3. Information Literacy Tutorials: In-depth Videos and online guides of Information Literacy tutorials are available on all the Library websites.
4. Research Guides: Research assistance, subject guides, and useful resources were compiled by librarians which help users navigate the information searching process effectively and efficiently.
5. Personalized Help for research: Researchers can seek prior appointment with librarians and get personalized in-depth help for their research was seen across Libraries
6. Institutional Repositories: Libraries have developed Institutional repositories archiving and showcasing research output of the faculty and researchers.
7. Reference Management : Guidelines on referencing, avoiding plagiarism and use of reference management software are given by all libraries.

8. Presence on Social Media : All libraries have their presence on social media, which helps them be where the users are, connect with them and popularize the services .
9. Ask Librarian services: Online connect to library staff through email, chat is very popular feature of all the libraries.

SPECIALISED SERVICES									
	Name of the Universities	Publish on demand (thesis printing and binding etc)	Research Impact (Metrics and Altmetrics)	Research Data Management	Statistical Software	Electronic Thesis and Dissertation	Open Access	Copyright	Publication
1	MIT	✓	✓	✓	✓	✓	✓	✓	✓
2	Harvard	✓	✓	✓	✓	✓	✓	✓	✓
3	University of cambridge	✓	✓	✓	✓	✓	✓	✓	✓
4	Stanford University	✓	✓	✓	✓	✓	✓	✓	✓
5	Caltech University	✓	✓	✓	✓	✓	✓	✓	✓
6	University of Oxford	✓	✓	✓	✓	✓	✓	✓	✓
7	University college of London	✓	✓	✓	✓	✓	✓	✓	✓
8	Imperial College London	✓	✓	✓	✓	✓	✓	✓	✓
9	ETH Zurich	✓	✓	✓	✓	✓	✓	✓	✓
10	University of Chicago	✓	✓	✓	✓	✓	✓	✓	✓
11	Princeton University	✓	✓	✓	✓	✓	✓	✓	✓
12	National University of Singapore	✓	✓	✓	✓	✓	✓	✓	✓
13	Nanyang Technological University, Singapore (NTU)	✓	✓	✓	✓	✓	✓	✓	✓
14	EPFL (Ecole Polytechnique Fédérale de Lausanne)	✓	✓	✓	✓	✓	✓	✓	✓
15	Yale University	✓	✓	✓	✓	✓	✓	✓	✓
16	John Hopkins University	✓	✓	✓	✓	✓	✓	✓	✓
17	Coronell University	✓	✓	✓	✓	✓	✓	✓	✓
18	University of Pennsylvania	✓	✓	✓	✓	✓	✓	✓	✓
19	Kings College London	✓	✓	✓	✓	✓	✓	✓	✓
20	Australian National University	✓	✓	✓	✓	✓	✓	✓	✓
21	University of Edinburg	✓	✓	✓	✓	✓	✓	✓	✓
22	Columbia University	✓	✓	✓	✓	✓	✓	✓	✓
23	Ecole Normale Paris	✓	✓	✓	✓	✓	✓	✓	✓
24	McGill University	✓	✓	✓	✓	✓	✓	✓	✓
25	Tsinghua University	✓	✓	✓	✓	✓	✓	✓	✓
26	UCB	✓	✓	✓	✓	✓	✓	✓	✓
27	UCLA	✓	✓	✓	✓	✓	✓	✓	✓
28	Hongkong University of Science and Technology	✓	✓	✓	✓	✓	✓	✓	✓
29	Duke University	✓	✓	✓	✓	✓	✓	✓	✓
30	University of hongkong	✓	✓	✓	✓	✓	✓	✓	✓
31	University of Michigan	✓	✓	✓	✓	✓	✓	✓	✓
		8	17	4	22	11	4	9	12
	NOT PROVIDED BY	25.80%	54.83%	12.90%	70.96%	35.48%	12.90%	29.03%	38.70%
	PROVIDED BY	74.2	45.17	87.1	29.04	64.52	87.1	70.97	61.3

Table 2 : Specialized Services

In addition to the basic services, many libraries provided specialized services. These services were extremely important for augmentation of the scholarly communication process of the researchers. These services will help researchers navigate the shifting patterns of the research process with ease. Library will be a facilitator in areas where researchers usually spend more time and struggle.

1. Printing on demand : Libraries help students print their thesis. In addition to the Information Commons which are seen by almost all libraries 74.2% have the services which help students printing and binding their thesis.
2. ETD repositories : Around 64.5% of libraries, have ETD repositories, which help the research scholars access older thesis easily from anywhere. The lesser rate of existence of ETD repositories can be attributed to the University being members of the national level ETD movement.

3. **Research Data Management:** Research data Management is the new service started by most of the libraries,(45.17%) in response to the needs of researchers. The funding agencies world over have certain mandates, which require the researcher to present the Data Management Plan at the time of applying for funding. The researchers are supposed to manage the data generated through the life cycle of the research. It is a very specialized and challenging service to be provided by the Libraries. A great need for training is required for the library staff to provide this service.
4. **Assistance in Publication:** (61.3%) Researchers require assistance with respect to selecting a journal for publication ascertaining authenticity of the journal, (COPE guidelines followed) choice of a toll journal Vs. Open Access journal, to find journals with high impact factor within in specific niche area that they are working in. Libraries are guiding them and proving step by step guidance into the publication process. Publication choice is also guided by the funding agency and the decision to publish Open Access is many a times governed by the funding agencies. Libraries are also orienting the authors with the Author Rights, the rights that need to be held with themselves instead of surrendering all to the publishers. Negotiating of the same is essential for Researchers.
5. **Copyright and IPR Licensing issues:** Copyright is an exclusive economic right granted to the creator of original work to permit or prevent other people from copying it. It is an extremely important area in the researchers work and also needs support. Library staff and campus constituents advise on specific issues around the use of texts, articles, media, etc., in teaching and research, as well as rights management for authors. This role is becoming increasingly important. 71% Libraries provided information on this aspect.

Disseminating research outputs is essential to the success of the institution and its researchers. However, it is important that this dissemination takes account of copyright law, and that researchers act according to the licenses or conditions agreed with publishers, funding agencies and other relevant parties.

In addition to using and referencing with the copyright and ethical framework, , authors need to be aware of various copyright mandates that they sign, the need to know that they can negotiate with the publisher for the same. Understanding the fine print of the agreements between the publishers, various type of copyright licenses including the ones for Open access (Creative Commons , CC_BY) is crucial part of the researcher work . By all means, this requires a completely trained and fully fledged staff support. The nuances of copyright and the intricacies of the within the legal framework are a matter of specialized course librarians with all this knowledge should extend this service or only help researchers how to locate such information. It is a specialized area needing tremendous experience and expertise. Library staff has to be specially trained and devoted to this function.

6. **Open Access :**A new dimension in the scholarly communication , needs a lot of guidance and advocacy by the libraries. Researchers need to be oriented with not only various OA resources but also various publishing options like Green OA /Gold OA , self-archiving for Institutional Repositories . The need to caution them against CC-BY Predatory publishers and identifying authentic OA publishers is extremely important. 87.1% Libraries give detail information on OA The authors need to know about OA Journal Evaluation spectrum along with SHERPA Romeo (Journals Policies, and SHERPA Juliet(Funder's Policies). In OA the role is multifold, to make aware, to advocate OA use, orient with different models of OA, OA publishing, funders guidance and evaluation tools for OA journals and maximizing research visibility through depositing in IR, Subject repositories etc. All this will help researchers

- explore new forms of scholarly communication
- Investigate the consequences of different forms of peer review on the scholarly output
- Support the integration of institutional repositories within the research life-cycle

7. Research Impact and Metrics

Research evaluation is increasingly important in management decisions in universities. Research metrics provide an objective way to assess the research output of individuals, groups, departments and universities. Scientific quality is constantly evaluated in journal publications, funding decisions, academic promotions, industry investment, medical practice guidelines, standard setting, and policy decisions. Peer review has long served as the cornerstone of such evaluations, but it is widely acknowledged to be imperfect and inefficient. Now Research is assessed on a number of criteria already and with the Web now providing the opportunity for the development of new tools and techniques for measuring 'things to do with research' the list of possible assessment criteria is growing. Metrics primarily classified as :

- Journal level metrics
- Author level metrics
- Article level metrics

Article-Level Metrics (ALMs) are rapidly emerging as important tools to quantify how individual articles are being discussed, shared, and used.

Information on all these is important to the research from many perspectives like choice of journal, choice of mode, how to when to how much too etc. Libraries extending support on these areas will surely make a mark on the researchers

8. DISCUSSION

Relationships between researchers and traditional library and university support for research have shifted radically. Given major time constraints within which they all work, investigators use and prefer easy solutions that are adequate, not optimal. (Kroll & Forsman, 2010)

In the changing landscape the libraries world over have geared up to rise up to challenging needs of their research community. Researchers require practical evidence of direct value of research tools and services. Academic libraries can support research by developing and aggregating discipline-based tools, providing customized services, and emphasizing user-centered services. (Kroll & Forsman, 2010)

There is a need in current times years, however, to develop new and more integrated services to support researchers at all stages of the lifecycle (RIN, UK , 2010)



Fig 1: Research Tool kit
Library services supporting Research life cycle
Based on Research Life cycle(RIN, UK , 2010)

The above Figure illustrates a toolkit that libraries can design to support the changing needs of the researchers. The process begins with :

1. Idea discovery where the Library following library services will be helpful provide :
 - Federated Search
 - Research Guides
 - Ask a Librarian
 - Personalized research assistance
 - Information Literacy
 - Information Commons
2. The second phase is that of Funding /Approval where the user's needs the following services in addition to the above services
 - Open Access and OA Mandates laid down by Funding agencies or Institutions
 - Research Data Management

3. The Third stage is of Experimentation, where the researchers requires more service like use of
 - Statistical Software
 - Manage Citations
4. The final stage which is crucial to the researchers, where they call for support in the areas of
 - Assisting in Publishing
 - Printing thesis
 - Reference Management
 - Copyright and IPR
 - Improving Visibility (IR/Web 2.0)
 - Research Metrics

All the above services will help the researchers to advance the research life cycle with ease. There is a need to keep the emerging needs of the researchers and prepare draft plan for services to be delivered. They can be further fine-tuned keeping in view the trends at the time of implementation. Information on all these services can be linked to Research Portal which will adding tremendous value to the Library work.

9. CONCLUSION

Libraries can no longer remain as mere institutions in the technological era, but should have a more active role as an efficient information provider. There are several challenges to the research library system. Digital technology is one, but also challenges coming from changes in the research system. The research library should be as catalyst in knowledge production cycle . There library continues to be an integral part research by responding to this challenge by developing a unique role in consultation with their Institutes and research community needs. Libraries must support and reinforce roles with renovated and repurposed spaces, staff with specialized expertise, and a strong institutional capacity for technological support. University libraries, which are engaged in a process of reinventing themselves and rethinking their services are an increasingly important source for the development of the institution. It is challenging to transform libraries and to remain relevant requires a deeper understanding what services will be valued in the future, how they can change and adapt to maintain relevancy in a continuously changing environment.

REFERENCES :

Association of College and Research Libraries, The Value of Academic Libraries: A Comprehensive Research Review and Report (Chicago: Association of College and Research Libraries, 2010), <http://www.acrl.ala.org/value> (accessed March 21, 2016).

Council on Library and Information Resources, No Brief Candle: Reconceiving Research Libraries for the 21st Century (Washington, DC: Council on Library and Information Resources, 2008), <http://www.clir.org/pubs/abstract/pub142abst.html> (accessed July 6, 2011), v, 10–12

ITHAKA. (2012) ITHAKA. (2009). Retrieved April 1, 2016, from ITHAKA website: <http://www.ithaka.org/ithaka-s-r/research/faculty-surveys-2012>

Kroll, S., & Forsman, R. (2010). *A Slice of Research Life: Information Support for Research*. Ohio: OCLC

Mary Auckland, Re-Skilling for Research: An Investigation into the Role and Skills of Subject and Liaison Librarians Required to Effectively Support the Evolving Information Needs of Researchers (London: Research Libraries UK, January 2012), <http://www.rluk.ac.uk/files/RLUK%20Re-skilling.pdf>.

(Accessed on March 25 2016)

RIN, UK . (2010). *Research Support Services in UK Universities*. Research Information Network

Staley, D. J. (2010). *Futures thinking for academic librarians: higher education in 2025 ACRL*.

Retrieved April 5, 2016, from

<http://www.ala.org/acrl/sites/ala.org.acrl/files/content/issues/value/futures2025.pdf>:

Scientometric Analysis on Materials Science Research Publication of Indian Institute of Technology Madras 2004-2013

S. Muthumari¹, S. Raja² and Mahendra N. Jadhav³

¹*psmuthumari@gmail.com*

³*jadhavm@iitm.ac.in*

Indian Institute of Technology Madras, Chennai, Tamilnadu, India - 600036

²*lisraja1979@gmail.com*

Alagappa University, Karaikudi, Tamilnadu, India -630003

ABSTRACT

This study aims to represent the research performance of Indian Institute of technology Madras (IITM) on materials science, based on a scientometric analysis of scientific research output. The data of research output for this study are extracted from the SCOPUS database. A few scientometric indicators such as author productivity, degree of collaboration, rank distributions etc. have been used to illustrate the research performance of researchers. A total of 2529 research papers have been published by researchers of IITM on materials science between 2004 and 2013. The result of this study shows that, the researchers are mostly preferred to publish their research work in journals (84.14%). The degree of collaboration is 0.983, which means most of the research works are collaborative works. USA is the most preferred country by the researchers for research collaboration.

Keywords: Scientometric study, Indian Institute of Technology Madras, Materials Science, Quantitative Techniques

1. INTRODUCTION

India has started major programs for research studies in the Materials Science, largely on collaborative basis, involving a large number of universities, mission-oriented research institutions, institutes of national importance and other organizations, with the hope of creating new industrial opportunities in the country, and to enable India compete globally. Materials science¹⁴ is an interdisciplinary field involving the properties of matter and its applications to various areas of science and engineering. This scientific field investigates the relationship between the structure of materials at atomic or molecular scales and their macroscopic properties. It incorporates elements of applied physics and chemistry. In recent years, materials science has become a major field of research as it is focused on Nano science and nanotechnology.

There is a lot of research conducted worldwide in materials science. In India various institutions and universities are also actively engaged in research on materials science. Bhabha Atomic Research Centre, Mumbai; Indian Institute of Science, Bengaluru; Indian Institute of Technology, Kharagpur; Indira Gandhi Centre for Atomic Research, Kalpakkam; and Indian Institute of Technology Madras, Chennai are the most active institutes carrying out research in materials science in India. Indian Institute of Technology Madras is one among the foremost institutes of national importance by the Government of India in higher technological education, basic and applied research. Founded¹³ in 1959, the German Government offered technical assistance for establishing an institute of higher education in engineering in India. It has established itself as a premier centre for teaching, research and industrial consultancy in the

country. The Institute has sixteen academic departments and a few advanced research centers in various disciplines of engineering and pure sciences, with nearly 100 laboratories organized in a unique pattern of functioning.

2. REVIEW OF LITERATURE

Koganuramath¹² et al., examined 663 papers published during 1990-2000 and authored by the scientists of TISS (Tata Institute of Social Sciences) to identify author productivity, areas of specialisation and publication pattern. Walke & Dhawan¹⁰ studied the status of Materials Science research in India during 1993-2001, with metrics on its publication size, growth rate and institutional productivity etc. Mohan, et al.⁹ analysed quantitatively the growth and development of Indian research in the field of Nano science and nanotechnology reflected in Science Citation Index (SCI) during 1982-2008. Vasishta⁶ undertook a study, PEC (Punjab Engineering College) University of Technology, Chandigarh published between 1996 and 2009 to examine the research productivity, publication trend, collaboration trend, etc. Kademani, B. S., et al.⁸, analysed the materials science publications in India for the period 1999-2008 based on the Scopus database. Thirumagal⁵ extracted publication data of Manonmaniam Sundaranar University from the Web of Science database to study the scientific publications and analysed 363 publications that were published between 1999 and 2011. Angadi, *et al.*,⁷ studied the research productivity of University of Madras by collecting publication data for the years 1999 to 2011 from Web of Science database. Kumbar & Gupta³ analysed the research contribution of Karnataka University in science and technology, 1467 data extracted from Scopus database and published between the years 2001 and 2010. Wani, *et al.*,⁴ reported the research output of All India Institute of Medical Sciences (AIIMS) from 1959-2011 based on 17,181 data extracted from Scopus database. 2015 Hanumappa, A., et al.¹, examined bibliometric analysis of the research publications of Gujarat University during the ten-year period between 2004 and 2013.

3. OBJECTIVES

The main objectives of the paper are to:

- (a) Evaluate and quantitatively analyze the research publication trend of IITM on materials science
- (b) To indicate the most prolific authors, highly cited authors
- (c) To identify the degree of collaboration
- (e) To find out the most cited papers
- (d) To identify most preferred source of publications
- (e) To indicate Collaboration with other institution and countries

4. METHODOLOGY, SCOPE AND LIMITATIONS

Scientometrics is a discipline which analyses scientific publications and citations appended to the papers to gain an understanding of the structure of science, growth of science at global level, performance of a country in a particular domain, performance of institutions, departments/divisions, and scientific eminence of an individual scientist. This study is conducted to analyze the research output of Indian Institute of Technology Madras (IITM) on materials science, and its collaboration with others. It is based on a quantitative analysis of scientific research output published as journal articles, letter, review, conference paper, short survey, book chapter, etc.

The data for the study has been drawn from SCOPUS database. SCOPUS is an international multi-disciplinary database indexing over 21,000 titles from more than 5,000 publishers,

including 20,000 peers reviewed journals, 390 trade publications, 370 book series, and 5.5 million international conference/ seminar papers. Scopus has a worldwide coverage, of which more than half of the Scopus contents originate from Europe, Latin America and the Asia & the Pacific Region¹⁴. The research output data of IITM is collected by using by using suitable search strategy (Indian Institute of Technology Madras in affiliation field, Materials Science in subject field and year between 2004 and 2013) provided by the SCOPUS database. The refined result was exported as CSV file and then used for further analysis. The final data consisted of 2529 publications by authors from IITM on materials science during the ten years between 2004 and 2013. In the study, some bibliometric indicators are used to assess the research output and author productivity.

5. DATA ANALYSIS AND RESULTS

5.1 Document type wise distribution of research output

Table 1. Document type wise distribution of research output

S. No.	Document Type	No. of Publications	Percentage
1	Article	2128	84.14
2	Conference Paper	341	13.48
3	Review	28	1.11
4	Book Chapter	8	0.32
5	Erratum	8	0.32
6	Editorial	7	0.28
7	Article in Press	3	0.12
8	Note	3	0.12
9	Letter	2	0.08
10	Short Survey	1	0.04
	Total	2529	100

Table & figure -1 shows the distribution of research output by document types. The research outputs of researchers of IITM are published in 10 different document types. The researchers are mostly preferred to publish their research work in journals. Out of a total of 2529 publication, 2128 items are published in research journals as articles which comprised 84.14 percent of the total. The next document type is Conference paper, which was the second preference of researchers, with a number of 341 items (13.48 %). The review was the next preferred category of document type which covered 28 items (1.1 %). The other remaining categories are covered only 1.28 percent of total publications.

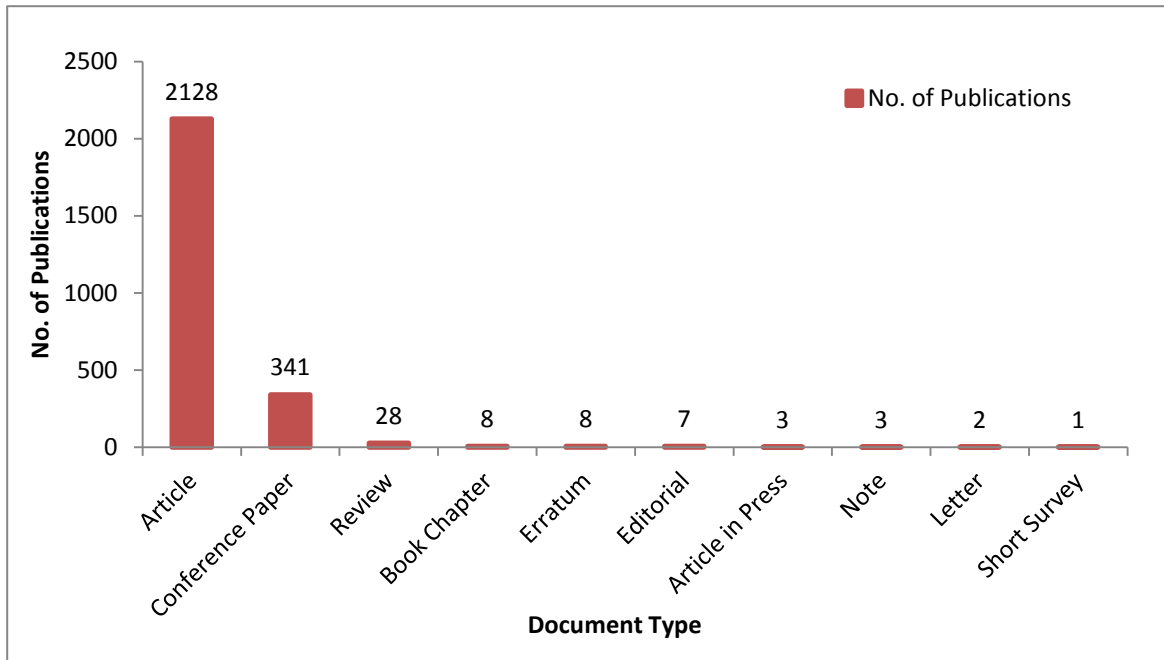


Figure 1. Document type wise distribution of research output

5.2 Year wise distribution of research output

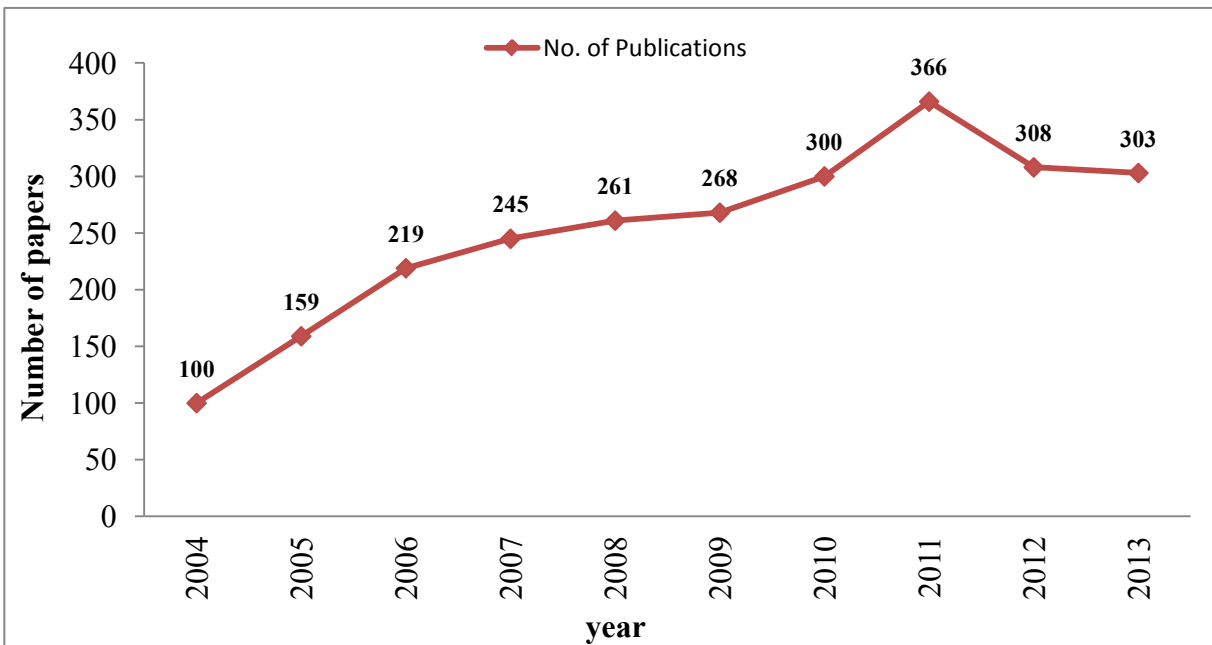


Figure 2. Year wise distribution of research output

Research publications do constitute an imperative basis in ranking of institutions, apart from infrastructure, faculty, student, and other variables. Most of the institutions in India are now emphasising on research and encouraging researchers to publish more. Figure & Table 2 depicts year wise distribution of research output, shows that there has been a steady growth in research publications at the IITM during the study period. Further the results show that though there has

been overall growth over the ten year period, there have been incidences of decline in number of publications in 2012 and 2013 when compared to their previous years. In rest of the other years, there has been a marked growth in number of publications over the previous years. The highest number of papers published in the year 2001 (366 papers) and lowest 2004 (100 papers).

Table 2. Year wise distribution of research output

Year	No. of publications	Percentage	Cumulative No. of publications	Cumulative Percentage
2013	303	11.98	303	11.98
2012	308	12.18	611	21.16
2011	366	14.47	977	38.63
2010	300	11.86	1277	50.49
2009	268	10.60	1545	61.09
2008	261	10.32	1806	71.14
2007	245	9.69	2051	81.1
2006	219	8.66	2270	89.76
2005	159	6.29	2429	96.05
2004	100	3.95	2529	100
Total	2529	100.00		

5.3 Most prolific authors

The data was sorted by the number of publications by each author and an order was compiled. Figure & Table 3 indicates the list of top ten most productive authors who have produced more than 44 papers. The list was topped by Murty, B.S. with 173 papers to his credit, followed by Ramaprabhu, S. (100), Pradeep, T. (97), Kamaraj, M. (70), and so on. The analysis of authors based on citations they received for their papers also shown in table 2, indicates that, Viswanathan, B. has got 22.64 average citations per paper followed by Varadaraju, U.V. with 16.67, Ramaprabhu, S. (15.63) citations and so on.

Table 3. Top ten most prolific authors

S. No.	Author	Total Papers	Total Citations	Citation Per Paper
1	Murty, B.S.	173	1938	11.20
2	Ramaprabhu, S.	100	1563	15.63
3	Pradeep, T.	97	1506	15.53
4	Kamaraj, M.	70	413	5.90
5	Viswanathan, B.	64	1449	22.64
6	Balasubramaniam, K.	61	413	6.77
7	Varadaraju, U.V.	52	867	16.67
8	Balasubramanian, M.	51	368	7.22
9	Rao, K.P.	50	515	10.30
10	Gnanamoorthy, R.	44	514	11.68

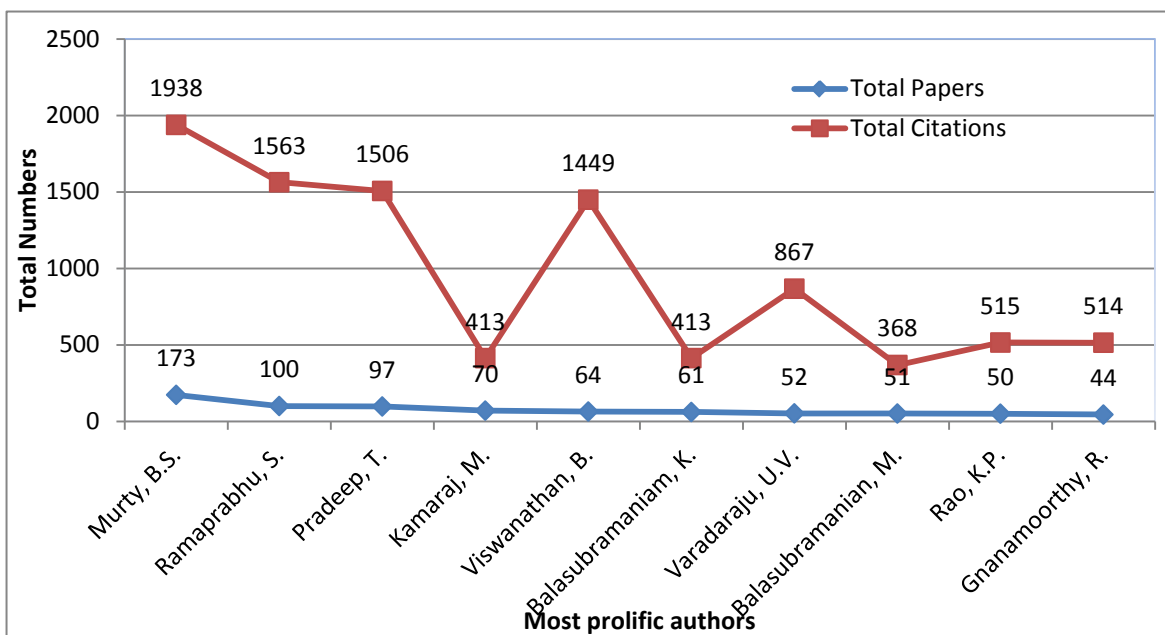


Figure 3. Top ten most prolific authors

5.4 Degree of collaboration

Table 4. Degree of collaboration

Year	Single authored papers (Ns)	Multi authored pappers (Nm)	Nm+Ns	DC= Nm/Nm+Ns	Mean in (DC)
2004	6	94	100	0.940	0.969
2005	6	153	159	0.962	
2006	4	215	219	0.982	
2007	6	239	245	0.976	
2008	4	257	261	0.985	
2009	3	265	268	0.989	
2010	1	299	300	0.997	
2011	3	363	366	0.992	
2012	5	303	308	0.984	0.989
2013	5	298	303	0.983	
	43	2486	2529	0.983	0.979

*Degree of Collaboration;

The data collected for the study indicated that from the 2529 publications of authors of IITM on materials science over the 10 year period, 2486 (98.2%) of them were collaborative work. Subramanyam¹² developed the DC (Degree of Collaboration) measure that was derived by the simple calculation of the proportion of multiple authors to the total papers. Table 4 reveals the

degree of collaboration by calculating the pattern of single and joint authorship of papers. The degree of collaboration is 0.983 which means most of the research works are collaborative.

5.5 Collaboration with other institution

Table 5. Top ten collaborative affiliations

S. No.	Name of the Affiliations	No. of Collaborating Publications	Percentage
1	Indira Gandhi Centre for Atomic Research	95	7.11
2	Defence Metallurgical Research Lab India	62	4.64
3	Indian Institute of Technology, Kharagpur	55	4.11
4	Anna University	35	2.62
5	Indian Institute of Science	34	2.54
6	Indian Space Research Organization	32	2.39
7	National Institute of Technology Tiruchirappalli	26	1.94
8	National Metallurgical Laboratory India	26	1.94
9	International Advanced Research Centre for Powder Metallurgy and New Materials, Hyderabad	25	1.87
10	National University of Singapore	23	1.72
11	Bhabha Atomic Research Centre	23	1.72
12	Tata Institute of Fundamental Research	21	1.57
13	Ashok Leyland	20	1.50
14	Other 146 affiliation with 860 publications	860	64.32
Total		1337	100.00

Further analysis on the collaboration pattern by the affiliation of the collaborating publications is shown in table 5 that includes institutions with at least 20 publications collaborated with IITM. Indira Gandhi Centre for Atomic Research topped the list of collaborating institutions with 95 of its publications collaborating with the IITM authors and followed by Defence Metallurgical Research Lab India (62), Indian Institute of Technology, Kharagpur (55) respectively.

5.6 Collaboration with other countries

Table 6. Country wise distribution of collaboration

S. No.	Country	No. of publications	Percentage
1	United States	146	23.70
2	Germany	104	16.88
3	South Korea	57	9.25
4	France	46	7.47
5	Japan	29	4.71
6	United Kingdom	29	4.71
7	Singapore	28	4.55
8	Canada	19	3.08
9	Russian Federation	19	3.08
10	Brazil	18	2.92
11	other 32 countries	121	19.64
	Total	616	616.00

The research collaboration with IITM researchers and international community is analyzed, 42 countries contributed 616 collaborative papers and figure 4 & table 6 shows list of top ten collaborative countries with IITM researchers according to their number of publications. Out of 2486 collaborative papers, 616 papers are written in collaboration with foreign authors, which covers 24.78% of total collaborative work. USA is topped with 146 collaborative papers (23.70%), subsequently Germany with 104 papers (16.88%) at second, South Korea with 57 papers (9.25%) and so on.

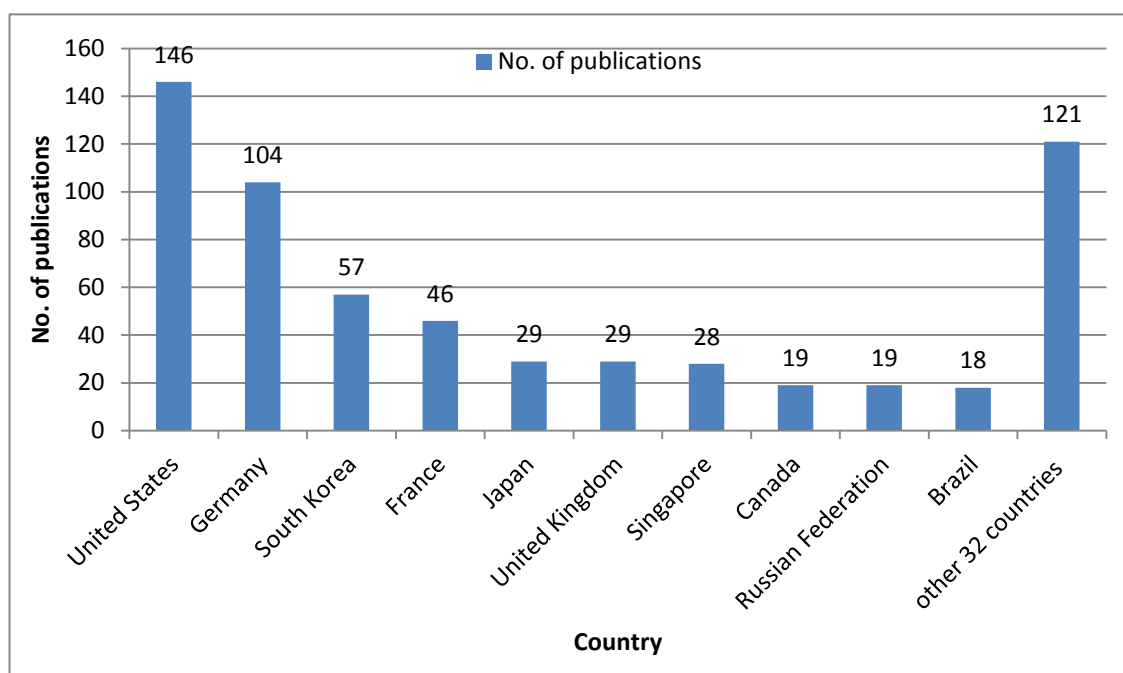


Figure 4. Country wise distribution of collaboration

5.7 List of Highly Cited Papers

Impact of research is an important benchmark in evaluation of any research and counting the citations is one of the important and common criteria used in calculating the impact of research. Citations are indications of positive recognition to the published work of authors and the journal itself and it can be said that the number of citations received is directly proportional to the recognition or impact of the published work. Exploring the citation data, for all the 2529 publications during the year 2004 to 2013, 2131 (84.26%) papers received 33,779 citation and 409 (15.74%) papers have not been cited in any publication. Table 7 shows the most cited papers, i.e., top ten ranks by citation count.

Table 7. List of top ten highly cited papers

S. No.	Title	Authors	Year	Source title	Citations	Rank
1	Synthesis, characterization, electronic structure, and photocatalytic activity of nitrogen-doped TiO ₂ nanocatalyst	Sathish, M., Viswanathan, B., Viswanath, R.P., Gopinath, C.S.	2005	Chemistry of Materials	495	1
2	Ultralayered Co ₃ O ₄ for high-performance supercapacitor applications	Meher, S.K., Rao, G.R.	2011	Journal of Physical Chemistry C	224	2
3	Nitrogen doped graphene nanoplatelets as catalyst support for oxygen reduction reaction in proton exchange membrane fuel cell	Imran Jafri, R., Rajalakshmi, N., Ramaprabhu, S.	2010	Journal of Materials Chemistry	214	3
4	Noble metal nanoparticles for water purification: A critical review	Pradeep, T., Anshup	2009	Thin Solid Films	210	4
5	Nanocrystalline metal oxides dispersed multiwalled carbon nanotubes as supercapacitor electrodes	Reddy, A.L.M., Ramaprabhu, S.	2007	Journal of Physical Chemistry C	185	5
6	Performance of polymer electrolyte membrane fuel cells with carbon nanotubes as oxygen reduction catalyst support material	Rajalakshmi, N., Ryu, H., Shaijumon, M.M., Ramaprabhu, S.	2005	Journal of Power Sources	169	6
7	Ligand exchange of Au ₂₅ SG18 leading to functionalized gold clusters: Spectroscopy, kinetics, and luminescence	Shibu, E.S., Muhammed, M.A.H., Tsukuda, T., Pradeep, T.	2008	Journal of Physical Chemistry C	153	7

8	Functionalized graphene-based nanocomposites for supercapacitor application	Mishra, A.K., Ramaprabhu, S.	2011	Journal of Physical Chemistry C	147	8
9	Photoluminescence studies on Eu ²⁺ -activated Li ₂ SrSiO ₄ -A potential orange-yellow phosphor for solid-state lighting	Pardha Saradhi, M., Varadaraju, U.V.	2006	Chemistry of Materials	135	9
10	Microwave-mediated synthesis for improved morphology and pseudocapacitance performance of nickel oxide	Meher, S.K., Justin, P., Rao, G.R.	2011	ACS Applied Materials and Interfaces	120	10

5.8 Most preferred source of publications

The analysis data indicated that out of 2529 publications 2258 papers are published in journals, followed by conference proceedings (178), book series (47), trade publications 38 and book (8). Table 5 shows top ten most prepared sources of publications by the authors of papers published by IITM authors on materials science during the study period. The result shows that “Materials Science and Engineering A” journal from Netherlands most prepared source of publication with 87 papers, followed by “Transactions of the Indian Institute of Metals” (75) and “Journal of Alloys and Compounds” with 68 papers by IITM researchers on materials science.

Table 8. List of top ten most preferred source of publications

No.	Name of the Publications	No. of papers	% of total publications
1	Materials Science and Engineering A	87	3.44
2	Transactions of the Indian Institute of Metals	75	2.97
3	Journal of Alloys and Compounds	68	2.69
4	Journal of Physical Chemistry C	61	2.41
5	Proceedings of SPIE the International Society for Optical Engineering	46	1.82
6	Journal of Materials Processing Technology	39	1.54
7	Journal of Materials Science Metallurgical and Materials	38	1.50
8	Transactions A Physical Metallurgy and Materials Science	36	1.42
9	Journal of Nanoscience and Nanotechnology	34	1.34
10	Materials and Manufacturing Processes	34	1.34

9. FINDINGS AND CONCLUSION

It can be concluded from this present study, a total of 2529 papers were published from 2004 to 2015 by the faculty members and researchers of IITM on materials science. The average publication during the study period is 252.9 per year, the highest number of 366 papers published in the year 2001. It is observed that out of 2529 publication, 2128 items are published in research journals as articles which comprised 84.14 percent of the total and Murty, B.S. topped in the list with 173 papers to his credit. It is observed that 2486 papers out of 2529 papers are collaborative work, the degree of collaboration is 0.983 which means most of the research works are collaborative works and the also indicates 42 other countries contributed 616 collaborative papers, USA is topped with 146 collaborative papers (23.70%). Analysis of authors based on citations they received for their papers, found that Viswanathan, B. has got 22.64 the highest average citations followed. It is found that 159 collaborating institutions involved in publishing 1337 articles with IITM, 'Indira Gandhi Centre for Atomic Research' topped the list of collaborating institutions with 95 of its authors collaborating with the IITM authors. It is observed that out 2529 documents, 2131 (84.26%) papers are cited and 409 (15.74%) papers have not been cited in any publication.

REFERENCE

1. Hanumappa, A., Desai, A., & Dora, M. A Bibliometrics Profile of Gujarat University, Ahmadabad during 2004-2013. *DESIDOC Journal of Library & Information Technology*, 2015, 35(1).
2. Meera, & Sahu, S. K., Research Output of University College of Medical Science, University of Delhi: A Bibliometric Study. *Collnet Journal of Scientometrics and Information Management*, 2014, 8(2).
3. Kumbar, B.D. & Gupta, B.M. Contribution of Karnataka University in science and technology: Research output and citation impact during 2001-10. *DESIDOC J. Lib. Inf. Technol.*, 2013, 33(2).
4. Wani, Z.A.; Hameed, O. & Iqbal, A. Research productivity of medicos at All India Institute of Medical Sciences (AIIMS). *Intern. J. Inf. Dissem. Technol.*, 2013, 3(2), 107-13.
5. Thirumagal, A. Scientific publications of Manonmaniam Sundaranar University, Tirunelveli, Tamilnadu: Scientometric analysis. *Lib. Philo. Prac.*, 2012, 791 (e-Journal). <http://digitalcommons.unl.edu/libphilprac/791>
6. Vasishta, S. Assessment of academic research output during 1996-2009: A case study of PEC University of Technology, Chandigarh. *DESIDOC J. Lib. Inf. Technol.*, 2011, 31(2).
7. Angadi, M.; Koganuramath, M.; Kademani, B.S. & Ramesha, B. Scientometric dimensions of innovation communication productivity of the University of Madras: A study based on Web of Science database. In *Dynamics of Librarianship in the Knowledge Society: Festschrift in honor of Prof. B Ramesh Babu*, edited by Achim Osswald, *et al.* B.R. Publishing Corporation, Delhi, 2012, pp. 1120-132.
8. Kademani, B. S., Sagar, A., & Bhanumurthy, K., Research and impact of materials science publications in India: 1999-2008. *Malaysian Journal of Library & Information Science*, 2011, 16(2), 63-82.
9. Mohan, L, Prakasan, E. R., Kademani, B. S., Surwase, G., Kumar, A. and Vijai Kumar., Research trends in Nano science and nanotechnology in India. *DESIDOC Journal of Library and Information Technology*, 2010, 30(2).

10. Walke, R., Dhawan, S. M., & Gupta, B. M.. Materials science research in India (1993–2001): A scientometric study. *COLLNET Journal of Scientometrics and Information Management*, (2007), 1(2)
11. Koganuramath, M.M.; Angadi, M. & Kademani, B.S. Bibliometric dimension of innovation communication productivity of Tata Institute of Social Sciences. *Malaysian J. Lib. Inf. Sci.*, 2002, 7(1), 69-76.
12. Subramanyam, K. Bibliometric studies of research collaboration: A review. *J. inf. Sci.*, 1983, 6(1), 33-38.
13. <https://www.iitm.ac.in> (accessed on 20th October 2015)
14. www.scopus.com (accessed on 20th October 2015)
15. https://en.wikipedia.org/wiki/Materials_science(accessed on 31ST October 2015)

Publication Trends in Library and Information Science in India

Ganesh Surwase¹, B. S. Kademani², E. R. Prakasan³, T. Swarna⁴ and G. Ravikumar⁵

² *bsk@barc.gov.in*

Scientific Information Resource Division,
Bhabha Atomic Research Centre, Mumbai-400085 (India).

ABSTRACT

This paper studies the research papers published by Indian researchers in the field of 'Library and Information Science' (LIS) during 2005-2014 and appeared in LISA database. The study assesses several parameters such as growth in number of research papers, subject areas, highly productive institutes and most prolific authors, journals preferred for communication and application of Bradford's law. A total of 1252 papers were published by Indian researchers during 2005-2014 in the field of 'Library and Information Science'.

Keywords: Library and Information Science, Publications, Research Papers, India, Bibliometrics, Informetrics, Scientometrics.

1. INTRODUCTION

Library and information science field has seen a paradigm shift in terms of subject coverage and application of information and communication technology. Librarian's responsibilities also have seen major changes from book keeper to document list to information manager to knowledge manager. Over the years, the research in library and information science field has grown manifold in variety of sub-fields. Knowledge assimilation and knowledge diffusion are visible to great extent.

The library environment is currently undergoing rapid and dynamic changes. There is an increasing demand for processing of data and retrieval of information in quickest possible time. The application of information systems and services is perhaps the only way to cope up with the information needs with speed, relative accuracy and reliability.

The impact of Information and Communication Technology (ICT) revolution in libraries over the last decade is tremendous and the developments in Internet technology has surpassed an individual's imagination. The Internet technology introduces both challenges and opportunities to libraries as well as information providers, database vendors, and others involved in information handling. The developments in the electronic publishing have made a great impact on the users and information management. These developments have provided us with a distribution channel that makes it cheap and easy to share information with others. Many individual researchers, research organisations, universities, government agencies, professional associations and commercial organisations have discovered that internet is simply a cheaper and more effective way of disseminating their information compared to print-based resources. There are also many Open Archive Initiatives (OAI) all over the world on LIS to keep the users abreast of the developments (Anil Kumar et al. 2008).

Many scientometric studies have appeared in the literature dealing with different aspects of scholarly communications: Peter Celec and Július Hodosy (2006) studied 'Student scientific

activity at the Bratislava medical faculty 2000–2004’; G. Stanhill (2001) ‘The growth of climate change science: a scientometric Study’; András Schubert and István Láng (2005) ‘The literature aftermath of the Brundtland report our common future - a scientometric study based on citations in science and social science journals’; Stéphane Fay and Sébastien Gautrias (2015) ‘A scientometric study of general relativity and quantum cosmology from 2000 to 2012’; K. C. Garg and Praveen Sharma (1991) ‘Solar power research: A scientometric study of world literature’; Barbara Stefaniak (1998) ‘International cooperation of polish researchers with partners from abroad: A scientometric study’; Yue Hu, Jun Sun and Weimin Li (2014) ‘A scientometric study of global electric vehicle research’; Kademani et al. (2009) ‘Bhabha scattering: a scientometric view’; Surwase et al. (2012) ‘Mapping the structure and development of science using co-citation analysis’; Prakasan et al. (2014). ‘Scientometric facts on international collaborative Indian publications’; and Magnone E. (2012) ‘A general overview of scientific production in China, Japan and Korea of the water-gas shift (WGS) process’.

2. OBJECTIVES

The objective of this study is to perform a scientometric analysis of all LIS research papers published by Indian researchers that appeared in the LISA database during 2005-2014. The parameters of study includes year-wise growth of research papers, subject areas, highly productive institutes and most prolific authors, journals preferred for communication and application of Bradford’s law. A total of 1252 papers were published by Indian researchers during 2005-2014 in the field of ‘Library and Information Science’.

3. MATERIALS AND METHODS

Data was collected from Library and Information Science Abstracts (LISA) database for the period 2005–2014. LISA is an international abstracting and indexing tool designed for library professionals and other information specialists. LISA currently abstracts over 440 periodicals from more than 68 countries and in more than 20 different languages. Subject coverage includes all aspects of librarianship, library users, information retrieval etc. The keyword ‘India’ was applied in ‘author affiliation’ field of LISA database to download the papers published by Indian researchers during 2005-2014. A total of 1252 papers were downloaded and transferred to spread sheet application and analysed the data as per the objectives of the study. The bibliographic fields were analysed by normal count procedure.

4. RESULTS AND DISCUSSIONS

4.1 Year-wise Distribution of Papers

A total of 1252 papers were published in LIS during 2005–2014 by Indian researchers. Year-wise distribution of papers is given in Fig. 1. The average number of papers per year was 125 with the highest number of papers (213) published in 2011 followed by 172 papers in 2012, 148 papers in 2013 and 139 papers in 2009. A declining trend of publication was observed in 2012.

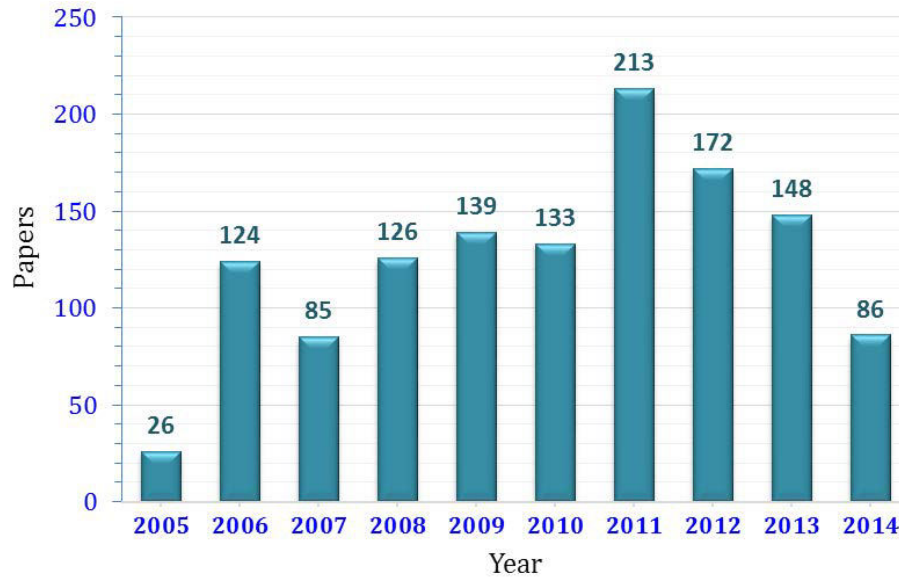


Figure-1: Year-wise distribution of papers in LIS (2005–2014) by Indian researchers

4.2 Subject-wise Distribution of Papers

All the papers under study were categorised in 12 broad subject categories as depicted in Fig.2. The highest number of papers (15%) were published in ‘Library automation’ followed by ‘Information Technology’ and ‘Scientometrics’ with 13% each, ‘User Studies’ with 11% papers and ‘Communication & Publication’ with 10% papers.

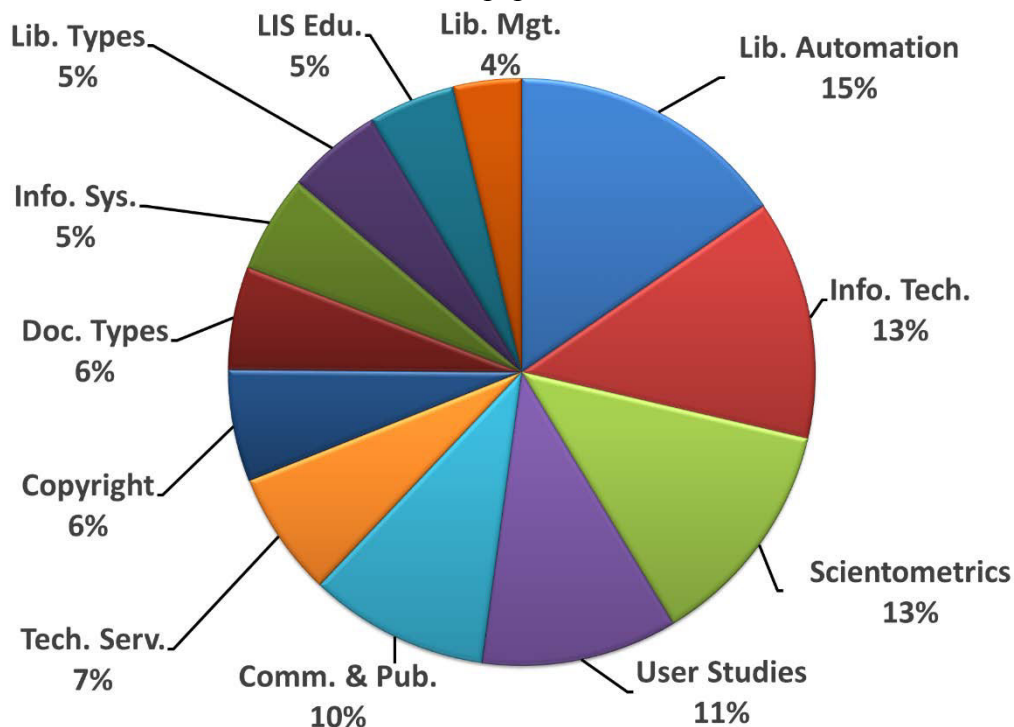


Fig.2 Subject-wise distribution of papers in LIS (2005-2014)

4.3 Institute-wise Distribution of Papers

The publication productivity of highly productive institutes is given in Table-1. University of Delhi published the highest number (38) of papers followed by University of Mysore with 29 papers, National Institute of Science Communication and Information Resources (NISCAIR), New Delhi with 27 papers, Guru Nanak Dev University, Amritsar with 24 papers and National Institute of Science Technology and Development Studies (NISTADS), New Delhi with 22 papers.

Table-1: Publication productivity of highly productive institutes in LIS (2005-2014)

Sr#	Institute	Papers
1	University of Delhi, Delhi	38
2	University of Mysore, Mysore	29
3	National Institute of Science Communication and Information Resources (NISCAIR), New Delhi	27
4	Guru Nanak Dev University, Amritsar	24
5	National Institute of Science Technology and Development Studies (NISTADS), New Delhi	22
6	Documentation Research & Training Centre (DRTC), Bangalore	21
7	University of Kashmir, Srinagar	21
8	Kuvempu University, Shimoga	20
9	Banaras Hindu University, Varanasi	19
10	Gulbarga University, Gulbarga	19
11	Aligarh Muslim University, Aligarh	18
12	Annamalai University, Annamalai Nagar	18
13	Indian Statistical Institute, Bangalore	18
14	Bhabha Atomic Research Centre, Mumbai	17
15	Indian Institute of Technology Kharagpur, Kharagpur	17
16	Anna University, Chennai	16
17	Indira Gandhi National Open University (IGNOU), New Delhi	15
18	Panjab University, Chandigarh	14
19	Indian Institute of Technology Kanpur, Kanpur	13
20	Cochin University of Science and Technology, Cochin	12
21	Karnatak University, Dharwad	12
22	Indian Institute of Science, Bangalore	11
23	Indian Institute of Technology Bombay, Mumbai	10
24	Islamia College of Science & Commerce, Srinagar	10
25	University of Kerala, Thiruvananthapuram	10
26	GGs Indraprastha University, Delhi	9
27	Indian Institute of Technology Madras, Chennai	9
28	University of Pune, Pune	9
29	HKBK College of Engineering, Bangalore	8
30	International Management Institute, New Delhi	8
31	Jammu University, Jammu	8
32	Sambalpur University, Sambalpur	8
33	Sarada Ranganathan Endowment for Library Science (SRELS),	8

Sr#	Institute	Papers
	Bangalore	
34	SNDT Women's University, Mumbai	8
35	St Stephen's College, New Delhi	8
36	University of Calcutta, Kolkata	8
37	Chaudhary Charan Singh University, Meerut	7
38	KIIT University, Bhubaneswar	7
39	National Institute of Technology, Tiruchirappalli	7
40	Thiagarajar College of Engineering, Madurai	7
41	Indian Institute of Management, Lucknow	6
42	Vellore Institute of Technology, Vellore	6
43	Andhra University, Visakhapatnam	5
44	Defence Scientific Information and Documentation Centre (DRDO), Delhi	5
45	Indian Institute of Management, Ahmedabad	5
46	Indian Institute of Technology Delhi, New Delhi	5
47	Jadavpur University, Kolkata	5
48	Kurukshetra University, Kurukshetra	5
49	Osmania University, Hyderabad	5
50	Tumkur University, Tumkur	5
51	University of Hyderabad, Hyderabad	5
52	University of Kalyani, Nadia	5

4.4 Most Prolific Authors

List of the most prolific authors in LIS during 2005-2014 is given in Table-2. Gangan Prathap (NISCAIR, New Delhi) published the highest number of papers (18) followed by A. Neelameghan (DRTC, ISI, Bangalore) with 17 papers, Amritpal Kaur (GND Univ., Amritsar) with 14 papers, M. P. Satija (GND Univ., Amritsar), Maitrayee Ghosh (IITK, Kanpur), V. K. J. Jeevan (IGNOU, New Delhi) and Vijai Kumar (BARC, Mumbai) with 13 papers each, B. S. Kademani (BARC, Mumbai), Dillip K. Swain (KIIT Univ., Bhubaneswar) and Sampath Kumar B. T. (Tumkur Univ., Tumkur) with 12 papers each.

Table-2: List of the most prolific authors in LIS (2005-2014)

Sr#	Author	Affiliation	Papers
1	Gangan Prathap	National Institute of Science Communication and Information Resources, New Delhi	18
2	A Neelameghan	Documentation Research and Training Centre, ISI, Bangalore	17
3	Amritpal Kaur	Guru Nanak Dev University, Amritsar	14
4	M P Satija	Guru Nanak Dev University, Amritsar	13
5	Maitrayee Ghosh	Indian Institute of Technology Kanpur, Kanpur	13
6	V K J Jeevan	Indira Gandhi National Open University, New Delhi	13
7	Vijai Kumar	Bhabha Atomic Research Centre, Mumbai	13

Sr#	Author	Affiliation	Papers
8	B S Kademani	Bhabha Atomic Research Centre, Mumbai	12
9	Dillip K Swain	KIIT University, Bhubaneswar	12
10	Sampath Kumar B T	Tumkur University, Tumkur	12
11	B M Gupta	National Institute of Science, Technology and Development Studies, New Delhi	11
12	Bhaskar Mukherjee	Banaras Hindu University, Varanasi	11
13	B U Kannappanavar	Kuvempu University, Shimoga	10
14	Mohammad Hanief Bhat	Islamia College of Science & Commerce, Srinagar	10
15	Anil Sagar	Bhabha Atomic Research Centre, Mumbai	9
16	M Chandrashekara	HKBK College of Engineering, Bangalore	9
17	S Thanuskodi	Annamalai University, Annamalai Nagar	9
18	B D Kumbar	Karnatak University, Dharwad	8
19	B S Biradar	Kuvempu University, Shimoga	8
20	Deepak Chawla	International Management Institute, Delhi	8
21	Devendra Kumar	Chaudhary Charan Singh University, Meerut	8
22	Himanshu Joshi	International Management Institute, Delhi	8
23	K R Mulla	HKBK College of Engineering, Bangalore	8
24	Margam Madhusudhan	University of Delhi, Delhi	8
25	N S Harinarayana	University of Mysore, Mysore	8
26	Raj Kumar Bhardwaj	St. Stephen's College, Dehli	8
27	S L Sangam	Karnatak University, Dharwad	8
28	Dinesh Gupta	Kurukshetra University, Kurukshetra	7
29	GaneshSurwase	Bhabha Atomic Research Centre, Mumbai	7
30	K C Panda	Sambalpur University, Jyoti Vihar	7
31	K T Anuradha	Indian Institute of Science, Bangalore	7
32	Khaiser Nikam	University of Mysore, Mysore	7
33	Lalitha K Sami	Gulbarga University, Gulbarga	7
34	Manorama Tripathi	Indira Gandhi National Open University, New Delhi	7
35	Mohammad Nazim	Banaras Hindu University, Varanasi	7
36	Sarika Sawant	SNDT Women's University, Mumbai	7
37	Sumeer Gul	University of Kashmir, Srinagar	7
38	G J Narayana	Sarada Ranganathan Endowment for Library Science, Bangalore	6
39	K C Garg	National Institute of Science, Technology and Development Studies, New Delhi	6
44	Mahesh V Mudhol	Mangalore University, Mangalore	6
40	Manjunath Lohar	Sahyadri Science College (Autonomous), Shimoga	6
41	S M Shafi	University of Kashmir, Srinagar	6
42	Satish Kanamadi	Tata Institute of Social Sciences, Mumbai	6
43	Shiv Kumar	Panjab University, Chandigarh	6
45	Abdul Mannan Khan	Aligarh Muslim University, Aligarh	5

Sr#	Author	Affiliation	Papers
46	Anil Kumar	Bhabha Atomic Research Centre, Mumbai	5
47	B K Sen	National Institute of Science Communication and Information Resources, New Delhi	5
48	Chetan Sharma	GGs Indraprastha University, Delhi	5
49	Devika P Madalli	Documentation Research and Training Centre, ISI, Bangalore	5
50	Fayaz Ahmad Loan	University of Kashmir, Srinagar	5
51	I V Malhan	Jammu University, Jammu	5
52	K M Krishna	Rajasthan Agricultural University, Jobner	5
53	Kiran Savanur	Raman Research Institute, Sadashivanagar, Bangalore	5
54	Lalit Mohan	Bhabha Atomic Research Centre, Mumbai	5
55	Mallinath Kumbar	University of Mysore, Mysore	5
56	Mayank Trivedi	Sardar Patel University, Vallabhvidyanagar	5
57	N K Sheeja	Cochin University of Science and Technology, Cochin	5
58	P Senthilkumaran	Indian Cardamom Research Institute, Kailasanadu	5
59	Preedip Balaji Babu	Documentation Research and Training Centre, ISI, Bangalore	5
60	Preeti Mahajan	Panjab University, Chandigarh	5
61	Ramasamy Rajaram	Thiagarajar College of Engineering, Madurai	5
62	Siva Ram Murthy	Indian Institute of Technology Madras, Chennai	5
63	Sunil Tyagi	Indian Pharmacopoeia Commission, GoI, Ghaziabad	5
64	Vasantha Raju N	Government First Grade College, Periyapatna	5

4.5 Journals Preferred for Communication

SRELS Journal of Information Management published the highest number (209) of papers followed by *Library Philosophy and Practice* with 67 papers, *International Journal of Library and Information Science* with 65 papers, *Information Studies* with 59 papers and *Annals of Library and Information Studies* with 56 papers (Table-3).

Table-3: Journals preferred for communication in LIS (2005-2014)

Sr#	Journal	Papers
1	SRELS Journal of Information Management	209
2	Library Philosophy and Practice	67
3	International Journal of Library and Information Science	65
4	Information Studies	59
5	Annals of Library and Information Studies	56
6	Journal of Intellectual Property Rights	55
7	Scientometrics	49
8	International Information and Library Review	42

Sr#	Journal	Papers
9	Electronic Library	41
10	Library Review	28
11	Program: Electronic Library and Information Systems	27
12	Journal of Information and Knowledge Management	24
13	Chinese Librarianship: An International Electronic Journal	21
14	International Journal of Information Communication Technologies and Human Development	18
15	International Journal of Intelligent Information Technologies	16
16	Knowledge-Based Systems	16
17	Malaysian Journal of Library and Information Science	15
18	IFLA Journal	13
19	Library Hi Tech News	13
20	Webology	13
21	Journal of Knowledge Management	12
22	Artificial Intelligence Review	11
23	Collection Building	11
24	International Journal of Virtual Communities and Social Networking	11
25	International Journal of Information Security and Privacy	10
26	Library Hi Tech	10
27	Library Management	10
28	Asian Journal of Information Science and Technology	9
29	Journal of Intellectual Capital	8
30	Learning Organization	8
31	Computer Networks	7
32	DESIDOC Journal of Library and Information Technology	7
33	E-JASL: The Electronic Journal of Academic and Special Librarianship	7
34	International Journal of Asian Business and Information Management	7
35	International Journal of Electronic Government Research	7
36	VINE: The Journal of Information and Knowledge Management Systems	7
37	CIT - Journal of Computing and Information Technology	6
38	COLLNET Journal of Scientometrics and Information Science	6
39	Information Management and Computer Security	6
40	Information Development	5
41	Interlending and Document Supply	5
42	International Journal of Digital Crime and Forensics	5
43	Journal of Academic Librarianship	5
44	Journal of the American Society for Information Science and Technology	5
45	Open Learning: The Journal of Open and Distance Learning	5

4.5.1 Application of Bradford's Law

The study shows that top 24% journals published 80% papers in the LIS field during 2005-2014. It is clearly visible from the figure-3 that it does not follow the Bradford's Law. The application of Bradford's law depicts the three zones of 417 (1/3) papers each, The first zone had 5 journals, second zone 14 journals and third zones 140 journals, where the ratio among these number of

journals is not as per the Bradford's Law. The core or first zone journals which published one third articles are: 'SRELS Journal of Information Management' published the highest number (209) of papers followed by 'Library Philosophy and Practice' with 67 papers, 'International Journal of Library and Information Science' with 65 papers, 'Information Studies' with 59 papers and 'Annals of Library and Information Studies' with 56 papers.

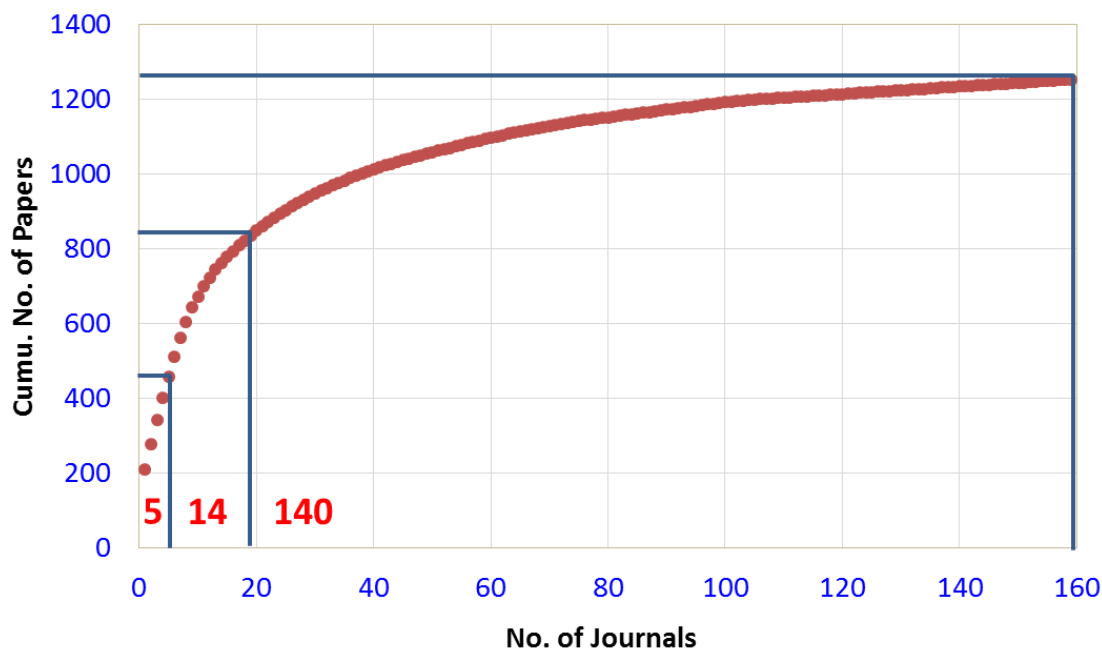


Fig.3: Application of Bradford's Law

6. CONCLUSION

A total of 1252 research papers were published by Indian researchers in the field of 'Library and Information Science' during 2005-2014. The average number of papers per year was 125 with the highest number of papers (213) published in 2011 followed by 172 papers in 2012, 148 papers in 2013 and 139 papers in 2009. A declining trend of publication was observed in 2011 which may be attributed to input time-lag to the database. The highest number of papers (298) were published in the subject areas 'Library automation' followed by 'Information Technology' with 256 papers, 'Scientometrics' 246 papers, 'User Studies' with 209 papers.

University of Delhi published the highest number papers followed by University of Mysore, NISCAIR, New Delhi, Guru Nanak Dev University, Amritsar, NISTADS, New Delhi and DRTC, Bangalore. The list of most prolific authors were: Gangan Prathap (NISCAIR, New Delhi) followed by A. Neelameghan (DRTC, ISI, Bangalore), Amritpal Kaur (GND Univ., Amritsar), M. P. Satija (GND Univ., Amritsar), Maitrayee Ghosh (IITK, Kanpur), V. K. J. Jeevan (IGNOU, New Delhi), Vijai Kumar (BARC, Mumbai), B S Kademani (BARC, Mumbai), Dillip K. Swain (KIIT Univ., Bhubaneswar) and Sampath Kumar B. T. (Tumkur Univ., Tumkur).

'SRELS Journal of Information Management' published the highest number (209) of papers followed by 'Library Philosophy and Practice' with 67 papers, 'International Journal of Library

and Information Science’ with 65 papers, ‘Information Studies’ with 59 papers, ‘Annals of Library and Information Studies’ with 56 papers, ‘Journal of Intellectual Property Rights’ with 55 papers, ‘Scientometrics’ with 49 papers.

REFERENCES

1. Celec P and Hodosy J. (2006). Student scientific activity at the Bratislava medical faculty 2000–2004. A scientometric study. *Central European Journal of Medicine*. Vol. 1 (2) pp.172-178.
2. Fay S and Gautrias S. (2015). A scientometric study of general relativity and quantum cosmology from 2000 to 2012. *Scientometrics*. Vol. 105 (1) pp.471-484.
3. Garg K. C. and Sharma P. (1991). Solar power research: A scientometric study of world literature. *Scientometrics*. Vol. 21 (2) pp.147-157.
4. Hu Yue, Sun Jun and Li W. (2014). A scientometric study of global electric vehicle research. *Scientometrics*. Vol. 98 (2) pp.1269-1282.
5. Kademani B.S., Surwase G., Lalit Mohan and Vijai Kumar. (2009). Bhabha scattering: a scientometric view. *DESIDOC Journal of Library and Information Technology*. Vol. 29(4) 3-11.
6. Kumar A., Prakasan E.R., Surwase G., Kademani B.S. and Vijai Kumar. (2008). Library and Information Science Research in India: A LISA-based Study. *International Conference on Knowledge for All (ILA-TISS-2008)* 12-15 November 2008. Mumbai (India), 685-696.
7. Magnone E. (2012). A general overview of scientific production in China, Japan and Korea of the water-gas shift (WGS) process. *Information*. Vol. 3(4) 771-789.
8. Prakasan E.R., Lalit Mohan., Girap P., Surwase G., Kademani B.S. and Bhanumurthy K. (2014). Scientometric facts on international collaborative Indian publications. *Current Science*. Vol. 106(2) 166-169.
9. Stanhill G. (2001). The growth of climate change science: a scientometric study. *Climatic Change*. Vol. 48 (2) pp.515-524.
10. Schubert A. and Láng I. (2005). The literature aftermath of the brundtland report ‘our common future’ - a scientometric study based on citations in science and social science journals. *Environment, Development and Sustainability*. Vol. 7 (1) pp.1-8.
11. Stefaniak B. (1998). International cooperation of polish researchers with partners from abroad: A scientometric study. *Scientometrics*. Vol. 41 (1) pp.155-167.
12. Surwsae G., Kademani B.S. and Bhanumurthy K. (2012). Mapping the structure and development of science using co-citation analysis. *National Workshop on Using Different Metrics for Assessing Research Productivity*, 16-17 Feb. 2012, Indian Statistical Institute, New Delhi (India), pp.164-174.

India's Contribution to Open International Nuclear Information System

Anil Kumar¹, Sandeep Kadam², Nita Bhaskar³, B.S. Kademani⁴ and G. Ravikumar⁵

¹*anil72@barc.gov.in*

Scientific Information Resource Division,
Bhabha Atomic Research Centre, Mumbai

ABSTRACT

INIS (International Nuclear Information System) is an international system operated by INIS secretariat, IAEA, Vienna in the field of peaceful uses of nuclear science, technology and allied subjects. India is participating as a member of the system from its inception, since 1970. Scientific Information Resource Division, Bhabha Atomic Research Centre, Mumbai is the National INIS Centre of India. This Centre works as a noble agency of all INIS activities within and outside India. The present study makes an endeavor to represent India in INIS co-operative venture during 2011-2015. The study is aimed at analyzing the inputting of records and usage trends; identifying the core contributing journals, observing country-wise inputs of articles published in India and other countries; analysing the content through the classification; and finding out publication forms of the literature during the period 2011-2015. India has the online user base INIS database next only to the United States in the last two years. While United Kingdom, United States, Netherlands, China, Germany and Japan are among the largest contributors. India ranks 10th with 12854 records to the database during the period with a yearly average of 2570 records. Indian Journal of Nuclear Medicine and Pramana are the highest contributing Indian journals. Nuclear physics, radiation physics and Materials Science are the main areas of Indian contribution.

Keywords: Open database, Information Systems; Information Dissemination; Information Retrieval; INIS; International Nuclear Information System; International Cooperation; Nuclear Knowledge Management; Scientometric; Bibliometric

1. INTRODUCTION

INIS is the world's first computer-based international documentation service for which bibliographic and full text input is prepared on a decentralized basis. It was set up co-operatively by the International Atomic Energy Agency (IAEA) and 129 Member States and 24 International Organizations, within the Agency's Division of Scientific and Technical Information, to construct a database identifying publications relating to nuclear science and its peaceful applications; it commenced operation in May 1970. Each participating Member State and international and regional organization is responsible for scanning the scientific and technical literature it produces and reporting the bibliographic input data for INIS to the IAEA. Since INIS is a world-wide information system and highly decentralized, standards for preparing the INIS document input were formulated to take into account the requirements and practices of the participants (INIS 2012, 2013, 2014).

India is 22nd Member State of IAEA (approved on 16th July 1957). Scientific Information Resource Division of Bhabha Atomic Research Centre (BARC) is the nodal point in India for inputting records to INIS, which is a mandatory function. India started participating in INIS in its formative stage itself in 1968 and contributed a few records for its very first issue, the INIS Atomindex of May 1970. Those records dealt with the reprocessing activities at Trombay (Nair 1999, Anil Kumar 2009).

Subjective databases are the representative samples to study the scholarly publications in that field. Scientometric analyses are mainly depending on such representative samples of the world of scholarly publishing (Vijai Kumar 2004). INIS database has been the focus of study for many scientometricians. Mandl (2002) has evaluated and assessed the impact and public acceptance of bibliographic studies on INIS, based on their usage as recorded by the Agency's Internet server log files. Many bibliometric studies have been conducted based on the records of INIS by Hillebrand (1998a, 1998b, 1998c, 1999), Marinkovic (2000a, 2000b, 2002a, 2002b, 2002c), (Anil Kumar 2013, Zeraatkar 2013, Venkatesan 2014, Agyeman 2015). The present study is focused on scientometrically analyzing India's representation in the INIS Database during the last few years. The present work has the following objectives:

- Usage of INIS database during 2014
- Show the inputting trend of India and World
- Identify input trend of INIS secretariat of member states using ONIXS
- Identify the highly contributing Indian journals
- Analyse the content through the classification
- Find out publication forms of the documents

2. MATERIALS AND METHODS

Bibliographic data was collected from the online INIS database through internet website <https://inis.iaea.org/search> during 2011 to 14 November 2015. A total of 6,10,461 records were extracted and analyzed as per objectives of the study. By using suitable search strategy-

“volume:42 OR volume:43 OR volume:44 OR volume:45 OR volume:46”

"country of input: International Atomic Energy Agency" AND volume:42 OR volume:43 OR volume:44 OR volume:45 OR volume:46 in advanced search using INIS link:

https://inis.iaea.org/search/search.aspx?orig_q=volume%3A42+OR+volume%3A43+OR+volume%3A44+OR+volume%3A45+OR+volume%3A46&src=ics&mode=Advanced&write=0

3. RESULTS AND DISCUSSION

3.1. Usage of INIS database worldwide

The INIS Collection Search is a new feature of the database. It is a single point of access to the INIS, NUCLEUS databases and the IAEA Library catalogue. The INIS collection was made searchable through Google.com and Google Scholar in 2014, increasing the number of page views to 3.4 million and document downloads to over 420 000. A total number of INIS website visitors were 89, 863 in 2013 and reached 11, 77,441 visitors in 2014 (INIS 2014). United State is the top visiting country with 213441 unique visitors of INIS online website (<http://inis.iaea.org/search>), followed by India with 99964 and Brazil with 60094 unique visitors respectively. Figure-1 shows the number of unique visitors and their visits in 2014.

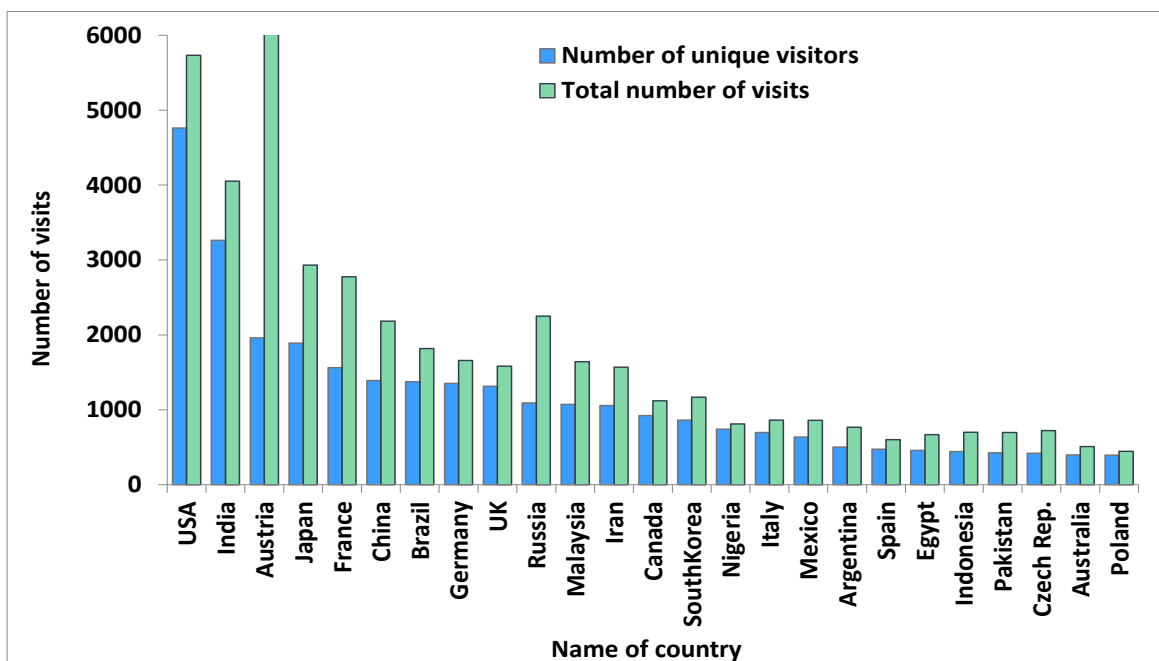


Figure 1: Number of unique visitors and total visits in 2014

3.2. World literature input to INIS

During 2011-2015 a total of 6, 10,461 publications were added in INIS database on peaceful applications of nuclear science, technology and allied subjects by various countries. The average number of publications produced per year was 1, 22,092. Figure-2 provides top 15 countries, which have inputted maximum number of bibliographic records. United Kingdom is the top inputting with 138824 (22.69%) records of total output, followed by United States with 124059 (20.27 %) records, Netherlands with 84010 (13.73 %) records, China with 34415 (5.6%) records, Germany with 27793 (4.54%) records, Japan with 25177 (4.11%) records, Republic of Korea with 21673 (3.54%) records, IAEA with 21329 (3.48%) records, France with 15473 (2.53%) records and India with 12854 (2.10%) records are on the top of the ranks.

India's rank is 10th among the countries with 12854 (2.1%) publications with a yearly average of 2570 records. Figure 2 depicts the literature inputting trend of India to INIS database. These records were converted to the spreadsheet application and analysed as per the objectives of the study.

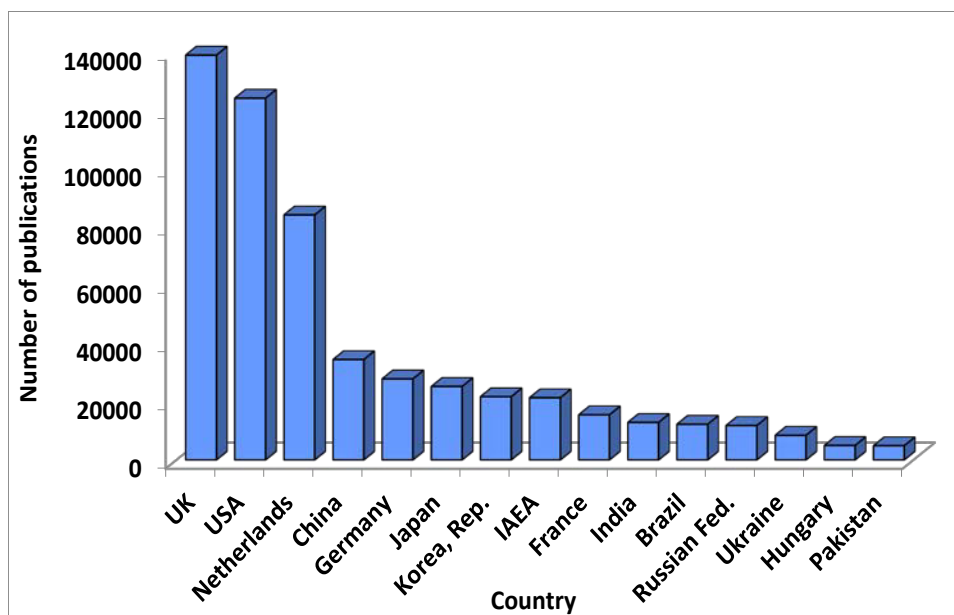


Figure 2: Country-wise literature inputs to INIS database during 2011-2015

3.3. India's contribution to INIS

India has inputted a total of 12854 bibliographic records during 2011-2015 with a yearly average of 2571 records. India is contributing to INIS database consistently in the last five years. Figure-3 depicts the literature inputting trend of India and world to INIS database. Average world bibliographic input was 122347 records per year and highest number of 130999 publications added in 2012.

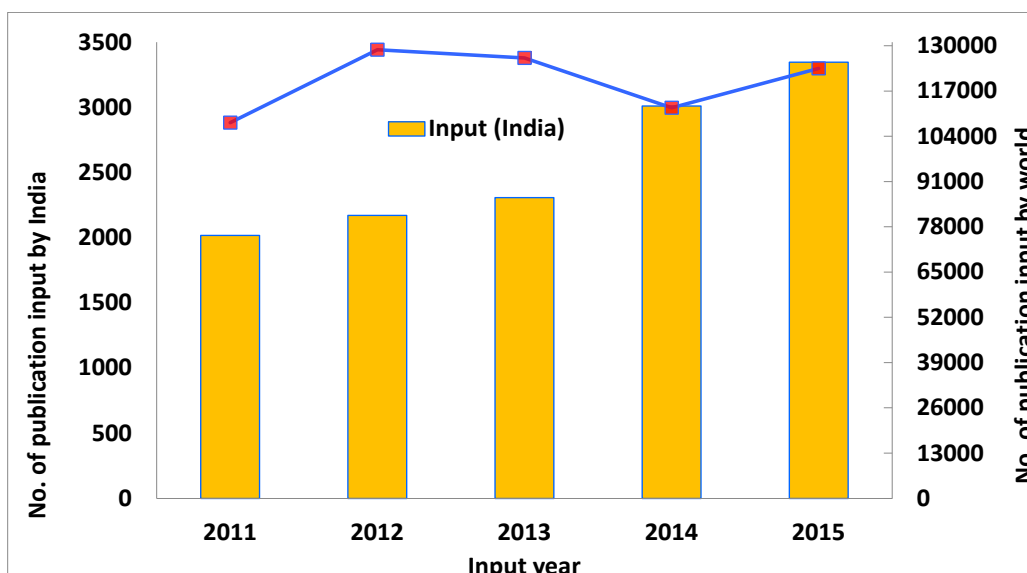


Figure 3: Year-wise trend of literature input by India and World to INIS database during 2011-2015














3.4.ONIXS implementation and bibliographic record inputs by IAEA for member states

In 18 June 2015, INIS Secretariat, IAEA has developed an application for harvesting bibliographic metadata from open access archives, publishers and information providers. It is technological advancement in INIS database, INIS developed the *Open Nuclear Information eXchange System* (ONIXS) for Harvesting and Automatic Indexing of Bibliographic Records. ONIXS has been successfully tested and that over 3000 open access articles from 15 journals stored in the *PubMed Central* (PMC) archive have been harvested and processed, 2000 of which were added to the INIS Collection. ONIXS was capable of harvesting large sets of records, analysing their scope and making preliminary subject analysis, using the refurbished *Computer Aided Indexing system* (CAI). INIS subject specialists verified the results achieved through ONIXS harvesting and automatic indexing and gave them a high mark for quality. The introduction by INIS of its new harvesting tool augments a long-standing INIS business model, based on decentralized single record acquisition and processing, and expands it with modern and very efficient node-to-node information harvesting and automatic processing. This breakthrough development will inevitably offer new opportunities and innovative approaches, ensuring a successful future for INIS (INIS highlights 2015).

INIS secretariat has added 352,128 bibliographic records to the INIS collection as a voluntary contribution on behalf of INIS member states and other International organizations during the study period. After implementation of ONIXS, IAEA's contribution has increased during 2015. Table 1 gives the highest input records of the United Kingdom with 114,921 publications and 35159 (31%) inputs in 2015 followed by United States with 86178 publications and 25,343 (29%) input in 2015. The Netherlands with 68,698 publications and 139,883 (20%) input in 2015, China with 15333 publications and 2923 (19%) input in 2015. This study observes high growth of Russian federation with 1675 (87%) publications followed by European Organization for Nuclear Research (CERN) with 1611 (100%) publications, Denmark with 630 (91%) publications, Japan with 619 (84%) publications, Germany with 533 (78%) publications, and India with 368 (92%) publications input in 2015 by INIS secretariat.

India is also contributing research publications in the field of cancer research and radiotherapy in various information sources such as journals, conference proceedings, reports, etc. These journals are also indexed in PubMed. Recently INIS secretariat has added 368 journal articles in 2015 directly on PubMed and in open Journal archives. These articles were published in 10 Indian journals: *Indian Journal of Nuclear Medicine*, *Annals of pediatric cardiology*, *Indian Journal of Genetics and Plant Breeding*, *Indian Journal of Animal Sciences*, *Indian Journal of Agricultural Science*, *Andhra Agricultural Journal*, *Indian Journal of Plant Physiology*, *Current Agricultural Research*, *International Journal of Tropical Agriculture*, *Journal of Maharashtra Agricultural Universities*, *Agricultural Science Digest*, *Crop Improvement*, *Fishery Technology*, *Indian Farming*, *Journal of Nuclear Agriculture and Biology*, *Journal of the Indian Society of Soil Science*, *Oryza*, *PKV Research Journal*, and *Tropical Ecology*.

Table 1: Publications input of member states by INIS secretariat
as per INIS database during 2011-15

S.N.	Country	2011	2012	2013	2014	2015	Total	%	Trend
1	UK	18231	32760	29894	17108	35159	133152	26.4	
2	USA	20364	19837	20464	20534	25343	106542	23.8	
3	Netherland	12686	17848	19903	16964	13983	81384	17.2	
4	China	1762	578	4162	7670	2923	17095	17.1	
5	Russian Federation	0	0	1	7	1675	1683	99.5	
6	CERN	0	0	0	0	1611	1611	100.0	
7	FAO	0	0	64	2482	854	3400	25.1	
8	Denmark	0	0	0	14	630	644	97.8	
9	Japan	0	0	0	119	619	738	83.9	
10	Germany	0	0	0	154	533	687	77.6	
11	India	0	0	0	10	368	378	97.4	
12	Slovenia	0	0	0	2	215	217	99.1	
13	Brazil	0	0	0	55	163	218	74.8	
14	Iran, Islamic Republic	0	0	0	0	118	118	100.0	
15	France	0	0	0	49	114	163	69.9	

3.5. Contributing Indian Journals

Out of the 12854 records 2007 journal articles were published in 84 different Indian journals. 29 key journals (which have produced minimum ten articles in the field) are covered more than 91% of total journal articles in Table 2. *Indian Journal of Nuclear Medicine; Pramana; Indian Journal of Physics and Proceedings of the Indian Association for the Cultivation of Science; Bulletin of Materials Science; BARC Newsletter; Radiation Protection and Environment; and Journal of Medical Physics* are found as the most contributed journals during the period of study.

Table 2: Ranking of Indian journals contributed at least ten articles to
INIS database during 2011-2015

S.N.	Journal	No. of articles	%
1	Indian Journal of Nuclear Medicine	491	24.5
2	Pramana	175	8.7
3	Indian Journal of Physics and Proceedings of the Indian Association for the Cultivation of Science	160	8.0
4	Bulletin of Materials Science	126	6.3
5	BARC Newsletter	111	5.5

S.N.	Journal	No. of articles	%
6	Radiation Protection and Environment	111	5.5
7	Journal of Medical Physics	102	5.1
8	Annals of pediatric cardiology	76	3.8
9	Current Science (Bangalore)	70	3.5
10	Indian Journal of Cryogenics	57	2.8
11	Journal of the Geological Society of India	35	1.7
12	Journal of Energy, Heat and Mass Transfer	34	1.7
13	Proceedings - Indian National Science Academy. Part A, Physical Sciences	30	1.5
14	Indian Journal of Pure and Applied Physics	28	1.4
15	Journal of the Indian Chemical Society	25	1.2
16	Journal of Applied Geochemistry	24	1.2
17	Indian Journal of Genetics and Plant Breeding	23	1.1
18	Science and Culture	17	0.8
19	Sadhana	16	0.8
20	Transactions of the Indian Ceramic Society	15	0.7
21	Journal of Nuclear Agriculture and Biology	14	0.7
22	Environment Observer	13	0.6
23	Indian Journal of Theoretical Physics	13	0.6
24	Proceedings - National Academy of Sciences, India. Section A, Physical Sciences	13	0.6
25	Indian Journal of Plant Physiology	12	0.6
26	Electrical India	11	0.5
27	Indian Journal of Experimental Biology	11	0.5
28	Journal of Food Science and Technology	11	0.5
29	Strategic Analysis	10	0.5
	Other Journals	173	8.6
Total		2007	

3.6.Channels for communication

Analysing the preference of channels for communicating the research works of scientific community is very much useful for the information specialists as well as science policy makers. Figure 4a & 4b are the bifurcation of records as per the types of Indian publications in INIS database along with the representative percentage of the articles. Nearly 83.8 per cent of articles are found as papers published in conferences/symposia and 15.6% in Indian journals.

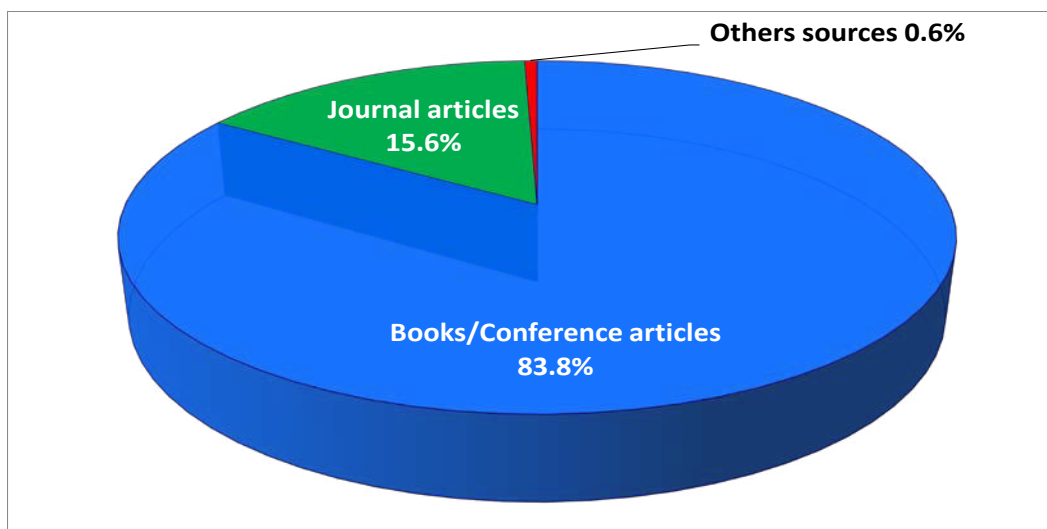


Figure 4a: Publication types of the bibliographic inputs to INIS database during 2011-2015

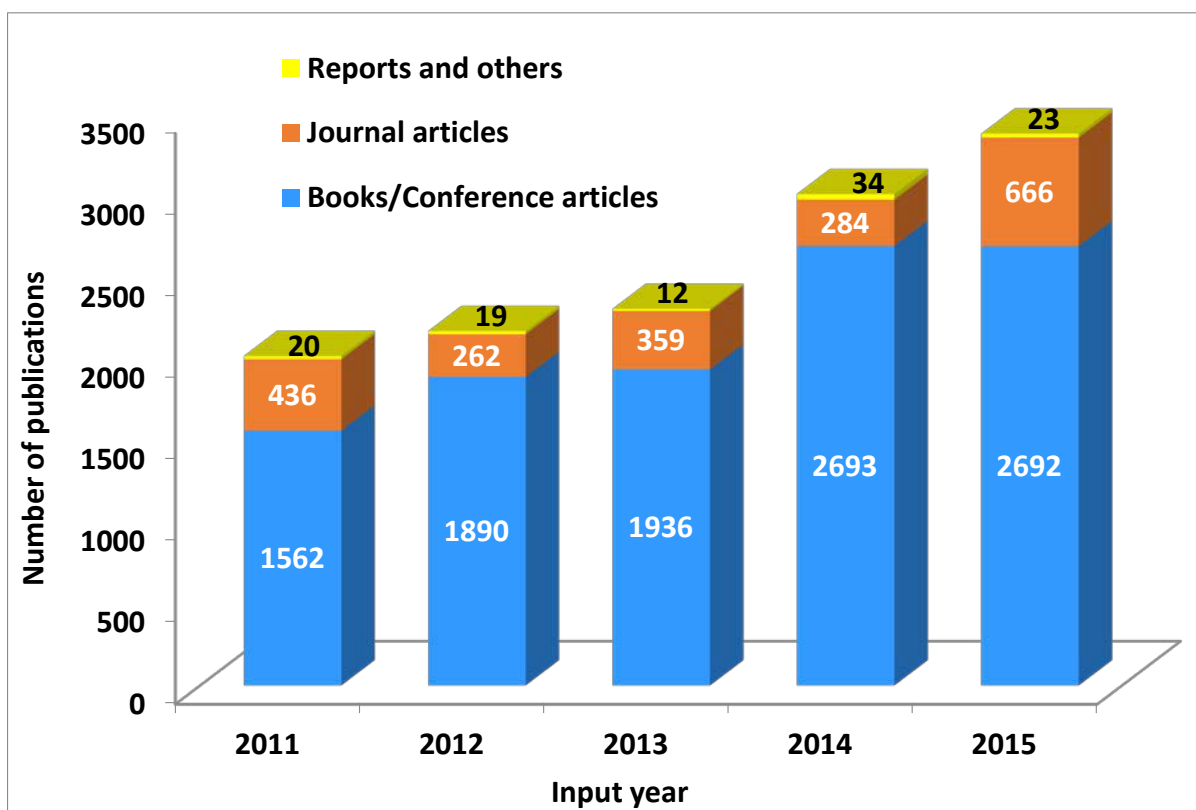


Figure 4b: Yearwise publication types of the bibliographic inputs to INIS database during 2011-2015

3.7. Subject classification

‘ETDE/INIS Joint Reference Series No.2: Subject Categories and Scope Descriptions’ is one of the publications of IAEA. It defines the subject categories and provides the scope descriptions to be used for categorization of the nuclear literature for the preparation of INIS input by national

and regional centers. This simplified categorization scheme contains 45 one-level broad subject categories from which 42 only are within INIS subject scope. Among them, 14 categories are ranked to which most of the research has been done and published in India. The Highest number of publications published in Nuclear physics and radiation physics with 1791 (15%) publications, Materials science with 1660 (14%) publications, Particle accelerators with 1147 (10%) publications, Environmental sciences with 1067 (9%) publications, Nuclear fuel cycle with 978 (8%) publications, Radiology & nuclear medicine with 900 (8%) publications, Elementary particles physics with 854 (7%) publications, Specific nuclear reactors with 737 (6%) publications. The subject categories along with percentage are given in Figure 5.

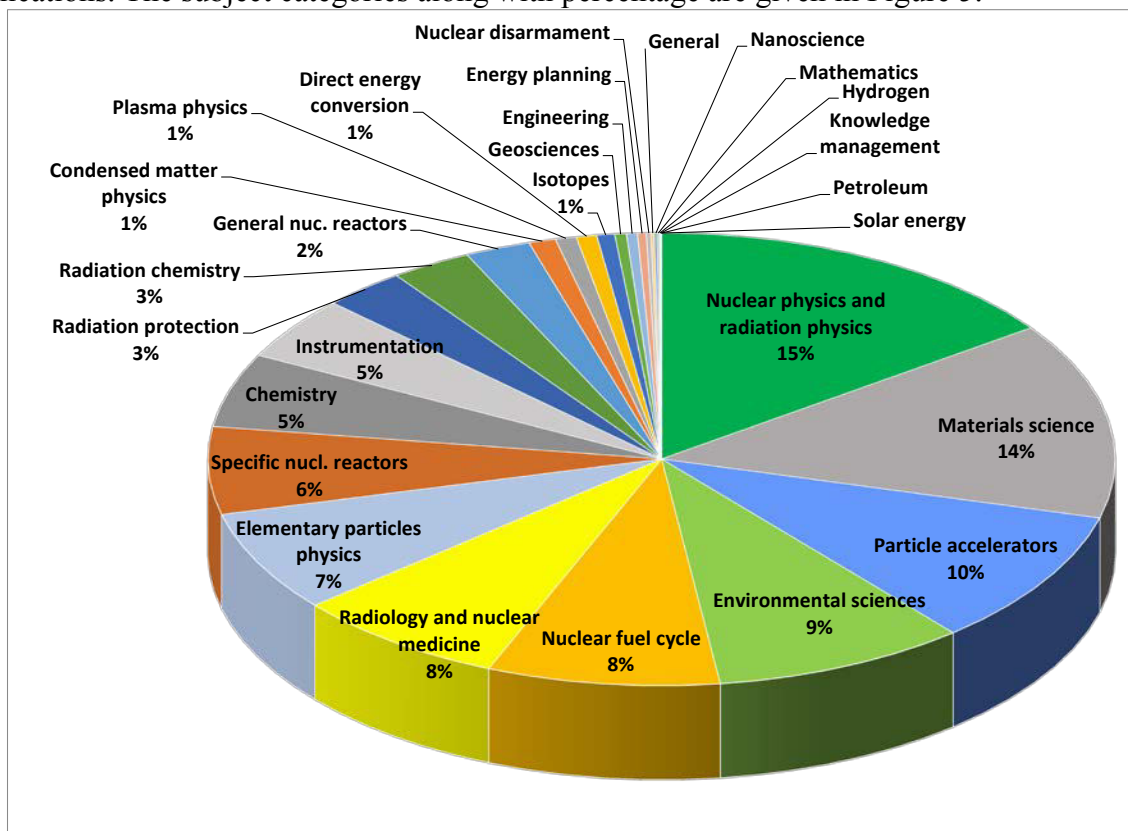


Figure 5: Leading subject categories of bibliographic records published in India to INIS database during 2011-2015

4. CONCLUSION

Every member state is having an INIS Liaison Centre for processing data to INIS database on peaceful uses of nuclear science and technology. In the event of recent development by IAEA to extract data from various open sources databases such as PubMed etc. This is a very welcome development which will help in eliminating the duplicate data entry to INIS database. This will enhance the comprehensiveness of the database with more coverage worldwide.

India is the second highest unique visitors after United States of INIS online which shows a new trend of online collection search. A total number of INIS website visitors were increased in 2014 (INIS 2014). INIS plays a key role in providing access to nuclear information free of cost to support worldwide nuclear projects of all types, not only in nuclear power but also in many other areas like physics of elementary particles and fields; inorganic, organic, physical and analytical chemistry; applied life sciences; nuclear safety and radiation protection; fissile material

safeguards; verification; regulatory and legal aspects; environmental effects and economics of nuclear energy as compared to other energy sources and non-power applications of nuclear techniques in areas such as food irradiation and nuclear agriculture, radiation medicine, non-destructive testing and tracer techniques for industrial applications. It can be seen that both developed and developing countries are actively participating in this cooperative endeavor and share the' information. India is a regular contributor to the database and our major input is to the area of nuclear and chemical sciences. India has contributed significantly in inputting bibliographic records regularly to the database during the period with a yearly average of 2570 records. Indian input mainly comprises of papers published in conferences/symposia. *Indian Journal of Nuclear Medicine; Pramana and Indian Journal of Physics and Proceedings of the Indian Association for the Cultivation of Science* are the most contributed Indian journals. Nuclear physics, radiation physics and Materials Science are the main areas of the Indian bibliographic inputs.

REFERENCES

1. Anil Kumar, Prakasan E.R., Kadam Sandeep, Bhaskar Nita, Narayan Mallika 2009. Serving knowledge in the 21th century, Dr. Vijai Kumar festschrift, Scientific Information Resource Division, Bhabha Atomic Research Centre, Mumbai, pp. 80-93.
2. Anil Kumar 2013. INIS Centre-India: An Introduction, International Atomic Energy Agency, International Nuclear Information System INIS. Unit, Vienna Austria.; 11 p.; INIS Training Seminar 2013; Vienna Austria.; 7-11 Oct 2013; INIS-XA--13M5523; <http://www.iaea.org/inis/events/training/TS-2013/Presentations/INIS-India-IAEA.pptx>
3. Agyeman, Elizabeth Ama and Bilson, Albert 2015. "Research Focus and Trends in Nuclear Science and Technology in Ghana: A Bibliometric Study Based on the INIS Database". Library Philosophy and Practice e-journal. . Paper 1212. <http://digitalcommons.unl.edu/libphilprac/1212>
4. Hillebrand, C.D. 1998a. A Survey on Publications in Fusion Research and Technology, Oct 1998. <http://www.iaea.org/inisnkm/nkm/ws/articles/index.html>
5. Hillebrand, C.D. 1998b. Science and Technology Indicators in High Energy Physics - Analysis of High Energy Physics Records in Databases, Nov 1998. <http://www.iaea.org/inisnkm/nkm/ws/articles/index.html>
6. Hillebrand, C.D. 1998c. Science and Technology Indicators in Low and Medium Energy Physics - Analysis of Low and Medium Energy Physics Records in Databases, Nov 1998. <http://www.iaea.org/inisnkm/nkm/ws/articles/index.html>
7. Hillebrand, C.D. 1999. Analysis of Condensed Matter Physics Records Bibliographic Study using the INIS Bibliography. Mar 1999. <http://www.iaea.org/inisnkm/nkm/ws/articles/index.html>
8. INIS Nov 2015. https://inis.iaea.org/search/advancedsearch.aspx?orig_q=#
9. INIS 2014, 2013, 2012. International Nuclear Information System INIS. Progress and activity reports. <https://www.iaea.org/inis/about-us/activities/>
10. INIS highlights 2015. 18/06/15 - INIS Develops the Open Nuclear Information eXchange System ONIXS. for Harvesting and Automatic Indexing of Bibliographic Records, <https://www.iaea.org/inis/highlights/2015/news-20150618.html>

11. Negeri, D.B. 2005. Knowledge Resources on the Chernobyl Accident and its Consequences in the INIS, Sep 2005. <http://www.iaea.org/inisnkm/nkm/ws/articles/index.html>
12. Marinkovic, N. 2002a. Research Reactor Records in the INIS Database, Apr 2002. <http://www.iaea.org/inisnkm/nkm/ws/articles/index.html>
13. Mandl, W. 2002. Impact and public acceptance of INIS' bibliographic studies, Apr 2002. <http://www.iaea.org/inisnkm/nkm/ws/articles/index.html>
14. Marinkovic, N. 2002b. Records related to Nuclear Power Infrastructure in the INIS Database, Feb 2002. <http://www.iaea.org/inisnkm/nkm/ws/articles/index.html>
15. Marinkovic, N. 2000a. Fast Breeder Power Reactor Records in the INIS Database, Aug 2000. <http://www.iaea.org/inisnkm/nkm/ws/articles/index.html>
16. Marinkovic, N. 2000b. Fission Reactor Records in the INIS Database Jul 2000. <http://www.iaea.org/inisnkm/nkm/ws/articles/index.html>
17. Marinkovic, N. 2002c. Records related to Nuclear Power Infrastructure in the INIS Database, February 2002. <http://www.iaea.org/inisnkm/nkm/ws/articles/index.html>
18. Nair, M.K.V.; Vijai Kumar 1999. INIS: A comprehensive electronic database on nuclear science and technology, In: *Proceedings of the Conference on Recent Advances in IT*, 28-29 October, IGCAR, Kalpakkam, p. 55-60.
19. Venkatesan, M.N. and Thanuskodi, S. 2014. A Scientometric analysis of nuclear power generation research: a study, *International Journal of Library and Information Studies*, Vol. 4 (3), pp. 65 - 75
20. Vijai Kumar; Kalyane V.L.; Prakasan E.R.; Anil Kumar; Anil Sagar; and Lalit Mohan 2004. Trend of R&D publications in Pressurised Heavy Water Reactors: A Study using INIS and Other Databases, Paper No. *IAEA-CN-123/03/O/5*, 10 pages, *International Conference on Nuclear Knowledge Management-Strategies, Information Management and Human Resource Development*, 7-10 Sept. 2004. Saclay, France, A book of extended synopses : available for participants at the beginning of the Conference. Conference proceedings prepared by IAEA as a CD-ROM distribution at the end of the conference. contain the full manuscripts of accepted papers/poster. <http://www-pub.iaea.org/MTC/Meetings/>
21. Zeraatkar, N. 2013. Radiology, nuclear medicine, and medical imaging: a bibliometric study in Iran, *Iran Journal of Nuclear Medicine*, Vol. 21 (2). pp. 81-90

Doctoral Research on Sociology Fields in Indian Universities: A Bibliometric Study

Anand Bandi¹ and Amrit Kaur²

¹*anb321in@yahoo.co.in*

Resource Centre, National Institute of Fashion Technology, Mumbai

²*kauramrit24@yahoo.com*

National Resource Centre, National Institute of Fashion Technology, Delhi

ABSTRACT

The case for P.hD in sociology is growing rapidly in India, the main reason being that today most of the universities are demanding a doctoral degrees for Sociology facilities as well as for senior professional in university and other higher educational. The present study investigates the arte of successful doctorates awarded by the Indian universities in the field of Sociology. The data of the doctoral research in Sociology in Indian universities has been analyzed chronologically, subject wise, guide wise, university wise and language wise.

Keywords: Doctoral Research, Indian Universities, Bibliometric Study, Sociology

1. INTRODUCTION:

Research in Sociology briefly means the collection and analysis of original data on a problem of sociology field. Research in this connection broadly includes investigations, studies, survey, surveys, academic work at the doctoral level and research by practicing.

2. OBJECTIVES OF THE STUDY:

- The present study is structured as follows:
- State wise distribution of doctoral thesis.
- Guide wise analysis of doctoral thesis.
- Quantitative measurement of Doctoral research on academic libraries.
- Chronological distribution of doctoral thesis
- Universities contribution of doctoral research
- State wise distribution of doctoral thesis
- State wise distribution of doctoral thesis
- Language wise distribution of research
- Guide wisedistribution of research
- Page wise distribution of research
- Reference wisedistribution of research

3. BIBLIOMETRICS:

The word ‘Bibliometrics’ is derived from Latin word ‘biblio’ and the Greek word ‘metrics’.It means the application of Mathematics to the study ofbibliography. According to Pritchard (1969), bibliometrics is defined as “the application of mathematics and statistical methods to books and other media of communication.” Potter(1981) defines bibliometrics as “the study and measurement of the publication pattern of all forms of written communication and their author”.

Later on, Derek de Solla Price (1970), argued that scholars in the hard sciences are likely to give more citations in their papers and these citations are more recently published works. The study concluded indicating that the time lag between publication and citation was shorter in the hard sciences than it is in other disciplines. He further stated that citations represent a measure of utility rather than of quality. The concept of citation analysis was enunciated by Eugene Garfield (1972). He is also known as father of citation analysis studies, who has conducted enormous studies and published views based on analytical studies and out of his hundreds of studies which covers almost every branch of the natural and social sciences, indicated the better use of citation studies. Bibliometrics is a technique for identifying the research trends in a different area, obsolescence, core periodicals, studying the productivity, characteristics of subject literature including structure of knowledge, historical and sociological aspect of science and helpful in formation of need based collection development policy, weeding and stacking policy and many others. The bibliometric laws such as Lotka's Law (Lotka 1926), Bradford Law (Bradford 1934), Price Law (Price 1963) are some of the prominent measure which have been used by different library and information scientists to test their implication on different literature as well as subject.

4. SCOPE OF THE STUDY AND METHODOLOGY

For the purpose of this study, bibliometrical survey method and has been used for the collection of data from the following sources going through their websites.

Some updated data have also been collected from the various universities, viz. Aligarh Muslim University, [Maharaja Sayajirao University of Baroda](#), Chaudhary Charan Singh University, Gujarat University and [Bundelkhand University](#). These databases up to the year 2013 have been chosen as sources for this study. From the whole databases, nearly 255 theses records were retrieved. The retrieved records were printed out and checked manually to avoid duplication of entries after the scrutiny theses related to academic libraries were selected.

S.No	Source	Mode of Collection	No. of Theses	%	Cumulative %
1.	Aligarh Muslim University	http://shodhganga.inflibnet.ac.in/	136	68	
2.	Maharaja Sayajirao University of Baroda	http://shodhganga.inflibnet.ac.in/	23	11.5	79.5
3.	Chaudhary Charan Singh University	http://shodhganga.inflibnet.ac.in/	54	27	106.5
4.	Gujarat University	http://shodhganga.inflibnet.ac.in/	23	11.5	118
5.	Bundelkhand University	http://shodhganga.inflibnet.ac.in/	19	9.5	127.5
			255		

5. ANALYSIS AND FINDINGS

Total 255 theses had been selected for the study from the retrieved data.

Table 2: Chronological-Wise Distribution

S.No.	Year	P.hD Awarded	%	Cumulative %
1	2013	18	9	
2	2014	73	36.5	45.5
3	2015	164	82	82
		255		127.5

Table 2 gives the distribution of study.

chronological
PhD theses under

From the above data, we can see that there is a steady growth in the number of doctorates awarded to sociology professional since 2013. Maximum numbers of PhD 164 (82%) were awarded in year 2015 and minimum number s of PhD 18 (9%) were awarded in year 2013.

Table 3: Guide Wise Distribution

S.N.	GuideWise	Nos.	Percentage	Cumulative Percentage
1	Abdul Matin	2	1	
2	Abdul waheed	1	0.5	1.5
3	Ahmad, Shadbano	10	5	6.5
4	Akram, Mohammad	2	1	7.5
5	Alka Rani	1	0.5	8
6	Aravind Bhai R.Shah	1	0.5	8.5
7	Arvindbhai,Shah	1	0.5	9
8	Awasthi, N N	5	2.5	11.5
9	Bisaria, Sarojini	1	0.5	12
10	Chandrika,Raaval	3	1.5	13.5
11	Chauhan, Brej Raj	4	2	15.5
12	Choondawat,P S	6	3	18.5
13	Desai,I P	4	2	20.5
14	Dharamvir	1	0.5	21
15	E J,Masihi	1	0.5	21.5
16	Farooqi, Jamil	7	3.5	25
17	Farosqui, S	2	1	26
18	Firoz, Nikhat	2	1	27
19	Garg, Jai Prakash	4	2	29
20	Gaurang,Jani	1	0.5	29.5
21	Gupta, S S	2	1	30.5
22	Haleem Siddiqui, A	2	1	31.5
23	Hallen, G C	2	1	32.5
24	Jai Prakash	1	0.5	33
25	Jamal Siddiquiui, M	6	3	36
26	Keshwara,MaldeobhaiRanabhai	1	0.5	36.5
27	Khan, Nemat Ali	8	4	40.5

28	Khare, Anand Kumar	2	1	41.5
29	Khasgiwala, Aruna	1	0.5	42
30	M H, Makwana	6	3	45
31	Mahajan, Dharam Vir	2	1	46
32	Mahajan, Kamlesh	2	1	47
33	Mahajan, Sanjeev	2	1	48
34	Manjulata	1	0.5	48.5
35	Mathur, M B	8	4	52.5
36	Mathur, P K	3	1.5	54
37	Matin, Abdul	10	5	59
38	Mehta, Leena	1	0.5	59.5
39	Mehta, Shirin	1	0.5	60
40	Mishra, Adhivesh Chndra	1	0.5	60.5
41	Mohammad Akram	33	16.5	77
42	Moosvi, Shireen	1	0.5	77.5
43	Naag, Jaswant	2	1	78.5
44	Navale, Anil S	1	0.5	79
45	Nemat Ali Khan	1	0.5	79.5
46	Nimesh, R P	1	0.5	80
47	Nischal, Surendra	1	0.5	80.5
48	Noor Mohammad	5	2.5	83
49	P.K. Mathur	1	0.5	83.5
50	Patel, Pravin J	1	0.5	84
51	Patel, Tara	3	1.5	85.5
52	Prof. Jerome Joseph	2	1	86.5
53	Pundir, J K	11	5.5	92
54	Rahmani, Sabiha (रहमानी, सबीहा)	1	0.5	92.5
55	Rajaram, N	2	1	93.5
56	S. Zainuddin	2	1	94.5
57	Saksena, R N	12	6	100.5
58	Saraswat, Anand Prakash	1	0.5	101
59	Sarikwal, R C	1	0.5	101.5
60	Shah, Vimal P	1	0.5	102
61	Sharma, Rajendra Kumar	3	1.5	103.5
62	Sharma, S. S.	4	2	105.5
63	Sheth, N R	6	3	108.5
64	Shukla, Arun	1	0.5	109
65	Siddiqi, M Jamal	2	1	110
66	Siddiqi, Mahmood Mustafa	2	1	111
67	Siddiqi, Rashida Rana	2	1	112
68	Siddiqui, Jamal	6	3	115
69	Singh, H N	2	1	116
70	Singh, Yogendra	1	0.5	116.5
71	Solanki, Chandra Prabha	4	2	118.5

72	TalatShakeel	1	0.5	119
73	Taraben,Patel	1	0.5	119.5
74	Tomer, Devendra pal singh	1	0.5	120
75	Usha,Kanhere	2	1	121
76	Vinod Kumar	2	1	122
77	Waheed, Abdul	2	1	123
78	Xavier,Sreedevi M	2	1	124
79	Yadava R. S.	1	0.5	124.5
80	Zainuddin S	6	3	127.5
		255		

Table 3 indicates that 255 research scholars were guided by as many as 80 guides. Dr. [Mohammad Akram](#) guided 33 research scholars, which is highest number. Co-guides were very few and are not included in the list.

Table 4: University-Wise Distribution

S.N	University Wise	Nos.	Percentage	Cumulative Percentage
1	Aligarh Muslim University	136	68	
2	Maharaja Sayajirao University of Baroda	23	11.5	79.5
3	Chaudhary Charan Singh University	54	27	106.5
4	Gujarat University	23	11.5	118
5	Bundelkhand University	19	9.5	
		255		127.5

Table 4 gives the details of university wise distribution of PhD. Research faculties in sociology department are available in near about universities in India. It is found that from the study that Aligarh Muslim University has awarded the maximum number of 136 (68%) PhD and University has awarded the Minimum number of 19(9.5%) PhD.

Table 5: Department wise Distribution:

S.No.	Department wise	Nos.	Percentage	Cumulative Percentage
1	Sociology and Social Work	136	68	
2	Department of Sociology	119	59.5	127.5
		255		

Table 5 gives the details of department wise distribution of PhD. Research facilities in sociology department are available in near about universities in India. It is found that from the study that Sociology and Social Work has awarded the maximum number of 136 (68%) PhD and Department of Sociology has awarded the Minimum number of 119 (59.5%) PhD.

Table 6: Subject wise Distribution

S.N	Subject	Nos.	Percentage	Cumulative Percentage
1	Democratic	24	12	
2	Deviant Behaviour	10	5	17
3	Economic	12	6	23
4	Economically	7	3.5	26.5
5	Empowering	10	5	31.5
6	Modern Society	26	13	44.5
7	Political, Economic	36	18	62.5
8	Population Policy	14	7	69.5
9	Rehabilitation	15	7.5	77
10	Social sciences	12	6	83
11	Sociological	14	7	90
12	Student Behaviour	20	10	100
13	Technology	15	7.5	107.5
14	Technology	26	13	120.5
15	Working Women	14	7	127.5

Table 6 reveals the subject wise distribution of successful doctorates awarded in the field of sociology. All 255 theses have been distribution in 15 subject areas. Out of 255 theses, sociology challenges subject is the maximum number of 36 (18%) and a study of social work is the minimum number of 7 (3.5%).

Table 7: Pages wise Distribution:

S.N	Pages	Nos.	Percentage	Cumulative Percentage
1	1-100	6	3	
2	101-200	60	30	33
3	201-300	116	58	91
4	301-400	49	24.5	115.5
5	401-500	15	7.5	123
6	501-600	9	4.5	127.5
		255		

Table 7 reveals the pages wise distribution of PhD theses. It is found that, out of 255 theses maximum number of 116(58%) pages under 201-300 range and minimum number of 6 (3%) pages under 1-100 range.

Table 8: Reference Wise Distribution:

S.N	Pages	Nos.	Percentage	Cumulative Percentage
1	1-5.	10	5	
2	6-10.	86	43	48
3	11-15.	81	40.5	88.5
4	16-20	16	8	96.5
5	21-25	30	15	111.5
6	26-30	9	4.5	116
7	31-35	10	5	121
8	36-40	11	5.5	126.5
9	41-45	2	1	127.5
		255	127.5	

Table 8 reveals the pages wise distribution of PhD theses. It is found that, out of 255 theses maximum number of 86 (43%) references under 6-10 range and minimum number of 2 (1%) pages under 41-45 range.

6. CONCLUSION:

The present study finds that 255 research theses have been published in different universities in sociology department. The study reflects that the doctoral students have contributed largely to the sociology departments in various universities. Research is the key to academic achievement and it is also a base for further study. As per previous work and on the basis of collected data, it is found that, research activities are increasing every year. We hope to see this trend continue in the years to come. For the benefit of the student and research scholars of library and information science full text databases of PhD theses should be compiled by the universities through cooperative efforts.

REFERENCE

1. Pritchard A, Statistical bibliography or bibliometrics, Journal of documentation, 25(4) (1969).
2. Potter W.G. "Introduction to Bibliometrics", Library Trends, Vol.30, pp.5-7, 1988.
3. Price Derek, J. andde Solla "Little Science", Big Science, New York: ColumbiaUniversity Press, 1963.11.
4. Garfield Eugene, 2001.From Bibliographic Coupling to Co-Citation Analysis viaAlgorithmic Historio-Bibliography presented at Drexel University, Philadelphia,PA.12.
5. Lotka, A.J. "The frequency distribution of scientific productivity", Journal of theWashington Academy of Sciences, Vol.16, p. 323, 1926.13.
6. Bradford, S.C. "Sources of Information on specific subjects", Engineering, Vol.137,pp.85-86, 1934.14.

A Scientometric Analysis of the Journal ‘Library Progress (International)’

Alka D. Wadhwana and Anil N. Chikate

¹*alkawadhwana@gmail.com*

KES Shroff College of Arts & Commerce, Kandivli (W), Mumbai 400067

²*achikate@rediffmail.com*

North Maharashtra University, Jalgaon

ABSTRACT

The paper presents a bibliometric analysis of the articles published in the journal titled ‘Library Progress (International)’ from 2010 to 2014. The study exhibits the findings of analysis of 117 articles published in the said journal during the five years span. The year 2011 was the most productive year as the highest number (32) of articles were published in this year. 69% of the articles (81) were multi-authored. Average length of the articles was 11 pages. Average number of citations per paper was 14. The highest contributions (55.25%) were by working librarians. Male authors’ contribution was more than the female authors. Out of 117 contributions, 24 articles were contributed by 52 foreign authors. Only one article was contributed by two authors from Oman, while remaining 23 articles were contributed by Nigerian authors. No other foreign country’s authors have contributed in this journal.

Keywords: Bibliometrics, Journal of Library and Information Science, Library Progress (International), Authorship Pattern, Degree of Collaboration, Citation Analysis.

1. INTRODUCTION

Bibliometrics is a research method used in library and information science. Bibliometrics is applied to measure the performance of a researcher, evaluation of a collection of articles, a journal or a field of research. The process involves application of statistical analysis to study patterns of authorship, publications, and use of documents (Sommer, 2005). It is a quantitative study of various aspects of literature on a topic and is used to identify the pattern of publications, authorship, and secondary journal coverage to gain insight on the dynamics of growth of knowledge in the areas under consideration. The term ‘bibliometrics’ was coined by Pritchard in 1969 and since then many studies have been reported in this field. Pritchard (1969) defined bibliometrics as an “application of mathematics and statistical methods to books and other media of communication”. The paper presents results of the bibliometric analysis of an international level journal published from India titled - ‘Library Progress (International)’.

2. ABOUT ‘LIBRARY PROGRESS (INTERNATIONAL)’ JOURNAL

The ‘Library Progress (International)’ journal is published by BPAS (Bulletin of Pure & Applied Science) Research from New Delhi. The journal is devoted to the international advancement of organised knowledge on all aspects of science. It provides a forum for comments by publishing original research contributions, scientific survey, case studies, book review and letter to the Editor-in-Chief. It is issued six monthly, i.e. June and December of every year. It is available online as well as in print form. Till December 34 volumes of the journal are published. The journal is Abstracted/ Indexed in Library & Information Science Abstract (India), Indian Citation Index, GALE Group, EBSCO host, ProQuest. The journal has become quite popular over the period of time and has attained a prominent status among all periodicals of Library and Information Science.

3. REVIEW OF LITERATURE

Jena, Swain, and Sahoo, (2012) presented the results of bibliometric analysis of the Journal Annals of Library and Information Studies (ALIS) from 2002 to 2010. The result showed that out of the total 247 articles, the maximum numbers of articles i.e. 43 (17.4%) were published in the year 2010 while the least number of articles i.e. 18 (7.29%) were published in the year 2002; steady growth in the rate of citations of articles was observed; and multi-authored papers (67.6%) dominated over the single-authored papers (32.4%).

Thanuskodi, S. (2011) presented a bibliometric analysis of the journal titled Library Herald for the period between 2006 to 2010. The analysis cover mainly the number of articles, authorship pattern, subject wise distribution of articles, average number of references per articles, forms of documents cited, year wise distribution of cited journals etc. The result showed that out of 138 articles, single authored articles were 72 (52.17%), while the rest 66 (47.83%) articles were contributed by joint authors. The analysis indicated that most of the contributions are from India with 89.85 % and only 10.15 % contributions were from foreign countries.

Tapas Kumar Das (2013) conducted a bibliometrics analysis of the papers published in the journal ‘Library Trends’. The result of study shows that out of 206 articles published in the journal from 2007-2012, highest number (51) of articles were published during the year 2007-08. Majority of the articles i.e. 122 (59.22%) were single authored; 63 (30.58%) articles were of

length of 16-20 pages and the highly cited papers were between paper length 11-20 is 48 (23.30%).

4. OBJECTIVES OF THE STUDY

The main objectives of the study are:

- To study the year wise contribution of articles;
- To examine the volume-wise distribution of contributions and to find the average number of contributions per volume;
- To study the Authorship Pattern of Contributions
- To find out degree of collaboration;
- To find gender wise productivity
- To find status wise contributions
- To study the research output in terms of institution type
- To study Geographical distribution of contributors
- To analyse the contributions by foreign authors
- To study the length of contributions;
- To study the citation pattern of contributions;

5. METHODOLOGY

The present study consists of 117 articles published in the journal 'Library Progress (international)' during the span of 5 years from 2010 to 2014. The articles were accessed through N-List of INFLIBNET. The articles were tabulated in excel sheet. The details pertaining to the authors, their affiliation, gender, designation, number of pages, number of citations per articles etc. were entered in excel sheet. The collected data were analysed using pivot table and presented in the form of tables and figures.

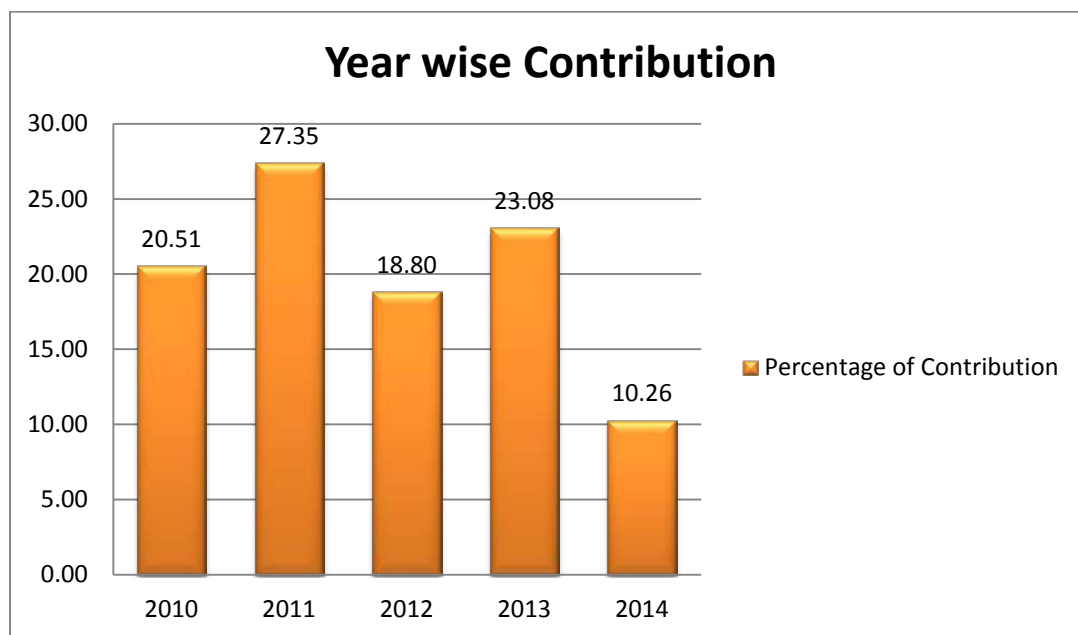
6. ANALYSIS AND FINDINGS

Table 1: Year wise distribution

Year	Vol. No.	No. of Issues	No. of Contributions	Percentage
2010	30	2	24	20.51
2011	31	2	32	27.35
2012	32	2	22	18.80
2013	33	2	27	23.08

2014	34	2	12	10.26
Total		10	117	100.00

Figure 1: Year wise distribution



Total 117 articles were published in 10 issues of ‘Library Progress (International)’ journal during 2010 to 2014. Table 1 and Figure 1 shows that highest number of articles i.e. 32 (27.35%) were published in the year 2011. This was followed by 27 articles (23.08%) in the year 2013, 24 articles (20.51%) in 2010 and 22 articles (18.80%) in the year 2012. The lowest number of articles i.e. 12 (10.26%) were published in the year 2014.

Table 2: Issue wise distribution of articles

Issue No.	Year & Vol. No.					Total
	2010	2011	2012	2013	2014	
	Vol. No. 30	Vol. No. 31	Vol. No. 32	Vol. No. 33	Vol. No. 34	
1	10	14	9	17	7	57
2	14	18	13	10	5	60
Total	24	32	22	27	12	117

Table 2 indicates that during 2010 to 2012 more number of articles were published in the second issue. However, in 2013 and 2014 more articles were published in the first issue. Overall it is observed that more articles (60) were published in the second issue.

Table 3: Authorship Pattern

No. of Author(s)	No. of Contributions	Percentage
One	36	30.77
Two	62	52.99
Three	17	14.53
Four	2	1.71
	117	100.00

Table 3 depicts the authorship pattern of articles published during the five years of study period. Majority of the articles were multi-authored. 62 articles were written by two authors, 17 articles were written by three authors and 2 articles were written by four authors. Only 36 articles (30.77%) were single authored. Like science discipline, multiple-authorship pattern was being observed in the field of library and information science.

Table 4: Authorship Pattern of Contributions (Year wise)

Year	One Author	%	Two Authors	%	Three Authors	%	Four Authors	%
2010	6	25.00	16	66.67	1	4.17	1	4.17
2011	9	28.13	17	53.13	6	18.75	0	0.00
2012	6	27.27	11	50.00	5	22.73	0	0.00
2013	9	33.33	15	55.56	2	7.41	1	3.70
2014	6	50.00	3	25.00	3	25.00	0	0.00
Total	36	30.77	62	52.99	17	14.53	2	1.71

Table 4 shows that only two articles were written by four authors between the years 2010 and 2013. The majority of the authors prefer to write in small group as out of 117 articles, 62 articles (52.99%) were written by two authors. From 2010 to 2013 the joint authorship is dominating in the journal 'Library Progress (International)'. However, in the year 2014, single authored papers and multi-authored papers were equal in number.

Table 5: Single Authored vs. Multi Authored Papers

		Single Authored		Multi-authored		Total Contributions
Year	Vol. No.	No. of Papers	Percentage	No. of Papers	Percentage	
2010	30	6	16.67	18	22.22	24
2011	31	9	25.00	23	28.40	32
2012	32	6	16.67	16	19.75	22
2013	33	9	25.00	18	22.22	27
2014	34	6	16.67	6	7.41	12
		36	100.00	81	100.00	117

Table 5 shows that out of total 36 single authored papers, the highest number of contributions i.e. 9 (25%) each were in the years 2011 and 2013. Whereas out of 81 multi-authored papers, the highest number of contributions i.e. 23 (28.40%) was observed in the year 2011. The above table also shows that except for the year 2014, multi authored papers were dominating to single authored papers.

Table 6: Degree of collaboration

Year	Single Authored papers	Multi-authored papers	DC
2010	6	18	0.75
2011	9	23	0.72
2012	6	16	0.73
2013	9	18	0.67
2014	6	6	0.50
	36	81	0.69

The degree of collaboration among authors is calculated using K.Subramanyan's (1983) formula. The formula is as follows:

$$DC = Nm / (Nm + Ns)$$

Where,

C=Degree of Collaboration

Nm=Number of Multi Authored papers

Ns= Number of Single Authored papers

In the present study the value of DC is $= 81/36+81 = 0.69$. This means that 69% of the articles in the journal ‘Library Progress (International)’ were multi-authored and only 31% articles were single-authored (Figure 2). As the degree of collaboration is above 0.5, it is deduced that multi-authored contributions is dominant than the solo ones.

Figure 2: Authorship Pattern

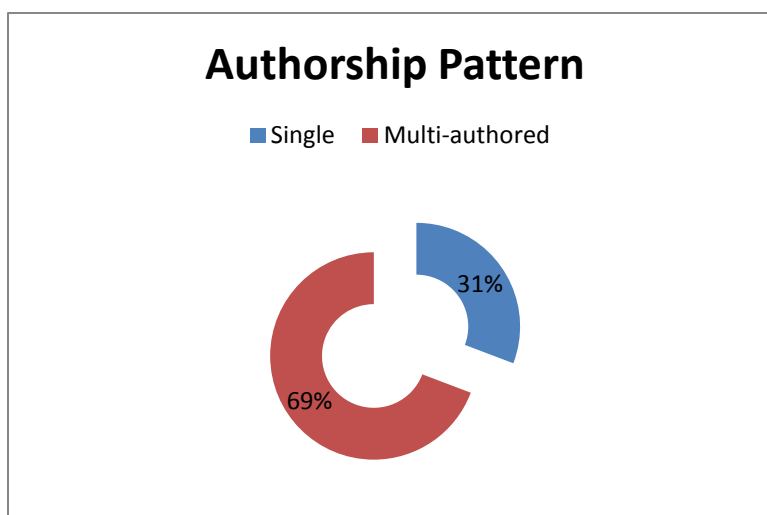


Table 7: Gender wise Contributions

Gender	No. of Authors	Percentage
Male	157	72
Female	62	28
Total	219	100.00

Table 7 reveals that out of 219 authors, 157 authors (72%) were male and 62 (28%) of the authors were female.

Table 8: Designation wise Contribution

Designation	No. of Authors	Percentage
Librarian	121	55.25
LIS Faculty	35	15.98
Research Scholar	57	26.03
Others	6	2.74
Total	219	100.00

Table 8 and figure 3 indicates that out of 219 authors contributed 117 articles, maximum number of the authors i.e. 121 (55.25%) were working librarians. This is followed by contributions by research scholars (57), contribution by LIS faculty (35). Only 6 authors belongs to non-library science field.

Figure 3: Designation wise Contribution

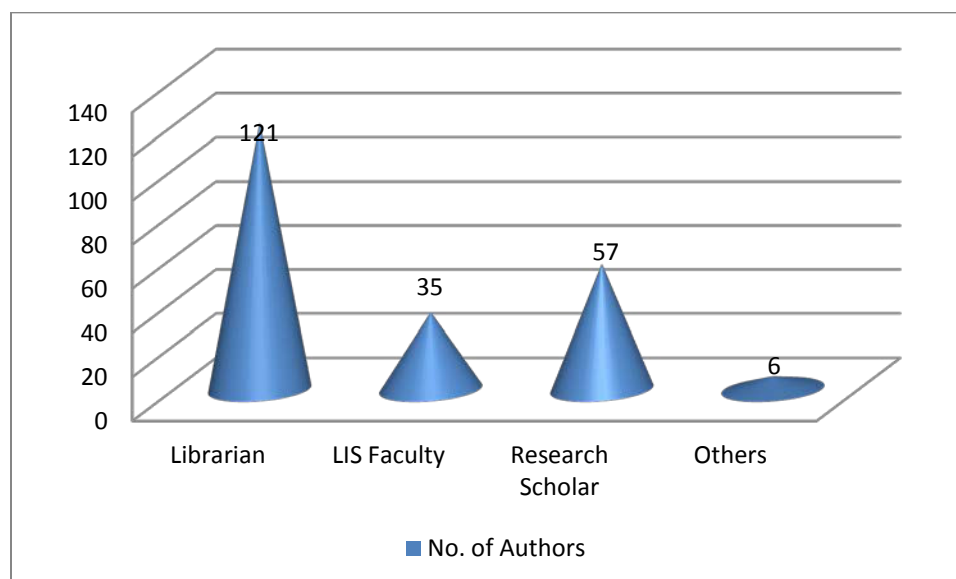


Table 9: Institution wise contributions

Institution	No. of Authors	Percentage
University	184	84.02
College	31	14.16
School	3	1.37
Govt. Org.	1	0.46
Total	219	100.00

The study indicates that highest contribution (84.02%) was by the authors affiliated to universities, followed by 31 authors affiliated to colleges (14.16%), 3 authors affiliated to schools (1.37%) and only one author affiliated to Government organization (0.46%).

Table 10:Institutional Collaboration

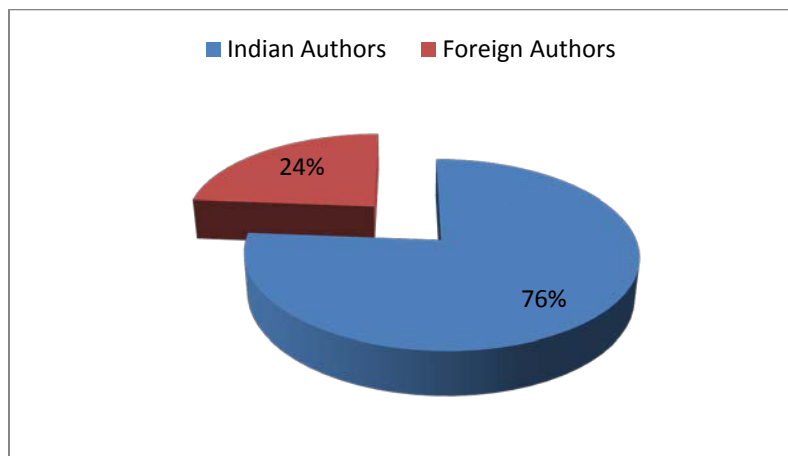
No. of Institution	No. of Articles
One	44
Two	33
Three	4
Total	81

Attempt has been made to find out the institutional collaboration in each contribution. Out of 81 collaborative articles, 44 articles had collaboration within the institute. 33 articles had collaborations among the authors of other two different institutions and 4 articles had the collaboration among the authors belonging to three different institutions.

Table 11: Country wise contribution

Country	No. of Authors	Percentage
India	167	76.26
Nigeria	50	22.83
Oman	2	0.91
Total	219	100.00

Figure 4: Country wise contribution



As the title of the journal indicates that it is of an international level, an attempt was made to find the percentage of contributions by the authors from India and foreign country. Figure 4 indicates that only 24% of the authors were from foreign country. Table 11 shows that authors from only three countries had contributed in the journal 'Library Progress (International)'. 76% of the authors (167) were Indian, 22.83% authors (50) were from Nigeria and two authors (0.91%)

were from Oman. Even though the journal is named as international, the analysis shows that most of the contributions were by the authors from India and Nigeria only. Other country's contribution was nil.

Table 12: State wise contributions of Indian Authors

Sr. No.	State	No. of Authors	Percentage
1	Tamil Nadu	84	50.30
2	Punjab	19	11.38
3	Rajasthan	14	8.38
4	UP	12	7.19
5	Karnataka	8	4.79
6	Uttarakhand	6	3.59
7	Kerala	5	2.99
8	Delhi	4	2.40
9	Assam	3	1.80
10	WB	3	1.80
11	Haryana	2	1.20
12	Jammu & Kashmir	2	1.20
13	Maharashtra	2	1.20
14	Pondicherry	2	1.20
15	AP	1	0.60
	Total	167	100.00

Table 12 exhibits that 167 Indian authors from 15 states have contributed in the journal 'Library Progress (International)'. In spite of the journal being published from Delhi, the analysis indicates that 50% of the Indian authors (84) were from Tamil Nadu. 11% of the Indian authors (19) were from Punjab, 8% of the authors were from Rajasthan and 7% of the authors were from UP. The authors belonging to rest of the states were less than 5%.

Table 13: Length of Articles

No. of Pages	2010	2011	2012	2013	2014	Total	Percentage
1-5	0	1	2	2	0	5	4.27
6-10	12	18	12	12	5	59	50.43
11-15	8	8	5	7	5	33	28.21
16-20	2	4	2	5	1	14	11.97
21-25	1	0	0	0	1	2	1.71
26-30	0	1	0	1	0	2	1.71
31-35	1	0	1	0	0	2	1.71
Total	24	32	22	27	12	117	100.00

Table 13 reveals that out of total 117 articles, 50% of the articles (59) have the length of 6-10 pages, followed by 33 (28.21 %) articles with the length of 11-15 pages, 14 (11.97%) articles with 16-20 pages, 5 articles (4.27%) with the length of 1-5 pages.

Table 14: Average Length of Contributions

Year	No. of Contributions	No. of Pages	Average Pages per Contribution
2010	24	285	11.88
2011	32	347	10.84
2012	22	246	11.18
2013	27	303	11.22
2014	12	144	12.00
	117	1325	11.32

The table shows that the average length of articles during five years lies between 11 to 12 pages. Taking into consideration all the 117 articles of the five years, we can say that average length of the article in the journal ‘Library Progress (International)’ is 11 pages.

Table 15: Study of Citation

No. of Citations	2010	2011	2012	2013	2014	Total	Percentage
Nil	0	1	0	0	0	1	0.85
1-10	18	15	11	13	5	62	52.99
11-20	2	11	4	12	6	35	29.91
21-30	3	4	2	0	1	10	8.55
31-40	0	1	4	1	0	6	5.13
51-60	1	0	1	0	0	2	1.71
156	0	0	0	1	0	1	0.85
Total	24	32	22	27	12	117	100.00

Out of 117 articles, one article (0.85%) has no citation and one article (0.85%) has 156 citations. Maximum number of the articles i.e. 62 (52.99%) have the citations between 1-10. This is followed by 35 articles (29.91%) having the citations between 11-20, ten articles having the citations ranging between 21-30 is 48 (23.30%), followed by citation between 21-30 is 45 (21.84%) and the lowest number of contributions with citation between 91-100, 121-130, 151-160 and 161-170 is 1 (0.49%).

Table 16: Average citations

Year	Vol. No.	No. of Contributions	No. of Citations	Average citations per Contribution	Percentage
2010	30	24	289	12.04	17.31
2011	31	32	363	11.34	21.74
2012	32	22	399	18.14	23.89
2013	33	27	464	17.19	27.78
2014	34	12	155	12.92	9.28
		117	1670	14.27	100.00

Table 16 shows that out of total 1670 citations in the articles published during five years, volume 33 has highest number of citations i.e. 464 (27.78%) and volume 34 has the lowest number of citations i.e. 155 (9.28%). The average citation per article during five years is 14.27.

7. CONCLUSION

The scientometric study tried to highlight the contributions of an international journal published from India namely ‘Library Progress (International)’. The analysis shows that total of 117 articles in 5 issues were published in the journal ‘Library Progress (International)’ during the period 2010 to 2014. The year 2011 was the most productive year as the highest number (32) of articles were published in this year. 69% of the articles (81) are multi-authored. The DC in the journal is 0.69. As DC value exceeds 0.5, it is further deduced that multi-authored contributions occupy the prominent position during this study period. Average length of the articles is 11 pages. Average number of citation per contribution is 14. The highest contributions (55.25%) were by working librarians. Male authors’ contribution is more than the female authors. Out of 117 contributions, 24 articles were contributed by 52 foreign authors. Only one article is contributed by two authors from Oman, while remaining 23 articles were contributed by

Nigerian authors. No other foreign country's authors had contributed in this journal. It is suggested that the editors of the journal should think of some plan to attract the authors from the countries other than Nigeria and Oman to make the journal truly international.

REFERENCES:

1. Das, T. K. (2013). A bibliometric analysis of contributions in the journal 'Library Trends'. *Library Philosophy and Practice (e-journal)* . Available on <http://digitalcommons.unl.edu/libphilprac/1014>, accessed on 25.8.15.
2. Jena, K. L., Swain, D. K., & Sahoo, K. (2012). Annals of Library and Information Studies, 2002–2010: A Bibliometric Study. *Library Philosophy and Practice(e-journal)* . Available in <http://unllib.unl.edu/LPP/> ,accessed on 25/8/2015.
3. Pritchard, A. (1969). Statistical bibliography or bibliometrics. *Journal of Documentation*, 25 (4), 348-349.
4. Sommer, S. (2005). Bibliometric analysis and private research funding. *Scientometrics*, 62 (1), 165-171.
5. Subramanyan, K. (1983). Bibliometric studies of research collaboration: A review. *Journal of Information Science*, 6 (1), 33-38.
6. Thanuskodi, S. (2011). Library Herald Journal: a bibliometric study. *Researchers World – Journal of Arts Science & Commerce*, 2 (4), 68-76.

Indian Journal of Fibre and Textile Research: A Scientometric Portrait

Deepak Meena¹ and A.N. Bandi²

[¹meenadeepaklis@yahoo.co.in](mailto:meenadeepaklis@yahoo.co.in)

ICAR-Central Institute for Research on Cotton Technology, Mumbai 400019

[²dr.anbandi@gmail.com](mailto:dr.anbandi@gmail.com)

National Institute of Fashion Technology, Mumbai- 410210

ABSTRACT

Study deals with a Scientometric assessment of the publication 'Indian Journal of Fiber and Textile Research' for the period of 2009 to 2014. The trend of publication comprising year-wise distribution of articles, growth rate and doubling time of contributions, forms of publications, subject trends of articles, authorship pattern, degree of author collaboration, length of the articles, geographical distribution of contributions have been studied. Results indicate that highest numbers of papers have been written by multiple authors. The relative growth and popularity of the journal indicated to be favored destination for the Scientific community for their publications.

KEYWORDS: Growth Rate; Doubling Time; Degree of Collaboration; Authorship Pattern; Scientometric; Productivity; Indian Journal of Fibre and Textile Research (IJFTR).

1. INTRODUCTION

The term Scientometrics was introduced and came in to prominence with the founding of the journal named 'Scientometrics' by T. Bauman in 1977. The scope of the journal is to publish all those studies of quantitative aspects of science as a discipline or economic activity. Scientometrics is a part of the sociology of science and has application to science policy making. Scientometrics is branch of the "Science of science." There are two aspects within science of science, viz: (1) The analytical aspect which deals with the general laws of the development of science as a knowledge system and a specific social institution and (2) The normative aspect, which deals with the development of practical recommendations for raising research efficiency.

2. ABOUT IJFTR

Started in 1976, this journal publishes papers on both fundamental and applied research in various branches of textile technology and allied areas such as production and properties of natural and synthetic fibres (including industrial fibres), yarns and fabrics; Physics and Chemistry of fibre forming polymers; Chemical and finishing processes; Fibre-reinforced composites; Garment technology; Analysis, testing and quality control; Application of microprocessors; Instrumentation; application of nanotechnology in textiles; and Industrial engineering. The journal has established itself as a leading technical journal in India in the field of Textile Technology. This journal is published by National Institute of Science Communication and Information Resource (NISCAIR), New Delhi, India. It is an open sources journal available in online and print form. It is a quarterly journal that publishes the original work of the authors and also publishes short communications, review articles, notes, book reviews and seminar/conference reports. So far, 40 volumes of the journal have been published. The Impact

Factor of IJFTR is 0.634 (JCR 2014). In this study, the articles published during the period 2009 to 2014, Volume 34 to 39 have been analysed.

3. RELATED WORKS

Works of many similar studies have been reviewed in this part. Thavamani (2014)¹ were studied the bibliometric techniques were applied to analyze the authorship trend in the 'Chinese Librarianship: an International Electronic Journal' during the period of 1996-2013. A total of 133 articles and 221 authors in the journal were examined by year and volume to ascertain authorship patterns, author productivity and degree of collaboration. The average number of authors per paper is 1.661% and the average productivity per author is 0.601%. The average degree of collaboration is 0.443 during the period under study. Kaurland Gupta (2012)² studied the Malaysian Journal of Library & Information Science from 2007 to 2011 and found that out of 100 articles, single authors contributed 27 (27%) articles while the rest 73 (73%) articles are contributed by joint authors. Rajendran, Jeyshankar, & Elango (2011)³ carried out Scientometric analysis of 633 research articles published in Journal of Scientific and Industrial Research. Five Volumes of the journal containing 60 issues from 2005-2009 have been taken into consideration for the present study. The number of contributions, authorship pattern & author productivity, average citations, average length of articles, average keywords and collaborative papers has been analyzed. Out of 633 contributions, only 51 are single authored and rest are multi authored with degree of collaboration 0.92. Thanuskodi (2010)⁴ has done bibliometric analysis of the journal 'Library Philosophy and Practice' from 2005-2009. The majority of articles of bibliometric study contain bibliographic references to journals, books, conference proceedings, dissertations, etc. Sam (2008)⁵ studied the Ghana Library Journal from 2000 to 2006. The majority of items cited were journals with 44.5%, followed by books with 32.5%. Current sources of information were about 62.9% of the journals and 48.8% of the books appeared in the reference lists and were published in 1990 or later. The subject area most researched was academic libraries. Majority of the authors were affiliated with universities and were local. Singh, Mittal and Ahmad (2007)⁶ conducted a study under the title "A Bibliometric Study of Literature on Digital Libraries" is an attempt to illustrate that over 1,000 articles for the period 1998-2004 were collected from LISA Plus. Study revealed that the author productivity is 0.34 dominated by the Indian authors. Jena (2006)⁷ studied the Indian Journal of Fibre and Textile Research from 1996 to 2004 and traced the trend of publications such as year wise distribution of articles, bibliographical distribution of citations, authorship pattern, citation pattern, average length of articles, number of tables and figures used, time lag, geographical distribution of authors and subject analysis. Narang (2004)⁸ analysed 8396 citations appended to 737 articles published in Indian Journal of Pure and Applied Mathematics published during 1998- 2002 and found that contributions are increasing in successive volumes, journal articles are the most cited and Delhi University was the top contributors during the period of study. Parameswaran and Smitha (2001)⁹ conducted a bibliometric analysis of LISA published during the period 1994 to 1998 cover 60 issues. Dhiman (2000)¹⁰ evaluated 'Ethnobotany Journal' for authorship pattern, year-wise distributions of articles, institutions and country-wise distribution and range of references cited. All the 10 volumes published from 1989-1998 were scanned.

4. OBJECTIVES OF THE STUDY

The objectives of the present study are as follows;

- (1) To study the research publishing trends between the year and among the issue;
- (2) To explore authorship pattern;
- (3) To assess geographical distribution of publications;
- (4) To identify the degree of author collaboration;
- (5) To find out the growth rate and Doubling Time of contributions;
- (6) To analyze the document type-wise distribution of publications.

5. SCOPE, METHODS AND TECHNIQUES

Six volumes (vol. 34 to 39) containing 24 issues and 355 articles of Indian Journal of Fibre and Textile Research published during the year 2009 to 2014 have been taken up for the study. The author has been taken out the information from National Institute of Science Communication and Information Resources (NISCAIR) website (<http://www.niscair.res.in>) and were scanned and tabulated using MS-Excel. The collected data were then analyzed to find out the result.

6. ANALYSIS OF DATA

Table 1 lists the year-wise distribution of articles. This table reveals that the numbers differ from year to year and there is also steadily increase in the number of articles from the year 2009 to 2014. Out of total 355 articles, the maximum numbers of articles are contributing 66 articles in the year 2014, which is 18.59% to the total publications. The minimum numbers of articles are contributed in the year 2010 with 51 articles, which is 14.37% to the total publications. Table 1 also depicts that the maximum numbers of articles 91, which is 25.63% of total publications are published in the issue number 3 and minimum numbers of articles 87, which is 24.51% of total publications are published in the issue number 4 of the Journal.

Table 1: Year-wise Distribution of Articles

Year	Vo. No.	No. of Articles in Issue-wise				Total Article	%	Cumulative Total Article	Cumulative %
		1	2	3	4				
2009	34	14	14	14	13	55	15.49	55	15.49
2010	35	13	13	14	11	51	14.37	106	29.86
2011	36	14	15	15	15	59	16.62	165	46.48
2012	37	15	15	15	15	60	16.90	225	63.38
2013	38	16	16	16	16	64	18.03	289	81.41
2014	39	16	16	17	17	66	18.59	355	100
Total		88	89	91	87	355	100		
%		24.79	25.07	25.63	24.51		100		

Year -wise distribution of Articles

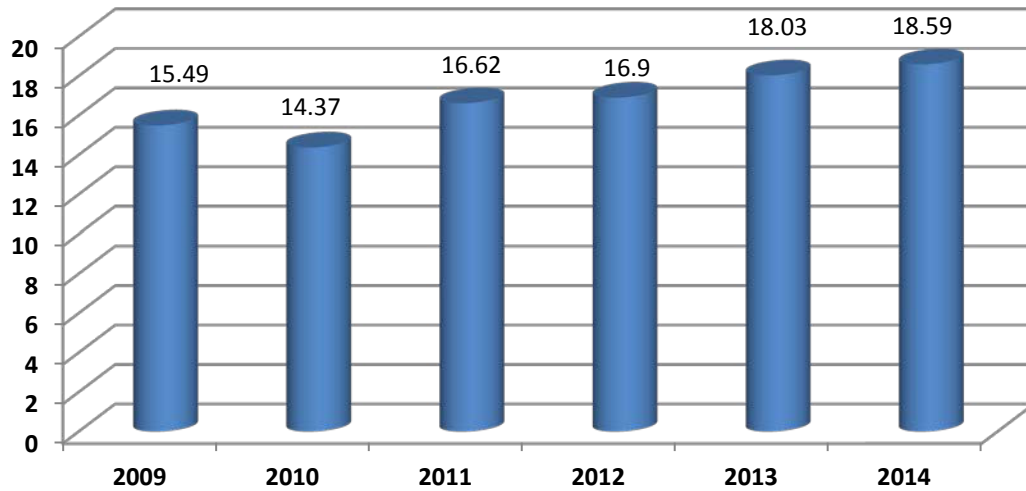


Figure 1: Year –wise distribution of Articles

6.1 Growth Rate

The growth rate in Bibliometrics is a measure to study the increase in number of articles per unit of articles per unit of time. The growth rate of articles over a specific period of interval is calculated mathematically as¹¹;

$$GR = \frac{\text{Log}_e 2P - \text{Log}_e 1P}{2T - 1T}$$

Where $\text{Log}_e 1P$ = Log of initial cumulative number of articles, $\text{Log}_e 2P$ = Log of final cumulative number of articles, $2T - 1T$ = difference between initial time and final time.

6.2 Doubling Time

A direct equivalence exists between the growth rate and doubling time. If the number of publications/pages of a subject doubles during a given period, then the difference between the logarithms of the numbers at the beginning and at the end of the period must be the logarithms of the number 2. This difference has a value of 0.693. Thus, the corresponding doubling time for publication and pages can be calculated by the following formula¹²;

$$\text{Doubling time (DT)} = \frac{0.693}{GR}$$

From table 2 and figure 2 it is observed that the growth rates have decreased gradually from 0.656 in 2010 to 0.206 in the year 2014. The whole study period records the mean growth rate of 0.310. Contrarily, the doubling time for publication of all sources of output has increased from 1.056 in 2010 to 3.364 in the year 2014. The doubling time for publications at the aggregate level has been computed as 1.831 years.

Table 2: Growth Rate and Doubling Time of Contributions

Sr. No	Year	No. of Contributions	Cumulative	Log _e 1 P	Log _e 2 P	Growth Rate	Doubling Time
1	2009	55	55		4.007		
2	2010	51	106	4.007	4.663	0.656	1.056
3	2011	59	165	4.663	5.106	0.443	1.564
4	2012	60	225	5.106	5.416	0.31	2.235
5	2013	64	289	5.416	5.666	0.25	2.772
6	2014	66	355	5.666	5.872	0.206	3.364
						Mean (0.310)	Mean (1.831)

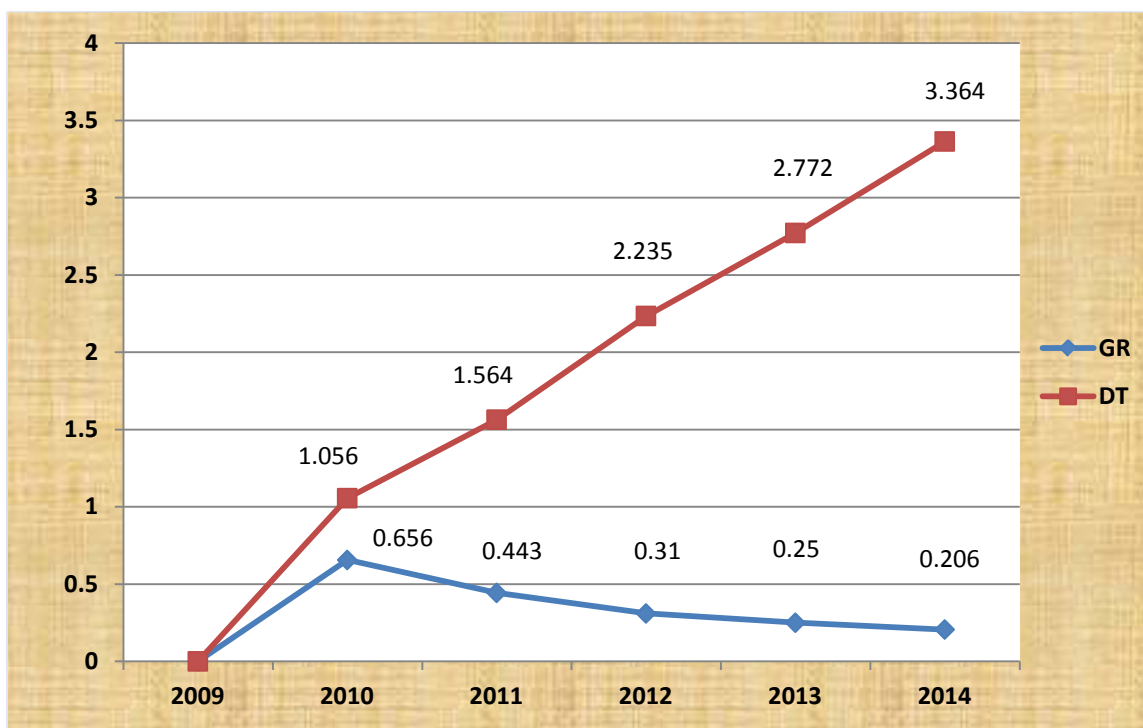


Figure 2: Growth Rate and Doubling Time of Contributions

Table 3 reveals that journal article is the most preferred medium of all the forms as 278, which is 78.31% of the total publications, followed by short communication 61 (17.18%) and review article 16 (4.51%) of the total publications. The largest number of the journal article indicates a continued trend of relying primarily on this form of publications.

Table 3: Forms of Publication in Year-wise

Year	Journal Article	Forms of Publication		Total Author	%
		Review Article	Short Communication		
2009	42	5	8	55	15.49
2010	40	3	8	51	14.37
2011	49	3	7	59	16.62
2012	51	1	8	60	16.9
2013	48	1	15	64	18.03
2014	48	3	15	66	18.59
Total	278	16	61	355	100
%	78.31	4.51	17.18	100	

All articles appearing in the issues of the IJFTR from 2009 to 2014 are divided into 8 subjects. The details of the subject wise analysis of the articles are shown in the table 4. The subject ‘Technical Textile’ constituted the highest number of articles i.e. 80 (22.54%). ‘Textile Testing’ constituted 60 (16.9%) number of articles followed by ‘Weaving’ having 46 articles (12.96%). The fourth highest articles belonged to the subject ‘Textile Finishing’ totaling 41articles (11.54%). Other headings constituted less than 40 articles.

Table 4:Subject-wise Trends of Articles

Subjects	Year						Total Articles	%
	2009	2010	2011	2012	2013	2014		
Technical Textile	1	14	9	21	18	17	80	22.54
Textile Testing	10	7	16	9	7	11	60	16.9
Weaving	12	6	12	3	5	8	46	12.96
Textile Finishing	9	6	4	5	9	8	41	11.54
Spinning	10	6	3	5	4	10	38	10.7
Dyeing	3	4	5	13	7	6	38	10.7
Textile Processing	2	7	4	3	6	6	28	7.89
Post-Harvest								
Technology	4	1	4	1	6	0	16	4.51
Others	4	0	2	0	2	0	8	2.26
Total	55	51	59	60	64	66	355	100
%	15.49	14.37	16.62	16.9	18.03	18.59	100	

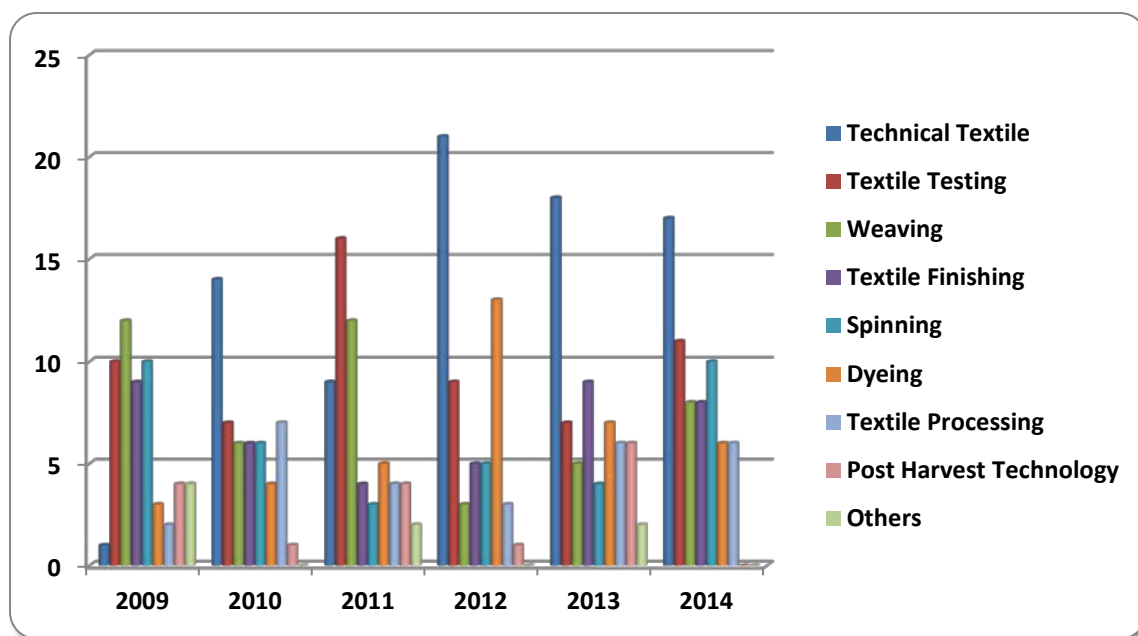


Figure 3: Subject Trends of Articles

In the present era, collaborative research is very much a feature in any field of research. Table 5 shows year wise distribution of authorship pattern of the contributions during the period. It reveals that maximum 215 (60.56%) articles have been written by multiple authors by three and more authors, followed by 107 (30.14%) articles have been written by joint authors. Only 33 (9.30%) of articles written by single authors of the total publications. It is also observed from the table that the number of articles has been increasing as we proceed from articles written by single author to those written by multiple authors. It is very good sign of collaborative research in the field of Fibre and Textile research.

Table 5: Year-wise Authorship Pattern

Year	Single	Authors Double	Multiple	Total	%
2009	5	19	31	55	15.49
2010	5	14	32	51	14.37
2011	9	16	34	59	16.62
2012	6	19	35	60	16.90
2013	5	16	43	64	18.03
2014	3	23	40	66	18.59
Total	33	107	215	355	100
%	9.30	30.14	60.56	100	

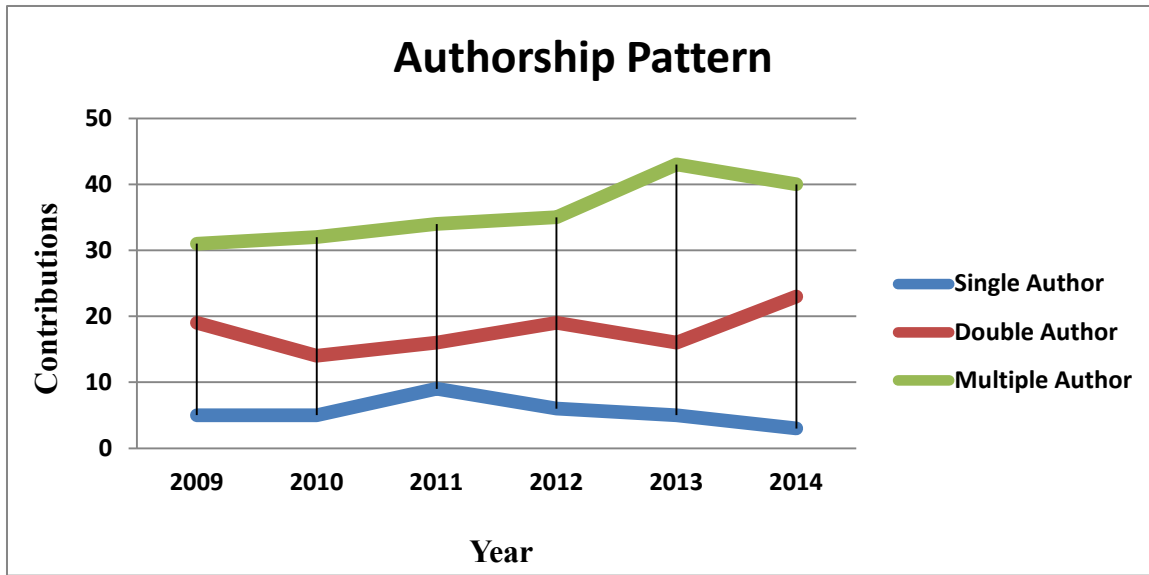


Figure 4: Year-wise Authorship Pattern

Degree of Collaboration:-

$$\text{Degree of Collaboration} = \frac{N_m}{N_m + N_s}$$

Where

N_m is the number of multi-authored research papers in the discipline published during a year.

N_s is the number of single authored papers in the discipline published during the same year

Degree of Collaboration:-

$$\text{Degree of Collaboration} = \frac{N_m}{N_m + N_s}$$

Where

N_m is the number of multi-authored research papers in the discipline published during a year.

N_s is the number of single authored papers in the discipline published during the same year

6.3 DEGREE OF COLLABORATION

The degree of collaboration is defined as the ratio of the number of collaborative research papers to the total number of research papers in the discipline during a certain period of time. The following formula suggested by Subramanyamis used. It is expressed as; ¹³

$$D.C. = \frac{N_m}{N_m + N_s}$$

Where; DC is the degree of collaboration in a discipline.

N_m is the number of multi-authored research papers in the discipline published during a year.

N_s is the number of single authored papers in the discipline published during the same year.

Table 6 shows the degree of author collaboration in the Indian Journal of Fibre and Textile research. The DC ranges between 0.91 to 0.95. As a result, the average DC is 0.905, which clearly indicates its dominance upon single authored contributions. However, multi authored articles have been increased in recent years. In 2009, there were 5 single authored articles and 50 multi author articles, and in 2014, there were 3 single authored and 63 multi author articles.

Table 6: Degree of Author Collaboration

Sr. No.	Year	Single Authored (NS)	Multiple Authored (NM)	Total (NS+NM)	Degree of Collaboration
1	2009	5	50	55	0.91
2	2010	5	46	51	0.90
3	2011	9	50	59	0.85
4	2012	6	54	60	0.9
5	2013	5	59	64	0.92
6	2014	3	63	66	0.95
Total		33	322	355	0.905 (Mean Value)

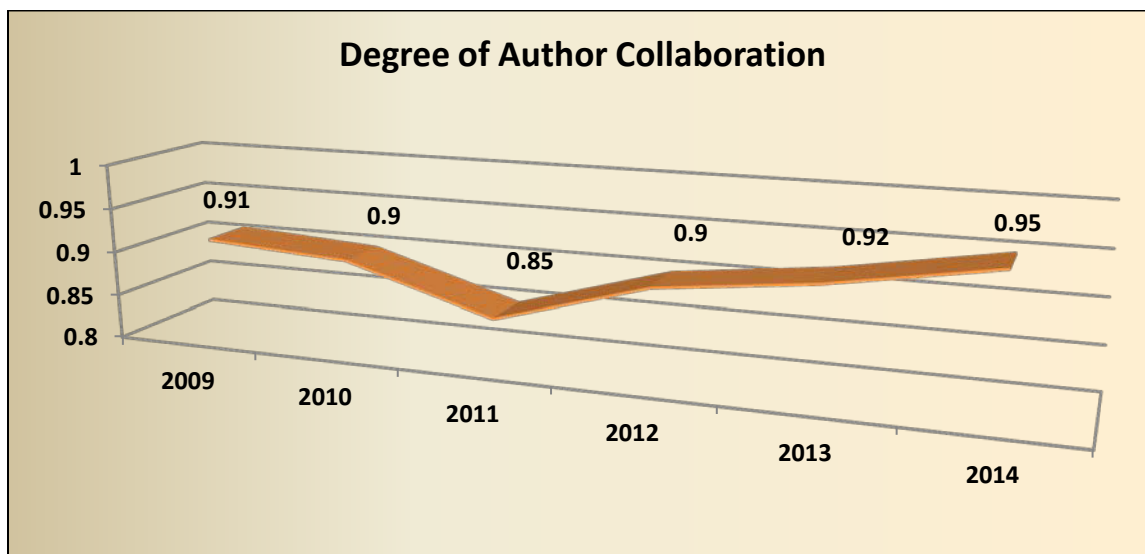


Figure 5: Degree of Author Collaboration in Year-wise

Table 7 reveals that the majority of articles 211 (59.43%) have the length of 6-10 pages, followed by 134 (37.75%) articles with 1 to 5 pages, 9 (2.54%) articles with 11 to 15 pages and the remaining 1 (0.28%) articles have the length of 16 and more pages. Study also reveals that maximum length of 6 to 10 pages i.e. 40 recorded in the year 2014.

Table 7: Length of articles in term of page numbers

Pages	Year						Total	Percentage
	2009	2010	2011	2012	2013	2014		
1 to 5	20	18	18	24	28	26	134	37.75
6 to 10	33	32	36	36	34	40	211	59.43
11 to 15	1	1	5	0	2	0	9	2.54
16 & more	1	0	0	0	0	0	1	0.28
Total	55	51	59	60	64	66	355	100
%	15.49	14.37	16.62	16.9	18.03	18.59	100	

The geographical distribution is indicated by two subcategories i.e. Indian and Foreign countries (Table 8 and Fig 6). In total, India has contributed 237 (66.76%) articles and holds the first rank. 21 foreign countries have contributed 118 (33.24%) articles of the total publications. The contribution by China 25 (21.19%) (Table 8 B) is at top in case of Foreign countries followed by Iran with 22 (18.64%) contributions, Egypt with 18 (15.26%) contributions, Turkey with 13 (11.02%) contributions and Pakistan holds the fifth rank with 8 (6.78%) contributions.

Table 8 (A): Geographical distribution of Contributions

Sr. No.	Country	No. of Articles	Percentage
1	Indian	237	66.76
2	Foreign Countries	118	33.24
	Total	355	100

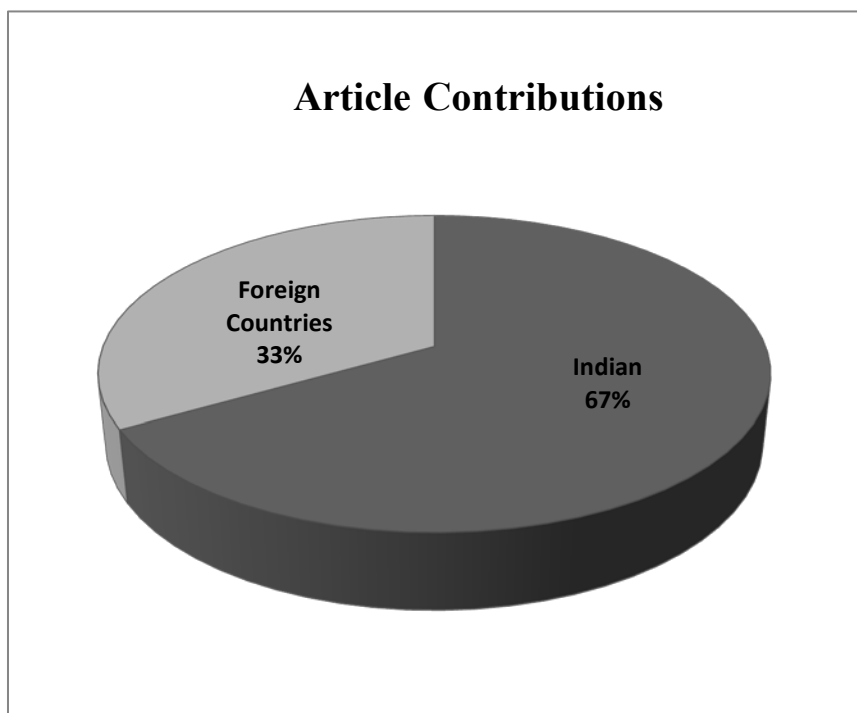


Figure 6: Geographical distribution of articles

Table 8 (B): Geographical distribution of Foreign Countries

Sr. No.	Country	No. of Contributions	%	Cumulative Contributions	Cumulative %	Rank
1	China	25	21.19	25	21.19	I
2	Iran	22	18.64	47	39.83	II
3	Egypt	18	15.26	65	55.09	III
4	Turkey	13	11.02	78	66.11	IV
5	Pakistan	8	6.78	86	72.89	V
6	USA	5	4.24	91	77.13	VI
7	Portugal	3	2.54	94	79.67	VII
8	France	3	2.54	97	82.21	VII
9	Bangladesh	3	2.54	100	84.75	VII
10	Malaysia	3	2.54	103	87.29	VII
11	Poland	2	1.69	105	88.98	VIII
12	UK	2	1.69	107	90.67	VIII
13	Czech Republic	2	1.69	109	92.36	VIII
14	Tunisia	2	1.69	111	94.05	VIII
15	Serbia	1	0.85	112	94.9	IX
16	South Africa	1	0.85	113	95.75	IX
17	Mauritius	1	0.85	114	96.6	IX
18	Macedonia	1	0.85	115	97.45	IX
19	Canada	1	0.85	116	98.3	IX
20	Slovenia	1	0.85	117	99.15	IX
21	Lithuania	1	0.85	118	100	IX
Total		118	100			

7. CONCLUSION

Scientometric techniques are very important tool for analyzing research performance of an individual Scientist, Institute etc. Citation analysis constitutes an important tool in quantitative studies of science and technology. To assess the quality of a given publication, the number of times it has been cited in the literature can be counted. The prime purpose of the present study is to portrait the growth and development of the 'Indian Journal of Fibre and Textile Research' using various scientometric techniques. A total of 355 papers are published in the period of 06 years i.e.2009 to 2014. The degree of collaboration ranges from 0.91 to 0.95 and its mean value is found to be 0.905. The study also indicates the highest number of publications (18.59%) in the year of 2014. Technical Textile (22.54%) and Textile Testing (16.9%) subject papers are the topmost publications in subject-wise analysis. Collaboration of author towards single author contribution is 9.30% double author contribution is 30.14% and multiple author contribution is 60.56%. The India has contributed more number of articles compared to any other countries. China is on the top with 21.19% contributions in foreign countries. The growth rates has decreased gradually from 0.656 in 2010 to 0.206 in the year 2014. Contrarily, the doubling time for publication of all sources of output has increased from 1.056 in 2010 to 3.364 in the year 2014. Journal articles is the most preferred form of communication i.e. 278 (78.31%) and the majority of articles 211 (59.43%) have the length of 6-10 pages.

REFERENCES

- 1Thavamani,Kotti 2014. Authorship and collaborative patterns in the Chinese Librarianship: An International Electronic Journal, 1996-2013. Chinese Librarianship: An International Electronic Journal, 37, pp. 1-14.
- 2Rattan, GurjeetKaurland Gupta, Kamini. 2012. Bibliometric analysis of ‘Malaysian Journal of Library & Information Science 2007-2011. International Journal of Information Dissemination and Technology, 2(4), pp.307-312.
- 3 Rajendran, P., Jeyshankar, R. and Elango, B. 2011. Scientometric analysis of contributions to Journal of Scientific and Industrial Research. International Journal of Digital Library Services, 1 (2), pp. 79-89.
- 4Thanuskodi, S. 2010. Bibliometric analysis of the journal Library Philosophy and Practice from 2005-2009.*Library Philosophy and Practice*. Available at: <http://www.webpages.uidaho.edu/~mbolin/thanuskodi-lpp.htm>.
- 5Sam, J. 2008. An analysis of papers published in the Ghana Library Journal: A bibliometric study. African Journal of Library, Archives and Information Science, 18(1), pp.55-62.
- 6 Singh, G., Mittal, R. & Ahmad, M. 2007. A bibliometric study of literature on digital libraries. The Electronic Library, 25(3), pp.342-348.
- 7 Jena, Kamal Lochan. 2006. A bibliometric analysis of the journal Indian Journal of Fibre and Textile Research 1996-2004. Annals of Library and Information Studies, 53(1), pp. 22-30.
- 8 Narang, A. 2004. Indian Journal of Pure and Applied Mathamatics: A bibliometric study. Annals of Library and Information Studies, 51(1), pp.28-38.
- 9 Parameswaran,M.,and Smitha, K.G. 2001. Bibliometric analysis of LISA. Annals of Library and Information Studies,48(4), pp. 149-156.
- 10 Dhiman, A.K. 2000.Ethnobotany Journal: A ten year bibliometric study. IASLIC Bulletin, 45(4), pp. 177-182.
- 11 Meena, Deepak, Kumar, S. and Jain, Anil Kumar. 2014. Indian contributions to International Pigeon Pea research: A bibliometric study. Indian Journal of Agricultural Library and Information Services, 30(1), pp.33-41.
- 12 *Ibid*, pp.34-35.
- 13 Arunachalam, S. and Garg, K. C. 1986.Science on the periphery: A scientometric analysis of Science in the Asian Countries. Journal of Information Science, 12(3), pp.105-117.

Scientometric Dimensions of the Central Nervous System (CNS) Cancer Research in India

Satish S Munnolli

smunnolli@actrec.gov.in

Advanced Centre for Treatment, Research and Education in Cancer (ACTREC)
Navi Mumbai 410210

ABSTRACT

This study is an attempt to map the Indian research output on Central Nervous System (CNS) Cancer during the period 2000-2014. The study uses Scientometric techniques to analyse growth of publications in fifteen years, top productive institutes, preferred journals for reporting research, prolific authors and highly cited papers in CNS cancer. Web of Science citation database was used for retrieving the publications' by framing a comprehensive search command. Journal Citation Reports (JCR) was used to refer the Impact Factors of 2014. The search resulted in 1782 records with 17002 citations. All India Institute of Medical Sciences (AIIMS) published highest number of papers, 207 with 1888 citations followed by Tata Memorial Hospital, 109 papers with 1026 citations. Indian Scientists have used 710 channels to publish 1782 papers in 15 years. The journals 'Neurology India' was the most preferred journal published 91 papers followed by 'Journal of Clinical Neuroscience' published 44 papers. Over 78% of papers were published in Impact Factor in the range of 0 to 4 and over 8% of papers were published in journals with Impact Factor 5 and above. The study gives an insight on status of Indian CNS cancer research and emphasizes the need of increased collaborations with international agencies.

Keywords: Scientometrics, Central Nervous System, Research Impact

1. INTRODUCTION

The central nervous system (CNS) is the processing center of the entire nervous system. It is the vital organ for functioning of sensory system of the body. It receives information from and sends information to the peripheral nervous system. The two main organs of the CNS are the brain and spinal cord. Central nervous system (CNS) cancer is a disease in which malignant (cancer) cells form in the lymph tissue of the brain and/or spinal cord (<http://www.cancer.gov/types/lymphoma/patient/primary-cns-lymphoma-treatment-pdq>). Most lymphomas start in lymphatic organs, such as the lymph nodes. But CNS cancer begins in the central nervous system. Cancer cells form in the lymphatic tissue in the brain. This is often in an area called the cerebrum. The symptoms of the disease may include raised intracranial pressure (an increase within pressure in the skull), changes in behavior and personality, seizures (fits), changes in balance/movement, numbness or weakness and problems with vision. The diagnosis of CNS cancer involves testing of a tissue through invasion technique called biopsy. This includes portion of the tissue is examined under microscope for the assertion of cancer cells. A team of specialists plan the treatment usually includes oncologists and neurologists. Based on the condition of the patient, the treatment involves chemotherapy followed by radiotherapy. CNS cancer s are rare and most likely to affect older people.

Scientometrics is domain involves various proven techniques used to measure the growth of a discipline and analyze influencing factors. Several Scientometric studies on various domains

with respect to countries (1-3), studies on global level (4-7), individual level (8-10) were published. These techniques were applied to CNS cancer of Indian literature to measure the growth and impact of research in the past 15 years (2000-2014).

2. RESEARCH METHODOLOGY

The study is based on Web of Science (WoS) online citation database. It is an international database acclaimed for indexing standard journals and follows rigorous quality check in the entire selection procedure on its contents. This study is based on the literature retrieved on Central Nervous System cancer published by Indian researchers for the period 15 years. A comprehensive search command *TS=(central nervous system OR CNS OR brain OR meninges OR spinal cord) AND TS=(tumor OR cancer* OR neoplasms) AND CU=(India)* was used on 'Web of Science'(WoS) SCI-Expanded database for the period 2000-2014. A search was made on 17.02.2015, and the bibliographic records along with citations data were extracted. The data was transferred to spread sheet for cleaning and standardizing the data for further analysis. Journal Citation Report (JCR) – 2014 was used to retrieve Impact Factors of different journals. The data was checked for errors and erroneous records were filtered out. The standardized data was then arranged and reorganized in the order of requirements of the study.

3. RESULTS AND DISCUSSION

3.1 Growth of CNS Cancer Research

The strategic search command on CNS Cancer on WoS database resulted in retrieval of 1782 records with 17002 citations. The records were for the period of 15 years both inclusive of 2000 and 2014. In the 15 years (2000–2014) there were 1782 publications from India, of which 1338 (75.05%) belong to category of articles and 259 (14.53%) were review papers. Other 185 (10.38%) papers scattered as Editorials, Letters and Abstracts. Citations of 12132 to articles in journals and 4715 citations for reviews forms the highest percentage of citations (71.35% and 27.73% respectively) to Indian CNS Cancer literature. This shows articles and reviews in journals were the preferred form of research communication and referred sources by scientists. Table 1 shows, there is consistent growth of CNS Cancer literature from 2000 to 2014 except in 2013. From the Table 1 it reveals publications of 2010 were cited by many others and they received highest citations (1901) followed by papers published in 2009 (1690) and publications in 2008(1591). Highest average citations per paper was received for publications of 2001(24.43) followed by 2003(21.16). There is a consistent rise of Indian CNS Cancer literature in last 15 years.

Table 1. Yearwise growth of CNS Cancer publications with citations

Year	TP	% of TP	TC	% of TC	ACPP
2000	29	1.63	358	2.11	12.34
2001	37	2.08	904	5.32	24.43
2002	50	2.81	850	5.00	17.00
2003	63	3.54	1333	7.84	21.16
2004	64	3.59	798	4.69	12.47
2005	83	4.66	1558	9.16	18.77
2006	84	4.71	1341	7.89	15.96
2007	87	4.88	1515	8.91	17.41
2008	121	6.79	1591	9.36	13.15
2009	157	8.81	1690	9.94	10.76
2010	169	9.48	1901	11.18	11.25
2011	197	11.05	1529	8.99	7.76
2012	216	12.12	1038	6.11	4.81
2013	204	11.45	482	2.83	2.36
2014	221	12.40	114	0.67	0.52
Total	1782	100	17002	100	12.67

TP = Total Publications; TC = Total Citations; ACPP= Average Citation per Paper

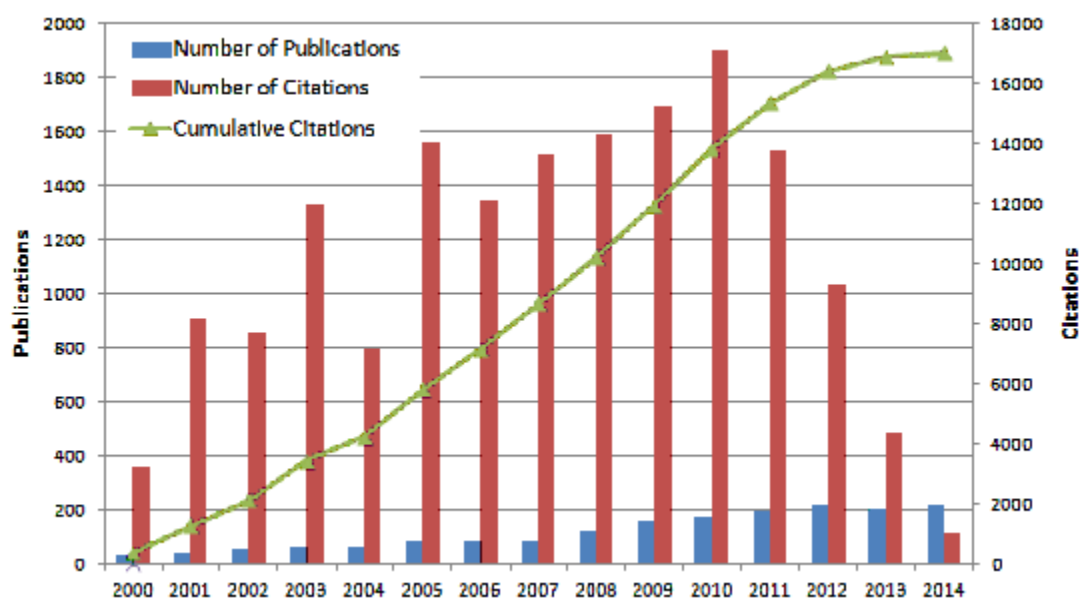


Fig. 1 Yearwise growth of Indian publications on CNS cancer with citations

3.2 Prolific Indian Institutes Contributed To CNS Cancer

Table 2 provides the most productive top 25 institutes contributed to CNS cancer research. In all, including Indian organisations, 1118 institutes all over the world collaborated to Indian CNS cancer research during the study period. This 1118 includes institutes from 57 other countries apart from India. This shows the dimension of the discipline which involves experts from various domains. All India Institute of Medical Sciences, Delhi contributed highest 207 papers with 1888 citations. Tata Memorial Hospital, Mumbai (109), Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow (103), National Institute of Mental Health and Neurosciences, Bangalore (102) contributed over 100 papers each with citations 1026, 1355 and 843 respectively. Post Graduate Institute of Medical Education and Research, Chandigarh has 66 papers and others had below 50 publications.

Table 2. Productive Indian Institutes contributed to CNS Cancer, 2000-2014

Sr No.	Name of the Institute	TP	% of TP	TC	% of TC	ACPP
1	All India Institute of Medical Sciences, New Delhi	207	11.62	1888	11.10	9.12
2	Tata Memorial Centre, Mumbai	109	6.12	1026	6.03	9.41
3	Sanjay Gandhi Post Graduate Institute of Medical Sciences, Lucknow	103	5.78	1355	7.97	13.16
4	National Institute of Mental Health and Neurosciences, Bangalore	102	5.72	843	4.96	8.26
5	Post Graduate Institute of Medical Education and Research, Chandigarh	66	3.70	303	1.78	4.59
6	Sree Chitra Tirunal Institute for Medical Sciences & Technology, Trivandrum	48	2.69	624	3.67	13.00
7	Indian Institutes of Technology, India	45	2.53	650	3.82	14.44
8	King Edward Memorial Hospital, Mumbai	45	2.53	274	1.61	6.09
9	Christian Medical College, Vellore	44	2.47	261	1.54	5.93
10	Panjab University, Chandigarh	42	2.36	596	3.51	14.19
11	Indian Institute of Science, Bangalore	35	1.96	425	2.50	12.14
12	University of Delhi, Delhi	32	1.80	326	1.92	10.19
13	Institute of Nuclear Medicine & Allied Sciences (INMAS), Delhi	29	1.63	453	2.66	15.62
14	Banaras Hindu University, Varanasi	29	1.63	313	1.84	10.79
15	National Brain Research Centre, Haryana	27	1.52	538	3.16	19.93
16	Nizam's Institute Of Medical Sciences, Hyderabad	27	1.52	162	0.95	6.00
17	Seth GS Medical College, Mumbai	25	1.40	162	0.95	6.48
18	King George's Medical University, Lucknow	22	1.23	488	2.87	22.18
19	Sri Sathya Sai Institute of Higher Medical Sciences, Bangalore	22	1.23	169	0.99	7.68
20	Jawaharlal Nehru University, New Delhi	18	1.01	134	0.79	7.44
21	University of Madras, Madras	18	1.01	128	0.75	7.11
22	Kasturba Medical College, Karnataka	17	0.95	160	0.94	9.41
23	Sher-i-Kashmir Institute of Medical Sciences, Jammu and Kashmir	17	0.95	33	0.19	1.94
24	Council of Scientific and Industrial Research	15	0.84	551	3.24	36.73
25	Central Drug Research Institute, Lucknow	15	0.84	317	1.86	21.13

TP = Total Publications; TC = Total Citations; ACPP = Average Citation Per Paper

Over 45% of CNS cancer research was contributed by 10 institutes and around 55% of research was contributed by remaining 1108 institutes. From the top 25 institutes, Council of Scientific and Industrial Research had received highest Average Citation Per Paper with 36.73 followed by King George's Medical University, Lucknow with 22.18.

3.3 Scattering of CNS Cancer Research in Journals

Indian Scientists have used 710 different channels to publish 1782 papers in 15 years. Table 3 shows list of preferred journals used by Indian scientists. 'Neurology India' (India) – a publication of Neurological Society of India was the most preferred journal published 91 papers followed by 'Journal of Clinical Neuroscience'(UK) published 44; 'Journal of Cancer Research and Therapeutics' (India) published 34 papers. From the top 25 journals, 9 journals were from USA, 5 from India and 4 were from UK. From the top 25 journals 'Neuro-Oncology' (UK) had the highest Impact Factor (IF) 5.562 published 29 papers followed by 'PLOS One' (USA) with IF 3.234 published 17 papers.

Table 3. List of Top 25 Preferred Journals Used by Indian Scientists

Sr No.	Journal	Country	IF 2014	TP	TC
1	Neurology India	India	1.232	91	435
2	Journal Of Clinical Neuroscience	UK	1.378	44	219
3	Journal Of Cancer Research And Therapeutics	India	0.791	34	183
4	Childs Nervous System	USA	1.114	32	242
5	British Journal Of Neurosurgery	UK	0.96	31	151
6	Journal Of Neuro-Oncology	Netherlands	3.07	29	378
7	Neuro-Oncology	UK	5.562	29	181
8	Pediatric Neurosurgery	Switzerland	0.326	27	156
9	Indian Journal Of Pathology And Microbiology	India	0.466	26	35
10	Acta Neurochirurgica	Austria	1.766	19	130
11	Plos One	USA	3.234	17	327
12	Annals Of Indian Academy Of Neurology	India	0.599	15	16
13	Asian Pacific Journal Of Cancer Prevention	Japan	2.514	14	44
14	Turkish Neurosurgery	Turkey	0.576	14	8
15	Surgical Neurology	USA	NA	12	185
16	Neuroradiology	USA	2.485	11	170
17	Indian Journal Of Pediatrics	India	0.867	11	12
18	Neurosurgery Quarterly	USA	NA	11	3
19	Magnetic Resonance Imaging	USA	2.09	10	168
20	Journal Of Computer Assisted Tomography	USA	1.411	10	119
21	Clinical Neuropathology	Germany	1.528	10	71
22	Clinical Nuclear Medicine	USA	3.931	10	57
23	Neuropathology	UK	1.651	10	49
24	Molecular And Cellular Biochemistry	Netherlands	2.393	9	191
25	Neurochemical Research	USA	2.593	9	108

Interestingly, when the journals were arranged as per citations received, only 25 journals figured in the list of citations received over 150. Only 2 Indian journals – 'Neurology

India' (435 citations for 91 papers) and 'Journal of Cancer Research and Therapeutics' (183 citations for 34 papers) figured in the list of 25 preferred journals. Papers published in journal - 'European Journal of Medicinal Chemistry' of France received highest citations (523) has published 8 papers followed by 'Journal of Controlled Release' (480) published 4 papers and 'Colloids and Surfaces B-Biointerfaces' (460) published 3 papers.

Table 4 shows distribution of papers in different journals with Impact Factors. The data reveals over 44% of papers were published in journals with Impact Factor 0 to 2 with journals accounts close to 34% and 34% of papers published in journals with Impact Factors 2 to 4 in journals account close to 37%. Over 7% of papers published in journals with Impact Factor 5 to 10 in journals account to 7.75%. Less than 1% papers were published in Impact Factor with over 10. These papers were published in 10 journals.

Table4. Distribution of papers by Impact Factors

Impact Factor 2014	Number of Journals	%	Number of Publications	%
Above 10	10	1.41	16	0.90
5 to 10	55	7.75	129	7.24
4- 5	42	5.92	88	4.94
2- 4	260	36.62	601	33.73
0- 2	240	33.80	795	44.61
NA	103	14.51	153	8.59
Total	710	100	1782	100

NA: Information Not Available

This shows over 78% of papers were published in Impact Factor in the range of 0 to 4. This percentage of publications is published in 500 journals. In other way, it construes majority of journals with scope of 'CNS Cancer' research fall under Impact Factors with range 0 to 4.

3.4 Collaboration Pattern of CNS Cancer

Collaboration in any domain increases the quality and productivity and it adds on multi dimensions to the research. Of the 1782 papers, 343 papers (19.24 %) were four authored, 282 papers (15.82%) were two authored, 272 papers (15.26%) were five authored and 262 papers (14.7%) were three authored. These four groups form the highest (65.04%) authorship pattern amongst the 1782 papers. Four authored papers is the most preferred pattern. A paper appeared in 'Lancet Oncology' in 2014 on "Cilengitide combined with standard treatment for patients with newly diagnosed glioblastoma with methylated MGMT promoter (CENTRIC EORTC 26071-22072 study): a multicentre, randomised, open-label, phase 3 trial" has highest 37 authors in the group. There are other mega authored papers with 31 authorship (Journal of Clinical Investigation, 2014), 29 authorship (American Journal of Plantation, 2009) and 28 authorship (Brain Pathology, 2004) in the period of 15 years.

Collaboration rate is a ratio of collaborative papers to the total number of papers. The study of collaboration pattern reveals 47 papers (2.63%) had single authored research and

1735 papers (97.36%) had multi authored papers. The health science or medical science discipline is complex and research is highly collaborative in nature. Of the 1782 papers, 819 papers (45.95%) had collaborations with other Indian institutes and 263 papers (14.75%) had collaborations with foreign institutes. And, 698 papers (39.16%) had no collaborations with others, but, they collaborated with the different departments of the same institute. Highly cited 25 papers (Table 5) shows, top 4 papers had no collaborations with any other outside institute. A paper authored by scientists from Biotechnology Division, Institute of Himalayan Bioresource Technology, CSIR, Palampur, Himachal Pradesh, India appeared in ‘Colloid Surface B’ published in 2010 received highest 454 citations.

Table 5. Highly Cited Top 25 papers and their collaboration pattern

Cited Articles	Times Cited	Type of Collaboration
Kumari,A;COLLOID SURFACE B(2010) 75 1-18	454	N
Ratnam,DV;J CONTROL RELEASE(2006) 113 189-207	229	N
Holla,BS;EUR J MED CHEM(2002) 37 511-517	227	N
Holla,BS;EUR J MED CHEM(2003) 38 759-767	223	N
Varna,MVS;PHARMACOL RES(2003) 48 347-359	170	I
Rahman,MM;J TOXICOL-CLIN TOXIC(2001) 39 683-700	169	F
Misra,A;J PHARM PHARM SCI(2003) 6 252-273	167	I
Ghoshal,A;GLIA(2007) 55 483-496	149	N
Vanetti,E;RADIOTHER ONCOL(2009) 92 111-117	130	F
Vang,O;PLOS ONE(2011) 6	125	F
Bello,L;NEUROIMAGE(2008) 39 369-382	124	F
Heymach,IV;J CLIN ONCOL(2008) 26 5407-5415	123	N
Yadav,A;CLIN CHIM ACTA(2010) 411 1570-1579	122	N
Patel,MM;CNS DRUGS(2009) 23 35-58	109	N
Ganly,I;HEAD NECK-J SCI SPEC(2005) 27 445-451	107	F
Sharma,S;HISTOPATHOLOGY(2005) 46 481-489	103	N
Singh,DH;STRAHLENTHER ONKOL(2005) 181 507-514	99	F
Mandal,M;MOL CELL BIOCHEM(2003) 252 305-329	99	N
Vyas,SP;CRIT REV THER DRUG(2001) 18 1-76	98	I
Chauhan,A;J CONTROL RELEASE(2007) 117 148-162	96	F
Kuhad,A;EUR J PHARMACOL(2007) 576 34-42	88	N
Reddy,LH;J PHARM PHARMACOL(2005) 57 1231-1242	87	N
Shiras,A;STEM CELLS(2007) 25 1478-1489	84	N
Jain,JP;J CONTROL RELEASE(2005) 103 541-563	84	F

F - Foreign Collaboration; N - No Collaboration; I - Collaboration with other institutions in India.

Collaboration rate of CNS cancer research 0.97 reveals it is highly collaborative in nature. The data suggests there is a need to increase the collaboration with different international institutions and agencies to enhance the overall quality and research output.

3.5 Prolific Authors in Indian CNS Cancer Research

The prominent authors contributed more than 20 papers to CNS cancer research during 2000-2014 in India is presented in Table 6. C. Sarkar and M.C. Sharma of All India Institute of Medical Sciences, New Delhi contributed highest with 75 and 73 papers respectively. Among these top 25 authors, 7 were affiliated to All India Institute of Medical Sciences, New Delhi contributed 320 papers, 3 authors affiliated to Sanjay Gandhi Postgraduate Institute Medical Sciences, Lucknow contributed 148 papers, 3 authors of Tata Memorial Hospital contributed 107 papers and National Institute of Mental Health & Neuroscience, Bangalore contributed 89 papers. There is a significant contribution by AIIMS at individual level also.

Table 6. Prolific Authors in CNS Cancer in India

Author	Affiliation	TP	TC	ACPP
Sarkar, C	All India Inst Med Sci., New Delhi	75	1018	13.57
Sharma, MC	All India Inst Med Sci., New Delhi	73	871	11.93
Kumar, R	Sanjay Gandhi Postgrad Inst Med Sci., Lucknow	63	495	7.86
Jalali, R	Tata Mem Hosp., Mumbai	53	323	6.09
Gupta, RK	Sanjay Gandhi Postgrad Inst Med Sci., Lucknow	50	807	16.14
Santosh, V	Natl Inst Mental Hlth & Neurosci., Bangalore	41	418	10.20
Kumar, A	All India Inst Med Sci., New Delhi	40	224	5.60
Mahapatra, AK	All India Inst Med Sci., New Delhi	39	404	10.36
Behari, S	Sanjay Gandhi Postgrad Inst Med Sci., Lucknow	35	383	10.94
Suri, V	All India Inst Med Sci., New Delhi	34	253	7.44
Goel, A	Seth GS Med Coll & King Edward., Mumbai	33	238	7.21
Julka, PK	All India Inst Med Sci., New Delhi	32	190	5.94
Gupta, T	Tata Mem Hosp., Mumbai	31	193	6.23
Husain, N	Ram Manohar Lohia Inst Med Sci., Lucknow	28	588	21.00
Chaudhuri, S	Sch Trop Med., Kolkata	27	144	5.33
Garg, A	All India Inst Med Sci., New Delhi	27	246	9.11
Hegde, AS	Sri Sathya Sai Inst Higher Med Sci., Bangalore	27	185	6.85
Husain, M	King Georges Med Univ., Lucknow	27	714	26.44
Rajshekhar, V	Christian Med Coll & Hosp., Vellore	25	167	6.68
Shankar, SK	Natl Inst Mental Hlth & Neurosci., Bangalore	25	197	7.88
Chandramouli, BA	Natl Inst Mental Hlth & Neurosci., Bangalore	23	189	8.22
Sarin, R	Tata Mem Hosp., Mumbai	23	217	9.43
Sharma, S	Indian Inst Technol., Mumbai	23	405	17.61
Kumar, S	Jawaharlal Nehru Univ., New Delhi	22	157	7.14
Chopra, K	Panjab Univ., Chandigarh	21	374	17.81

TP = Total Publications; TC = Total Citations; ACPP = Average Citation Per Paper

C Sarkar papers received highest 1018 citations followed by MC Sharma papers received 871 citations.

4. CONCLUSION

The study gives an insight on the growth of CNS cancer research prominent channels used for research communications and collaboration pattern in Indian scenario for the period 2000 to 2014. Cancer of CNS is rare in any region either in country or in the global level. According to the ‘Consolidated Report of Hospital Based Cancer Registries: 2008-2011’ (http://ncrpindia.org/ALL_NCRP_REPORTS/HBCR_REPORT_2007_2011/ALL_CONTENT/ALL_PDF/Chapter1.pdf) cancer of mouth and lungs are the leading cases in Males; Breast and Cervical cancers in Females. In Chandigarh cancer of Brain is the second leading cancers as per the report. Otherwise, in all other registries brain cancer is reported at the bottom of incidences list. The data reflected on Web of Science alone is not sufficient and it does not represent the complete CNS cancer research in India and hence may be inadequate to project a clear picture. However, with the studied sample, it reflects, though there is gradual increase in publications over 15 years, the output is not significant. One of the reasons could be number of CNS cancer cases registered in the Indian Cancer hospitals is low and the other could be focus of cancer research is more towards prevailing leading cancers as there is an increased incidences of other cancer cases registered in Indian hospitals.

REFERENCES

1. Gupta BM, Bala A. A scientometric analysis of Indian research output in medicine during 1999-2008. *J Nat Sci Biol Med.* 2011;2(1):87-100. Epub 2011/01/01.
2. Gupta BM, Bala A. A scientometrics approach to schizophrenia research in India: an analysis of publications output during 2002-11. *Asian J Psychiatr.* 2013;6(4):292-8. Epub 2013/07/03.
3. Dutt B, Nikam K. Solar cell research in India: A scientometric profile. *Annals of Library and Information Studies.* 2013;60:115-27.
4. Gupta BM, Kaur H. World glaucoma research: A quantitative analysis of research output during 2002-11. *Annals of Library and Information Studies.* 2013;60:98-106.
5. Elango B, Rajendran P, Bornmann L. Global nanotribology research output (1996-2010): a scientometric analysis. *PLoS One.* 2013;8(12):e81094. Epub 2013/12/18.
6. Bhardwaj RK. Dengue Research: A Scientometric Mapping of World Publications. *SRELS Journal of Information Management.* 2014;51(2):77-86.
7. Bala A, Gupta BM. Measles: A quantitative analysis of world publications during 2001-2010. *Journal of Scientometric Research* 2012;1(1):60-70.
8. Munnolli SS, Pujar SM, Kademani BS. Scientometric Portrait of Nobel Laureate Harald zur Hausen. *Annals of Library and Information Studies.* 2011;58(1):71-8.
9. Kademani BS, Kalyane VL, Kumar V. Scientometric portrait of Nobel Laureate Harold W Kroto. *SRELS Journal of Information Management.* 2002;39(4):409-34.
10. Kalyane VL, Munnolli SS. Scientometric Portrait of T. S. West. *Scientometrics.* 1995;33(2):233-56.

Scientometric Dimensions of Knowledge Management: A Global Perspective

Lalit Mohan¹, B. S. Kademani² and G. Ravikumar³

¹ lalitm@barc.gov.in

Scientific Information Resource Division,
Bhabha Atomic Research Centre, Mumbai, India

ABSTRACT

This paper attempts to highlight the quantitative and qualitative growth and development of the literature on *knowledge management* in terms of publication output as per *Web of Science* (2006–2015) database. A total of 9991 publications and 25993 citations to these publications were received. The average number of publications published per year was 991.1. The highest number of publications (1339) was published in 2008. The highest number of citations (4823) were received in 2006. The average citations per publication were 2.60. The collaboration trend is toward multi-authored publications. Majority of the countries prefer to work in a large group in this field. Peoples R China topped the list with 2011 publications followed by USA with 1002 publications, England with 585 publications, Germany with 532 publications, Taiwan with 522, publications, Spain with 465 publications, Italy with 391, France with 360, Malaysia with 344 publications. The highest number of publications was published in Engineering Sciences with 6724 publications, followed by Business & Economics with 3275, Operations Research & Management Science with 1449 publications and Information Science & Library Science with 1375 publications. The highly productive institutions were: Wuhan University Science & Technology, Peoples R China with 75 publications followed by Hong Kong Polytech University, Peoples R China with 71 publications and Wuhan University, Peoples R China with 68 publications.

Keywords: Knowledge Management, Scientometrics, Bibliometrics, Publication productivity, Collaboration

1. INTRODUCTION

Since time immemorial, the importance to knowledge was accorded the most important position in the society. The societies which gave importance to knowledge, its transmission and preservation evolved, developed and flourished and always had an upper hand over the societies which were less developed. Though the man is a late comer on this planet compared to other animals could make tremendous progress mainly because of his inquisitive, questioning, intuitive, analytical and inventive mind he possessed and the capacity to transmit and preserve the knowledge for the posterity. The knowledge always has a cumulative effect as today is built upon yesterday and tomorrow is built upon today. Man would not have progressed so fast, if he had to re-invent the wheel again and again.

The twelfth century Kannada poet Sarvajna, has beautifully narrated in his poems that how important is knowledge for the society and the process by which one can acquire knowledge and preserve it for the future generation. He says that an ordinary person can become knowledgeable by learning from those who know, observing from those who do, reading, listening to discourses and applying his own intellect and

interpreting it according to the context. He also adds that the knower of everything does not exist in this world and the knowledgeable persons are only a few in every field of knowledge, if they do not share anything and the documents that contain everything is not available to everybody to learn is a fact even today. Therefore, it is important to preserve the knowledge possessed by the experts to make it available to all to achieve progress faster and to harness the benefits of the available knowledge for the common man in the society.

Knowledge is a familiarity, awareness or understanding of someone or something, such as facts, information, descriptions, or skills, which is acquired through experience or education by perceiving, discovering, or learning.

Knowledge can refer to a theoretical or practical understanding of a subject. It can be implicit (as with practical skill or expertise) or explicit (as with the theoretical understanding of a subject); it can be more or less formal or systematic.^[1] Knowledge acquisition involves complex cognitive processes: perception, communication, and reasoning; while knowledge is also said to be related to the capacity of *acknowledgment* in human beings.^[2]

Knowledge management (KM) is the process of capturing, developing, sharing, and effectively using organizational knowledge.^[3] It refers to a multi-disciplinary approach to achieving organizational objectives by making the best use of knowledge.^[4]

Knowledge was considered as a competitive asset in the 80s when the ‘information explosion’ was one of the burning issues to find the information from the vast array of resources. The advent of computer and information technology paved the way for storage, retrieval and archiving of classified and indexed information.

An established discipline since 1991 (see Nonaka 1991), KM includes courses taught in the fields of business administration, information systems, management, library, and information sciences.^[5,6] More recently, other fields have started contributing to KM research, including information and media, computer science, public health, and public policy.^[7] Several Universities now offer dedicated Master of Science degrees in Knowledge Management.

Many large companies, public institutions, and non-profit organisations have resources dedicated to internal KM efforts, often as a part of their business strategy, information technology, or human resource management departments. Several consulting companies provide strategy and advice regarding KM to these organisations.^[8]

The goal of a knowledge management system is to provide managers with the ability to organize and locate relevant content and the expertise required to address specific business tasks and projects, minimize loss of corporate memory due to retirement of employees, to identify the critical resources and areas of knowledge so that the industry/institution knows what it knows and does it well and why to develop a

toolkit of methods that can be used with individuals, groups and with the organization to stem the potential loss of intellectual capital.

There are many knowledge management challenges faced by the industries/institutions all over the world mainly due to the aging of personnel, retirement, loss of valuable knowledge, degradation in technology skill and knowhow and the gaps in the present day education and training system.

Over the years, many knowledge management models have been developed: Nonak/Takeuchi's Knowledge Spiral, Choo's Sense-making KM model, Adam's Model and Wiig's KM Model.

Publication and citation counting techniques have been used in the assessment of scientific activity for at least 50 years. During the half-century of this activity, the main thrust of interest seems to flow along the two connected but parallel paths: The bibliometric path of publication and citation counts as tools for the librarian and an evaluative path using the same tools to illuminate the mosaic of scientific activity.^[9] Research publications are clearly one of the quantitative measures for the basic research activity in a country. It must be added, however, that what excites the common man, as well as the scientific community, are the peaks of the scientific and technological achievement, not just the statistics on publications. There are also other kinds of research and technology development-mission oriented, industry-oriented, country-specific, etc., progress in these cannot be obviously measured by counting only the number of publications^[10]. Gu has studied publication activity of global knowledge management (KM) as reflected in web of Science during 1975-2002^[11]. Serenko, A. et. al. have studied the body of literature contained in 11 major knowledgemanagement and intellectual capital peer-reviewed journals.^[12] Surulanathi, M. et. al. Have analysed the growth and development of knowledge management research in India in terms of publications output as reflected in SCOPUS database during 1999-2007.^[13] Anil Kumar and Rakesh Mohindra have explored the research trends in terms of growth of literature, geographical distribution, most productive journals, top authors, highly cited papers in the field of Knowledge Management.^[14] Many scientometric studies have appeared in the literature to focus on the performance of science in various domain^[15-27].

2. OBJECTIVES

The main objective of the study is to present the growth of *knowledge management* related literature published during 2006–2015 as per the database and make the quantitative and qualitative assessment by the way of analyzing various features of research output which includes the growth of publications and citations, country-wise distribution of publications and citations, subject-wise distribution of publications and citations, highly productive institutes, highly cited publications, and journals preferred for publication.

3. MATERIALS AND METHODS

Data was collected from *Web of Science* for the period 2006–2015. By using suitable search strategy, records pertaining to *knowledge management* in the “Topic field” were

downloaded. A total of 9991 publications were retrieved and 25993 citations to these publications were received. Further, all the bibliographic details were transferred to spreadsheet application. The data were analyzed as per objectives of the study.

Degree of collaboration is the ratio of the number of collaborative research papers during a certain period of time. As per the formula given by Subramanyam, [28] for determining the degree of collaboration in a discipline, the value of collaboration will be between 0 and 1.

4. RESULTS AND DISCUSSION

4.1. Year-wise Distribution of Publications and Citations

A total of 9911 publications were retrieved and 25993 citations to these publications were received. The average number of publications published per year was 999.10. The highest number of publications (1339) were in 2008. The highest number of citations (4823) were received in 2006. The overall average citations per publication (ACP) was 2.60. There is a declining trend of citations in recent years mainly because the older publications tend to receive more citations than younger publications as they require more time to be noticed by the researchers and to find the context and relevance to the cite[13]. Figure 1 provides the year-wise growth of publications and citations, Figure 2 provides the year-wise average citations per publication. It is observed from the Table 1 that the highest growth rate 37.25 was observed in 2008. Overall, there is declining trend of publication in the field of knowledge management.

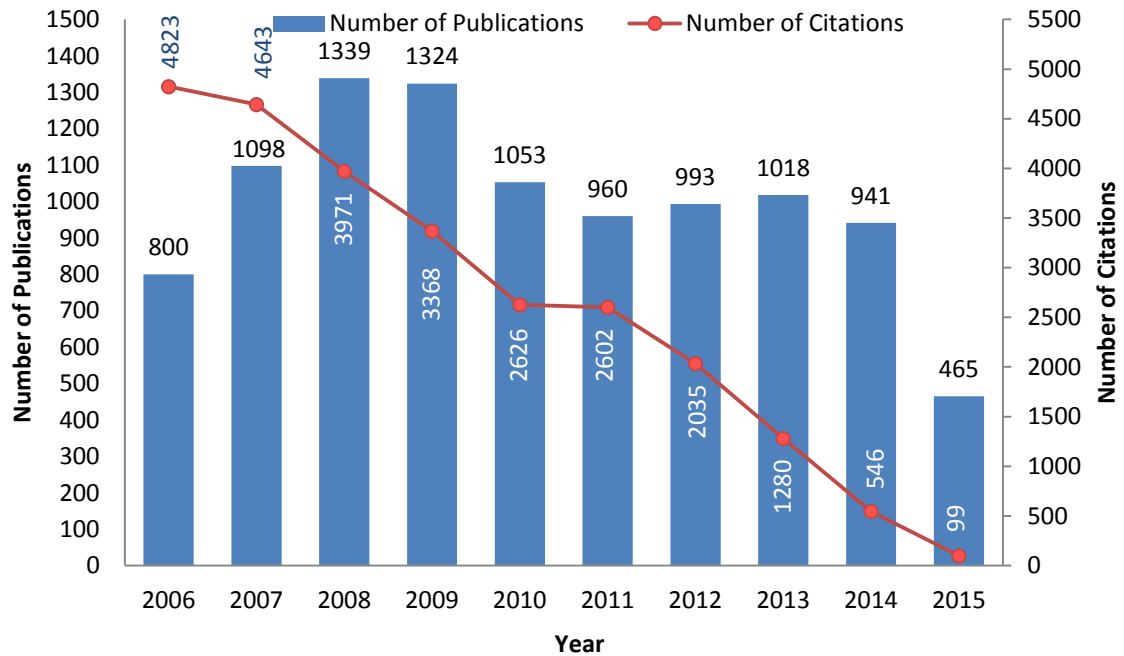


Figure 1: Year-wise distribution of publications and citations

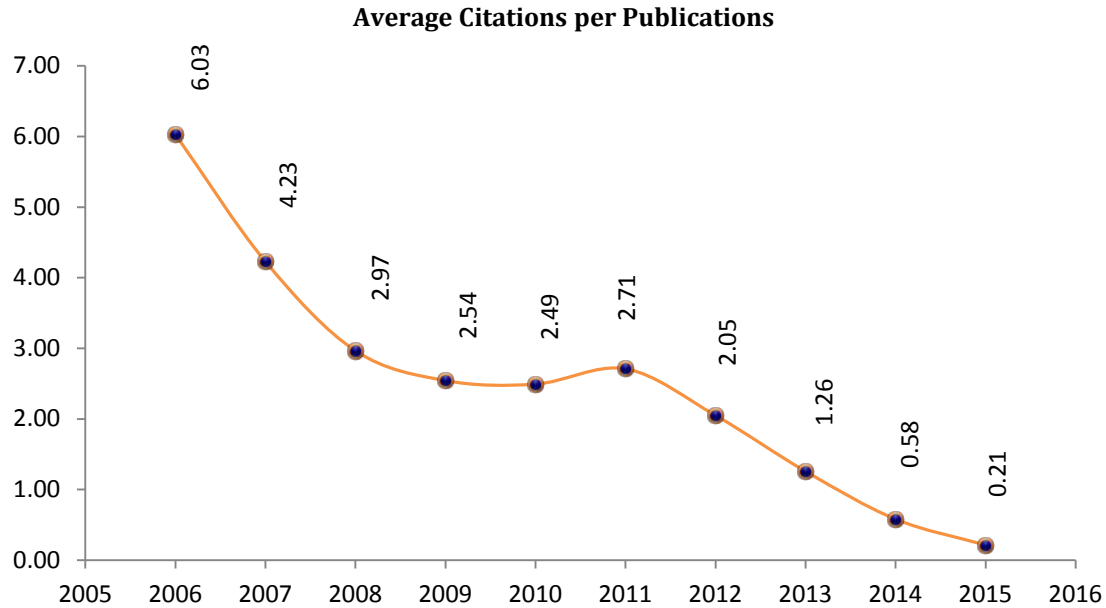


Figure 2: Year-wise distribution of average citations per publications

Table 1: Year-wise growth of literature on Knowledge Management

Year	TP	GR	% of TP	No. Citations	% of TC	ACP
2006	800	-	8.01	4823	18.55	6.03
2007	1098	37.25	10.99	4643	17.86	4.23
2008	1339	21.95	13.40	3971	15.28	2.97
2009	1324	-1.12	13.25	3368	12.96	2.54
2010	1053	-20.47	10.54	2626	10.10	2.49
2011	960	-8.83	9.61	2602	10.01	2.71
2012	993	3.44	9.94	2035	7.83	2.05
2013	1018	2.52	10.19	1280	4.92	1.26
2014	941	-7.56	9.42	546	2.10	0.58
2015	465	-50.58	4.65	99	0.38	0.21
9991			100.00	25993	100.00	2.60

TP=Total Publications, GR=Growth rate of publications, T C= Total number of citations, ACP=Average citations per publication

4.2. Degree of Collaboration

The extent of collaboration can be measured with the help of multi-authored papers. To measure the collaborative research pattern, a simple indicator called degree of collaboration is used. The number of single authored and multi-authored publications is calculated and is applied to the formula: $C = \text{TMAP}/\text{TP}$.

Where:

C = Degree of collaboration

TMAP = Total number of multi-authored publications (8077)
 TP = Total number of publications during a certain period of time (9991)
 Here: $C = 8077/9991 = 0.81$

Hence, the degree of collaboration of publications on *knowledge management* authors is 0.81. This indicates that there were more number of collaborative publications (80.84%) than single authored publications (19.16%).

4.3. Country-wise Share

There were a total of 112 countries involved in research on *knowledge management*. Peoples R China topped the list with 2011 publications and 1.3 ACP followed by USA with 1002 publications and 7.6 ACP, England with 585 publications and 4.9 ACP, Germany with 532 publications and 2.7 ACP, Taiwan with 522 publications and 7.8 ACP, Spain with 465 publications and 3.4 ACP, Italy with 391 publications and 3.4 ACP, France with 360 publications and 3.2 ACP, Malaysia with 344 publications and 0.7 ACP. Figure- 3 gives country-wise share of publications. Table -2 provides the publications, citations and average citations per publication of different countries with publications ≥ 100 .

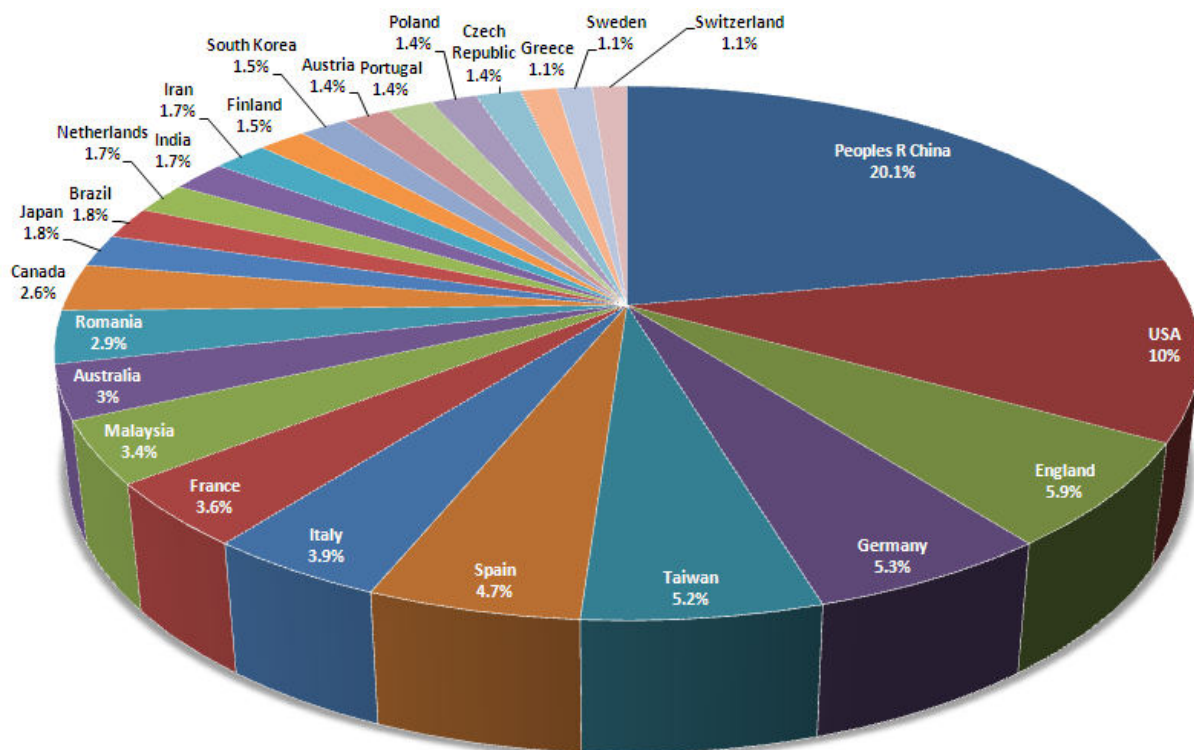


Figure 3 : Country-wise share of publications

Table 2: Distribution of publications and citations and their citation impact of different countries (≥ 100 publications)

Rank	Countries	TP	% of TP	TC	% of TC	ACP
1	Peoples R China	2011	20.1	2706	10.41	1.3
2	USA	1002	10.0	7593	29.21	7.6
3	England	585	5.9	2839	10.92	4.9
4	Germany	532	5.3	1433	5.51	2.7
5	Taiwan	522	5.2	4060	15.62	7.8
6	Spain	465	4.7	1566	6.02	3.4
7	Italy	391	3.9	1345	5.17	3.4
8	France	360	3.6	1155	4.44	3.2
9	Malaysia	344	3.4	255	0.98	0.7
10	Australia	298	3.0	974	3.75	3.3
11	Romania	292	2.9	101	0.39	0.3
12	Canada	260	2.6	1747	6.72	6.7
13	Japan	179	1.8	367	1.41	2.1
14	Brazil	177	1.8	272	1.05	1.5
15	Netherlands	170	1.7	1134	4.36	6.7
16	India	169	1.7	434	1.67	2.6
17	Iran	167	1.7	175	0.67	1.0
18	Finland	148	1.5	149	0.57	1.0
18	South Korea	148	1.5	792	3.05	5.4
19	Austria	144	1.4	641	2.47	4.5
20	Portugal	140	1.4	127	0.49	0.9
21	Poland	139	1.4	298	1.15	2.1
22	Czech Republic	138	1.4	137	0.53	1.0
23	Greece	111	1.1	438	1.69	3.9
24	Sweden	107	1.1	318	1.22	3.0
24	Switzerland	107	1.1	591	2.27	5.5

TP=Total Publications, GR=Growth rate of publications, T C= Total number of citations, ACP=Average citations per publication

4.4. Subject-wise Distribution of Publications and Citations

All the publications were broadly classified into thirteen subject categories based on WoS subject categories. Engineering Sciences accounted for the highest number of publications 6724 (42.9%) followed by the Business & Economics with 3275 (20.9%) publications, Operations Research & Management Science with 1449 (9.2%) publications, Information Science & Library Science with 1375 (8.8%) publications, Multidisciplinary Sciences with 1180 (7.5%) publications, Medical Sciences with 830 (5.3%) publications, Earth and Environmental Sciences with 190 (1.2%) publications and

Mathematical Sciences with 190 (1.2%) publications. Figure- 4 provides subject-wise distribution of publications and Table-3 provides subject-wise distribution of publications and citations. Table-4 provides the distribution of publications and citations of top five countries in various subject areas.

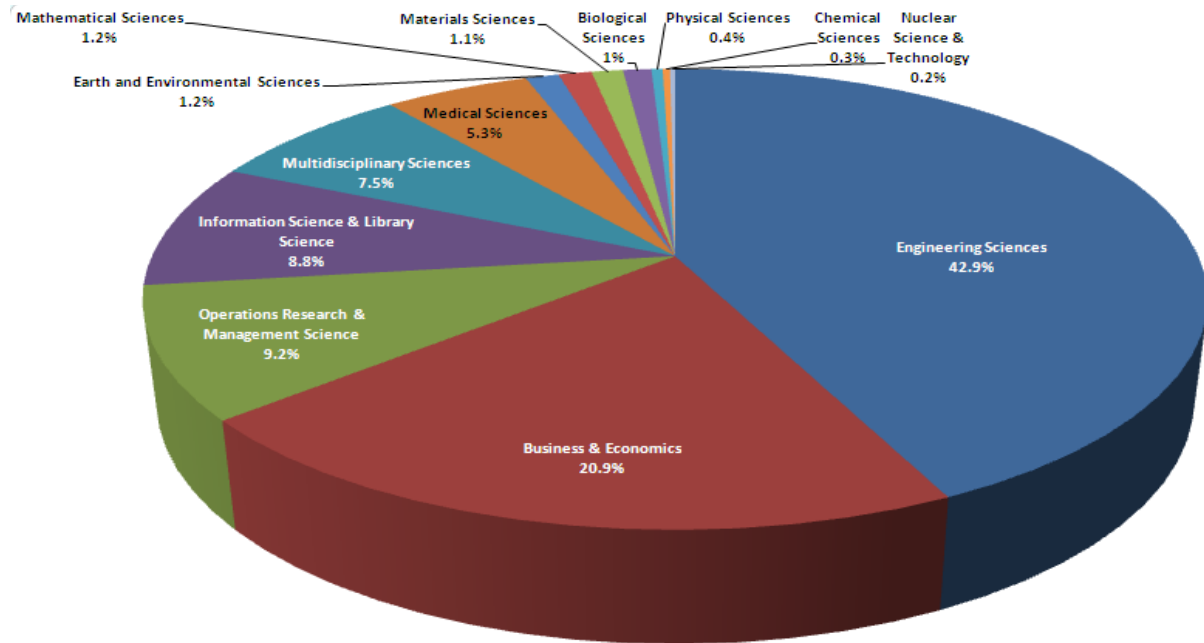


Figure 4: Subject-wise distribution of publications

Table 3: Subject-wise distribution of publications and citations

SN	Subject	No. of Publications	% of Publications	No. of Citations	% of Citations
1	Engineering Sciences	6724	42.9	20733	47.55
2	Business & Economics	3275	20.9	5751	13.19
3	Operations Research & Management Science	1449	9.2	5948	13.64
4	Information Science & Library Science	1375	8.8	4427	10.15
5	Multidisciplinary Sciences	1180	7.5	1245	2.86
6	Medical Sciences	830	5.3	2965	6.8
7	Earth and Environmental Sciences	190	1.2	829	1.9
8	Mathematical Sciences	190	1.2	518	1.19
9	Materials Sciences	179	1.1	71	0.16
10	Biological Sciences	171	1.1	961	2.2
11	Physical Sciences	64	0.4	68	0.16
12	Chemical Sciences	42	0.3	82	0.19
13	Nuclear Science & Technology	29	0.2	3	0.01

Table 4: Distribution of publications and citations of top five countries in various subject areas

Subject	Country	TP	TC	ACP
Engineering Sciences [42.9%]	Peoples R China	1507	2398	1.6
	USA	760	5735	7.5
	Taiwan	471	3929	8.3
	Germany	392	1015	2.6
	England	378	1767	4.7
Business & Economics [20.9%]	Peoples R China	752	441	0.6
	USA	255	2777	10.9
	England	199	347	1.7
	Malaysia	189	31	0.2
	Romania	167	26	0.2
Operations Research & Management Science [9.2%]	Peoples R China	493	1018	2.1
	USA	165	1677	10.2
	Taiwan	150	1637	10.9
	England	98	431	4.4
	Germany	52	34	0.7
Information Science & Library Science [8.8%]	USA	175	1939	11.1
	England	124	284	2.3
	Peoples R China	100	347	3.5
	Malaysia	85	24	0.3
	Germany	68	218	3.2
Multidisciplinary Sciences [7.5%]	Peoples R China	292	76	0.3
	Romania	73	8	0.1
	Italy	66	375	5.7
	Spain	62	65	1
	Germany	58	62	1.1
Medical Sciences [5.3%]	USA	155	1331	8.6
	England	78	560	7.2
	Spain	61	246	4
	Canada	55	535	9.7
	Germany	48	198	4.1
Earth and Environmental Sciences [1.2%]	Peoples R China	33	8	0.2
	USA	26	210	8.1
	England	24	248	10.3

	Germany	19	152	8
	Spain	19	101	5.3
Mathematical Sciences [1.2%]	Peoples R China	60	13	0.2
	USA	23	171	7.4
	England	11	88	8
	Germany	9	34	3.8
	Taiwan	15	47	3.1
Material Sciences [1.1%]	Peoples R China	95	27	0.3
	Taiwan	11	2	0.2
	Romania	10	2	0.2
	USA	7	7	1
	Poland	6	10	1.7
Biological Sciences [1.1%]	USA	28	316	11.29
	Germany	22	202	9.18
	Italy	19	110	5.79
	England	18	344	19.11
	Peoples R China	15	13	0.87
Physical Sciences [0.4%]	Peoples R China	17	2	0.1
	Spain	8	3	0.4
	USA	5	0	0
	Taiwan	4	0	0
	Malaysia	4	0	0
Chemical Sciences [0.3%]	USA	8	0	0
	Spain	5	11	2.2
	Germany	4	0	0
	France	2	44	22
	England	2	13	6.5
Nuclear Science & Technology [0.2%]	USA	4	1	0.3
	Germany	6	0	0
	Japan	6	1	0.2
	Netherlands	2	0	0

TP=Total publications, TC=Total number of citations, ACP=Average citations per publication

4.5. *Highly Productive Institutes*

Wuhan University Science & Technology, Peoples Republic China with published highest 75 number of publications which received 19 citations followed by Hong

Kong Polytechnic University, Peoples Republic China with 71 publications received 555 citations, Wuhan University, Peoples Republic China with 68 publications received 32 citations, National Cheng Kung University, Taiwan with 58 publications received 483 citations.

Table 5: Highly productive institutions (≥ 25 publications) in *knowledge management* research

Rank by TP	Institutes	TP	TC	ACP
1	Wuhan University Science & Technology, Peoples Republic of China	75	19	0.25
2	Hong Kong Polytechnic University, Peoples Republic of China	71	555	7.82
2	Wuhan University, Peoples Republic of China	68	32	0.47
4	National Cheng Kung University, Taiwan	58	483	8.33
5	Acad Econ Studies, Romania	56	10	0.18
6	Bei Hang University, Peoples Republic of China	53	108	2.04
6	Harbin Institute of Technology, Peoples Republic of China	53	60	1.13
7	Chinese Academy of Sciences, Peoples Republic of China	48	289	6.02
7	Islamic Azad University, Iran	48	29	0.60
7	University Teknol MARA, Malaysia	48	6	0.13
8	City University Hong Kong, Peoples Republic of China	46	485	10.54
8	University Loughborough, England	46	246	5.35
8	Zhejiang University, Peoples Republic of China	46	55	1.20
9	Multimedia University, Malaysia	42	51	1.21
10	S China University Technology, Peoples Republic of China	41	41	1.00
10	Shanghai Jiao Tong University, Peoples Republic of China	41	199	4.85
11	Beijing Jiaotong University, Peoples Republic of China	40	42	1.05
12	Dalian University Technology, Peoples Republic of China	39	15	0.38
13	National Chiao Tung University, Taiwan	36	527	14.64
14	Tampere University Technology, Finland	35	10	0.29
15	University Hradec Kralove, Czech Republic	34	42	1.24
16	University Carlos III Madrid, Spain	33	233	7.06
17	National University Singapore, Singapore	32	275	8.59
17	University Teknology Malaysia, Malaysia	32	82	2.56
18	National Tsing Hua University, Taiwan	31	275	8.87
19	Tsinghua University, Peoples Republic of	30	84	2.80

Rank by TP	Institutes	TP	TC	ACP
China				
19	University Putra Malaysia, Malaysia	30	7	0.23
20	University Manchester, England	29	177	6.10
21	University Politecn Madrid, Spain	28	53	1.89
22	National Taiwan University, Taiwan	27	133	4.93
23	Renmin University China, Peoples Republic of China	27	32	1.19
24	Rhein Westfal TH Aachen, Germany	25	47	1.88
24	University Calabria, Italy	25	393	15.72

(TP= Total Publications, TC= Total Citations, ACP= Average Citations per Publications)

4.6. Highly Cited Publications

The number of citations to a specific publication is thus a rough measure of the importance or usefulness of the publications within the scientific community. The highly cited nine knowledge management publications which have got more than 100 citations during the period are listed in Table 6. Note that such lists actually imply no real ranking because of various publications accumulated their citations over different time periods. Table 6 provides the highly cited publications which have received more than 100 citations. Figure 5 provides the citation life cycle of the highly cited publications. This publication was published in 2006. This paper attracted citations in the same year of its publication which shows that how hot is this paper. The highest citations (54) were received in 2009. This paper has received a total 297 citations of science it's published in 2006 and continue to receive citations. This paper has 460 citing authors, total 20.9% citing by self and 79.1% citing by others.

Table 6 : Highly cited publications which have received more than 100 citations in *knowledge management* research

S. No.	Paper Bibliographic Details of Cited Publications	TC	S C	CB O	FC Y	CT L	CA
1	Leone, N; Pfeifer, G; Faber, W; Eiter, T; Gottlob, G; Perri, S; Scarcello, F. The DLV system for knowledge representation and reasoning. <i>ACM Transactions on Computational LOGIC</i> . (2006). Vol. 7: pp.499-562	297	62	235	2006	0	460
2	Wu, JH and Wang, YM. Measuring KMS success: A respecification of the DeLone and McLean's model. <i>Information & Management</i> . (2006). Vol. 43: pp.728-739	85	0	85	2007	1	179
3	Kulkarni, UR; Ravindran, S and Freeze, R. A knowledge management success model: Theoretical development and empirical validation. <i>Journal of Management Information Systems</i> .	75	0	75	2008	2	164

	(2006). Vol. 23: pp.309-347						
4	Uren, V; Cimiano, P; Iria, J; Handschuh, S; Vargas-Vera, M; Motta, E; Ciravegna, F. Semantic annotation for knowledge management: Requirements and a survey of the state of the art. <i>Journal of Web Semantics</i> . (2006). Vol. 4: pp.14-28	108	5	103	2006	0	293
5	Rowley, J. The wisdom hierarchy: representations of the DIKW hierarchy. <i>Journal of Information Science</i> . (2007). Vol. 33: pp.163-180	71	0	71	2008	1	181
6	Leonardi, PM. When Flexible Routines Meet Flexible Technologies: Affordance, Constraint, and the Imbrication of Human and Material Agencies. <i>MIS Quarterly</i> . (2011). Vol. 35: pp.147-167	49	1	48	2012	1	121
7	Wu, WW. Choosing knowledge management strategies by using a combined ANP and DEMATEL approach. <i>Expert Systems With Applications</i> . (2008). Vol. 35: pp.828-835	92	3	89	2008	0	193
8	Fosfuri, A and Tribo, JA. Exploring the antecedents of potential absorptive capacity and its impact on innovation performance. <i>OMEGA-International Journal of Management Science</i> . (2008). Vol. 36: pp.173-187	35	0	35	2008	0	97
9	Huang, CY; Shyu, JZ and Tzeng, GH. Reconfiguring the innovation policy portfolios for Taiwan's SIP Mall industry. <i>Technovation</i> . (2007). Vol. 27: pp.744-765	93	47	46	2007	0	175

(TC= Total Citations, SC = Self- citations, CBO = Citations by others, FCY = First Citation Year, CTL = Citation Time-lag, CA = Number of Citing Authors)

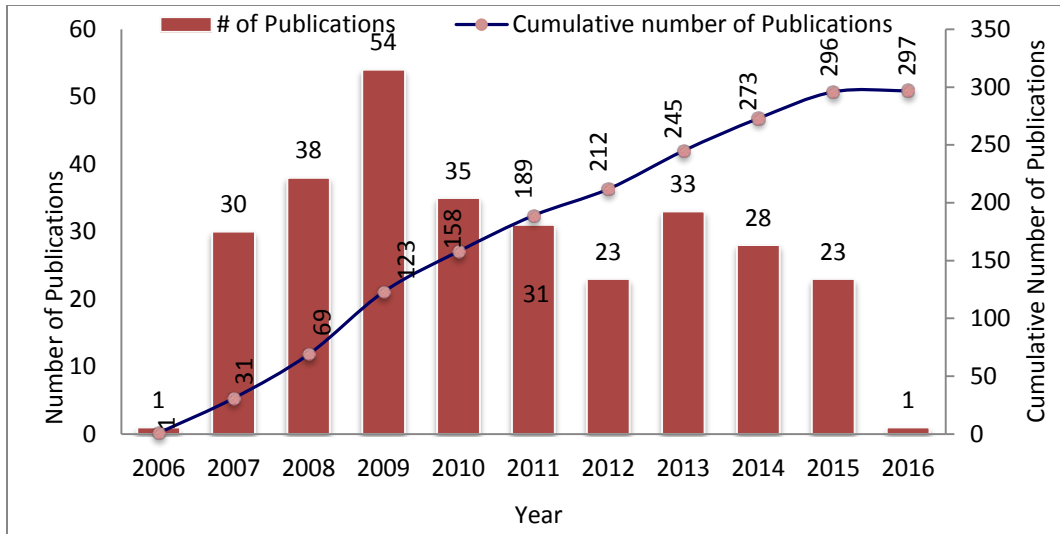


Figure 5: Citation Life Cycle of Highly Cited publication

Leone, N; Pfeifer, G; Faber, W; Eiter, T; Gottlob, G; Perri, S; Scarcello, F. The DLV system for knowledge representation and reasoning. *ACM Transactions on Computational LOGIC*. (2006). Vol. 7: pp.499-562

4.7. Channels of Communication

The distribution of *knowledge management* related publications were spread over 6766 (67.72%) in conference which received 8.91% citations, 2908 (29.11%) published journal articles received 90.91% citations and only 317 (3.17%) published in book form and received 48 citations.

4.8. Journals Preferred for Publication by the Scientists

The distribution of *knowledge management* related publications were spread over 754 journals across the world. The leading journals preferred by the scientists were: *Expert Systems with Applications* with 154 publications, *International Journal of Technology Management* with 80 publications, *Decision Support Systems* 72 *Industrial Management & Data Systems* with 55 and the *Information & Management* with 45 publications [Table 7] provides the highly preferred journals by the scientists for publications in the field of knowledge management. Out of 9991 publications, 6766 (67.72%) publications were published in the Conference and received 2316 (8.91%) citations with 0.34 average citation per publications, 2908 (29.11%) received 23629 (90.91%) citations with 8.13 average citation per publications.

Table 7: Highly preferred journals by the scientists for publications (≥ 10 publications)

Journals	TP	TC
<i>Expert Systems With Applications</i>	154	1941
<i>International Journal of Technology Management</i>	80	292
<i>Decision Support Systems</i>	72	998
<i>Industrial Management & Data Systems</i>	55	643
<i>Information & Management</i>	45	785

Journals	TP	TC
<i>International Journal of Production Research</i>	44	362
<i>Journal of the American Society for Information Science and Technology</i>	44	302
<i>Knowledge-Based Systems</i>	44	367
<i>Online Information Review</i>	42	197
<i>Journal of Universal Computer Science</i>	37	135
<i>Kybernetes</i>	36	82
<i>Journal of Information Science</i>	32	558
<i>Journal of Computer Information Systems</i>	30	136
<i>Computers in Industry</i>	28	427
<i>ASLIB Proceedings</i>	25	73
<i>Journal of Management Information Systems</i>	25	585
<i>Automation in Construction</i>	24	251
<i>Technovation</i>	24	534
<i>Behaviour & Information Technology</i>	23	160
<i>Information Systems Frontiers</i>	23	111
<i>Information and Software Technology</i>	22	206
<i>International Journal of Production Economics</i>	21	157
<i>International Journal of Software Engineering and Knowledge Engineering</i>	20	37
<i>Information Sciences</i>	19	290
<i>International Journal of Advanced Manufacturing Technology</i>	19	101
<i>International Journal of Computer Integrated Manufacturing</i>	19	71
<i>Journal of Biomedical Informatics</i>	19	226
<i>Journal of the Operational Research Society</i>	19	49
<i>MIS Quarterly</i>	19	653
<i>Information Systems Management</i>	18	104
<i>Journal of Management in Engineering</i>	18	140
<i>Cybernetics and Systems</i>	17	37
<i>European Journal of Information Systems</i>	17	182
<i>Journal of Intelligent Manufacturing</i>	17	141
<i>Journal of the Association for Information Systems</i>	17	126
<i>IEEE Transactions on Engineering Management</i>	16	169
<i>Life Science Journal-Acta Zhengzhou University Overseas Edition</i>	16	0
<i>IEEE Transactions on Knowledge and Data Engineering</i>	15	106
<i>Journal of Construction Engineering and Management-ASCE</i>	15	166
<i>Journal of Strategic Information Systems</i>	15	185
<i>Proceedings of the European Conference on Intellectual Capital</i>	15	1
<i>Research in Engineering Design</i>	15	191

Journals	TP	TC
<i>Computers & Education</i>	14	183
<i>Scientometrics</i>	14	60
<i>Advanced Engineering Informatics</i>	13	136
<i>Information Processing & Management</i>	13	120
<i>Journal of Engineering and Technology Management</i>	13	220
<i>Journal of Information Technology</i>	13	140
<i>EMJ-Engineering Management Journal</i>	12	46
<i>International Journal of Information Technology & Decision Making</i>	12	37
<i>Journal of Database Management</i>	12	134
<i>Knowledge and Information Systems</i>	12	134
<i>Program-Electronic Library and Information Systems</i>	12	16
<i>Concurrent Engineering-Research and Applications</i>	11	34
<i>Engineering Applications of Artificial Intelligence</i>	11	105
<i>Interciencia</i>	11	36
<i>Internet Research</i>	11	70
<i>Journal of Organizational Computing and Electronic Commerce</i>	11	53
<i>Journal of Systems and Software</i>	11	107
<i>Production Planning & Control</i>	11	45
<i>ASLIB Journal of Information Management</i>	10	5
<i>BMC Medical Informatics and Decision Making</i>	10	93
<i>Computer Supported Cooperative Work-The Journal of Collaborative Computing</i>	10	34
<i>Computer-Aided Design</i>	10	246
<i>European Journal of Operational Research</i>	10	168
<i>Metalurgia International</i>	10	3

TP= total number of publications, TC= Total number of citations

5. CONCLUSION

A total of 9991 publications were published by the scientists in Knowledge Management as per *WoS* during 2006–2015 which received 25993 citations. The average number of publications per year was 991.1. The average number of citations per publication was 2.60. The highest number of publications (13396) was published in 2008. The highest number of citations (3368) was received in 2009. A total of 112 countries involved in research on *knowledge management*. People's Republic of China topped the list with 2011 publications 1.3 ACP followed by the USA with 1002 publications and 7.6 ACP, England with 585 publications and 4.9 ACP, Germany with 532 publications and 2.7 ACP, Taiwan with 522 publications and 7.8 ACP, Spain with 465 publications and 3.4 ACP, Italy with 391 publications and 3.4 ACP, France with 360 publications and 3.2 ACP. The highest number of publications was published in Engineering Sciences followed by the Business & Economics, Operations Research & Management Science, Information Science & Library Science, Multidisciplinary Sciences, Medical, Earth and Environmental and Mathematical Sciences. The highly productive institutions were: Wuhan University Science & Technology, Peoples R China with 75 publications received

19 citations followed by Hong Kong Polytech University, Peoples R China with 71 publications received 555 citations and Wuhan University, Peoples R China with 68 publications received 32 citations.

REFERENCES

1. "Knowledge: definition of knowledge in Oxford dictionary (American English) (US)". *oxforddictionaries.com*.
2. Cavell, S. "Knowing and Acknowledging", Must We Mean What We Say? (Cambridge University Press, 2002), pp. 238–266.
3. Davenport, T. H. 1994. "Saving IT's Soul: Human Centered Information Management". *Harvard Business Review* 72 (2) pp. 119–131.
4. "Introduction to Knowledge Management". www.unc.edu. University of North Carolina at Chapel Hill. Archived from the original on March 19, 2007. Retrieved 11 September 2014.
5. Nonaka, I. 1991. "The knowledge creating company". *Harvard Business Review*. 69 (6) pp. 96–104.
6. Nonaka, I. and Von Krogh, G. 2009. Tacit Knowledge and Knowledge Conversion: Controversy and Advancement in Organizational Knowledge Creation Theory. *Organization Science*. 20 (3) pp. 635–652. doi:10.1287/orsc.1080.0412.
7. Bellinger, G. "Mental Model Musings". Systems Thinking Blog. Retrieved 18 April 2013.
8. Addicot, R. , McGivern, G. and Ferlie, E. 2006. Networks, Organizational Learning and Knowledge Management: NHS Cancer Networks. *Public Money & Management*. 26 (2) pp. 87–94. doi:10.1111/j.1467-9302.2006.00506.x.
9. Narin, F. 2005. Evaluative Bibliometrics : The Use of Publication and Citation Analysis in the Evaluation of Scientific Activity. New Jersey: Computer Horizons Inc.; 1976.
10. Chidambaram, R. 2005. Measures of progress in science and technology. *Current Science*. 88 pp. 856–860.
11. Yinian Gu. 2004. Global knowledge management research: A bibliometric analysis. *Scientometrics*. 61 (2), pp. 171-190.

12. Serenko, A. and Bontis, N. 2004. Meta-Review of Knowledge Management and Intellectual Capital Literature: Citation Impact and Research Productivity Rankings. *Knowledge and Process Management*. 11 (3), pp. 185–198.
13. Surulinathi, M., Amsaveni, N., Maheswaran, K. and, Srinivasaraghavan, S. 2009. Scientometric Dimensions of Knowledge Management Research in India: A Study based on Scopus database. *Sri Lankan Journal of Librarianship and Information Management*, 2 (2) pp. 13-24.
14. Kumar, A. and Mohindra, R. 2015. Bibliometric Analysis on Knowledge Management Research, *International Journal of Information Dissemination and Technology*. 5(2) pp. 106-113.
15. Kademani, B. S., Kumar, V., Surwase, G. Sagar, A., Mohan, Gaderao, C. R., Kumar, A., Kalyane, V. L. and Prakasan, E. R. 2005. Scientometric Dimensions of Innovation Communication Productivity of the Chemistry Division at Bhabha Atomic Research Centre. *Malaysian Journal of Library and Information Science*. 10 (1), pp. 65-89.
16. Kademani, B. S., Kumar, V., Sagar, A. and Kumar, A. 2006. World literature on thorium research: A scientometric study based on Science Citation Index. *Scientometrics*. 69, pp. 347-364.
17. Kademani, B. S., Surwase, G., Kumar, V. and Kumar, V. 2007. Raman spectroscopy research: a scientometric perspective. *Pearl: A Journal of Library and Information Science*, 1 (4), pp. 46-66.
18. Kademani, B. S., Gaderao, C. R., Surwase, G., Sanhotra, A., Kumar A. and Kumar, V. 2007. Scientometric Profile and Publication Productivity of the Radiochemistry Division at Bhabha Atomic Research Centre. *SRELS Journal of Information Management*. 44(2), pp. 99-124.
19. Sagar, A., Kademani, B. S. and Kumar, V. 2009. Research trends in neutron activation analysis in nuclear science and technology: A global perspective. *International Journal of Low Radiation*. 6 pp. 119-46.
20. Kademani, B. S., Surwase, G., Mohan, L., Mohan, L. and Kumar, V. 2009. Bhabha Scattering: a scientometric view. *DESIDOC Journal of Library & Information Technology*, 29 (4), pp. 3-11.
21. Sagar, A., Kademani, B. S., Garg, R. G. and Kumar, V. 2010. Research trends in cobalt-60 in nuclear science and technology. *International Journal of Nuclear Knowledge Management*. 4 pp. 146-64.
22. Mohan, L., Prakasan, E. R., Kademani, B. S., Kademani, B. S., Surwase, G., Kumar, A. and Kumar, V. 2010. Research trends in Nano science and

- nanotechnology in India. *DESIDOC Journal of Library & Information Technology*, 30 (2), pp. 40-58.
23. Kademani, B. S., Prakasan, E. R., Sagar, A., Sagar, A., Mohan, L., Kumar, A. and Bhaskar, N. 2011. Research trends in fusion engineering: a global perspective. *International Journal of Nuclear Knowledge Management*, 5 (4), pp. 307-333.
 24. Kademani, B. S., Surwase, G., Sagar, A., Sagar, A., Mohan, L. and Bhanumurthy, K. 2013. Research trends in radioactive waste management: a global perspective. *International Journal of Low Radiation*, 9 (1), pp. 59-94.
 25. Surwase, G., Mohan, L., Kademani, B. S., Kademani, B. S. and Bhanumurthy, K. 2014. Research Trends on Food Preservation: A Scientometric Analysis. *DESIDOC Journal of Library & Information Technology*, 34 (3), pp. 257-264.
 26. Prakasan, E. R., Mohan, L., Girap, P., Girap, P., Surwase, G. and Kademani, B. S. 2014. Scientometric facts on international collaborative Indian publications. *Current Science*, 106 (2), pp. 166-169.
 27. Surwase, G., Mohan, L., Kademani, B. S., Kademani, B. S. and Bhanumurthy, K. 2014. Molten salts in nuclear science and technology: a scientometric perspective. *International Journal of Nuclear Knowledge Management*, 6 (3), pp. 183-198.
 28. Subramanyam, K. 1983. Bibliometric studies of research collaboration: A review. *Journal of Information Science*. 6, pp. 33-38.

Transfer of Journals Published By Societies to Commercial Publishers: Changes Observed

E.R. Prakasan¹, Ganesh Surwase², N.K. Mishra³, Saroj Sharma⁴, T. Swarna⁵ and G. Ravi Kumar⁶
¹*prak@barc.gov.in*

Scientific Information Resource Division, Knowledge Management Group,
Bhabha Atomic Research Centre, Mumbai, India

ABSTRACT

There is a constant transfer of journals from Learned Societies to commercial publishers and vice versa. This transfer may include transfer of full or partial rights of publishing, marketing rights, etc. Changes in publishing pattern of journals can be expected in terms of subscription models, authorship patterns, frequency, number of contributing articles, editorial boards, quality etc. The present study is aimed to note the changes that occurred in ten Indian Society journals before and after the transfer to Springer-India in terms of few parameters. It was observed that there was an increase in number of articles published, this included an increase in the number of articles published from India and abroad. There was no appreciable change in the members of editorial boards from India and abroad; and the frequency of most of the journals remained almost same even after the 5th year of transfer. However subscription models have changed which affected the subscription costs. The number of citations did not show any specific trend.

Keywords: Journal Publishers, Society Journals, Publisher Change, Subscription Cost, Editorial Board, Frequency of Publishing, Authorship Pattern, Citations

0. INTRODUCTION

Many of the journals published by learned societies transfer the rights to publish the journals to commercial publishers. The contract between the publishing Society and the publisher mainly pertains to copyright of the content; the journal title; the cover and internal design; the physical stock; the electronic files (both the underlying content, and the specific formatting/tagging); editorial work in progress; subscriptions or other payments not yet earned; the non-member (personal and institutional) subscriber list; the list of those entitled to gratis copies; and the member subscriber list - and what should happen on transfer including how any valuations for the above items will be determined [ALPSP, 2009].

Effective editorial management, visibility and wide circulation are being stated as the reasons for such transfers by societies. Assuming that the journals taken over by commercial publishers gain good editorial management, increased visibility and wide circulation, it would be interesting to study the in journals in terms of:

- nature of contributing authors
- subscription cost
- frequency of publishing
- editorial board
- quality of articles

Most of the Societies insist on retaining control of several key aspects of their journal including: editorial policies and selection, design and branding, page budgets and editorial costs, pricing, and licensing [Robinson, 2011]. Many Society publishers have editorial boards consisting of their own institutional or departmental people which may create inter-dependency among board members. Editorial independence is more in case of commercial publishers than society publishers, which is another advantage of transfer

[Seadle, 2001]. Implications of the transfer on scholars and libraries which subscribe to the journals are [JISC Collections, 2011]:

- Loss of access (temporary or fairly lengthy) to key Society journal contents
- Different pricing model for libraries
- Lack of good communication by publishers with their customers on the changes happened
- Exclusion of number of journals from publishers' deals
- Uncertainty among librarians about access, especially the rights for perpetual access etc.

There are many Indian journals published by various Societies transferred to Springer-India publishers, which was founded in 2002 [Springer, 2010]. The Indian Academy of Sciences (IAS), Bengaluru has transferred maximum number of journals to Springer-India, as compared to any other Society/Institution in India. The IAS was primarily looking for an improvement in the visibility and circulation of the Academy's journals outside India that would in turn improve the quality of the articles submitted both from India and elsewhere.

The present study is an endeavor to study the changes that a journal undergoes with respect to: changes in the editorial board; authorship patterns; number of published articles; subscription cost; periodicity of the journal; and the impact as indicated by the number of citations.

1. MATERIALS AND METHODS

Springer website lists the journals that Springer is publishing in partnership with various Societies in India. Ten journals are randomly selected for the study (6 from Indian Academy of Sciences; 4 other Societies) and the details of the selected journals are given in Table 1.

Web of Science (core collection) of Thomson Reuters and *Scopus* of Elsevier bibliographic databases are used to elicit citations of the articles published in the journals under study. These records are also used for identifying the countries of the contributing authors.

Table 1: Society journals published in partnership with Springer

Journal	Starting Year	Earlier Publisher	Year of Transfer
<i>Bulletin of Materials Science</i>	1979	Indian Academy of Sciences	2007
<i>Indian Journal of Microbiology</i>	1961	Assoc. of Microbiologists of India	2007
<i>Indian Journal of Pediatrics</i>	1933	Dr. K.C. Chaudhuri Foundation	2007
<i>Indian Journal of Surgery</i>	1938	Assoc. of the Surgeons of India	2007
<i>Journal of Biosciences</i>	1979	Indian Academy of Sciences	2007

<i>Journal of Chemical Sciences</i>	1934	Indian Academy of Sciences	2007
<i>Journal of Genetics</i>	1985	Indian Academy of Sciences	2007
<i>Pramana</i>	1973	Indian Academy of Sciences	2007
<i>Sadhana</i>	1978	Indian Academy of Sciences	2009
<i>Trans. of the Indian Institute of Metals</i>	1948	Indian Institute of Metals	2008

2. OBJECTIVES

The objectives of this study is to note the changes in the journals with respect to:

- 1) Editorial board
- 2) Number of articles published
- 3) Authorship pattern
- 4) Subscription costs
- 5) Frequency/periodicity
- 6) Citations received

3. RESULTS AND DISCUSSION

Data collected are analysed based on the objectives of the study and the results are discussed in the following sessions:

3.1 Changes in editorial board

Table 2 indicates the number of editorial members from India and outside India for each of the journals five years before and after the transfer. There is no appreciable change in the composition of the editorial boards.

Table 2: Indian and foreign editorial board members of ten journals before and after the transfer

<i>Journal</i>	Editor	Before 5 years	Before 4 years	Before 3 years	Before 2 years	Before 1 year	Year of Transfer	After 1 year	After 2 years	After 3 years	After 4 years	After 5 years
<i>Bulletin of Materials Science</i>	IN	23	NA	21	21	NA	NA	NA	NA	NA	16	16
	FR	1		0	0						0	0
<i>Indian Journal of Microbiology</i>	IN	NA	33	NA	36	43	43	NA	NA	NA	69	
	FR		9		10	6	5				10	
<i>Indian Journal of Pediatrics</i>	IN/F R	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
<i>Indian Journal of Surgery</i>	IN/F R	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
<i>Journal of Biosciences</i>	IN	NA	NA	NA	44	46	46	46	43	43	NA	NA
	FR				19	19	19	19	17	16		
<i>Journal of Chemical Sciences</i>	IN	NA	NA	19	19	19	19	22	22	22	22	24
	FR			0	0	0	0	0	0	0	0	0
<i>Journal of Genetics</i>	IN	20	20	21	25	25	25	24	24	25	20	20

	FR	9	11	15	19	19	20	10	10	10	10	9
<i>Pramana</i>	IN	22	22	22	23	23	25	25	25	24	28	28
	FR	0	0	0	0	0	0	0	0	0	1	0
<i>Sadhana</i>	IN	20	20	20	20	20	20	20	20	20	26	24
	FR	5	5	5	5	7	6	3	3	3	3	3
<i>Transactions of the Indian Institute of Metals</i>	IN	9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	FR	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

IN-No. of editorial board members from India; FR- No. of editorial board members from outside India;

NA - information not traceable

3.2 Number of articles published

Table 3 is summary of the number of articles published in the ten journals before and after the transfer. There is an appreciable growth in number of articles published in these journals after the transfer had occurred in comparison to before the transfer.

Table 3: Number of articles published before and after the transfer

Journal	Before 3 years	Before 4 years	Before 5 years	Before 7 years	Before 1 year or more	Before Transfer	After 1 year	After 2 years	After 3 years	After 4 years	After 5 years
<i>Bulletin of Materials Science</i>	118	122	86	117	115	96	156	96	112	256	165
<i>Indian Journal of Microbiology</i>	77	57	55	57	60	53	47	52	94	97	124
<i>Indian Journal of Pediatrics</i>	194	202	224	208	219	230	277	270	291	244	291
<i>Indian Journal of Surgery</i>	NA	NA	95	100	99	71	91	96	158	134	118
<i>Journal of Biosciences</i>	80	97	40	89	77	124	84	100	71	100	103
<i>Journal of Chemical Sciences</i>	NA	NA	44	82	73	75	75	126	98	104	158
<i>Journal of Genetics</i>	12	20	37	41	40	38	67	67	79	98	65
<i>Pramana</i>	262	256	304	222	213	254	253	178	223	189	235
<i>Sadhana</i>	48	44	52	46	51	60	52	56	50	79	89
<i>Trans. of the Indian Institute of Metals</i>	78	54	144	80	90	76	95	132	100	115	96

NA – information not traceable

3.3 Authorship pattern

The journal articles are categorized into two viz. a. Local articles (all authors are affiliated to institutions in India) and, b. International articles (at least one author is

affiliated to institution other than India). The publishing pattern of these two categories of articles is given in Table 4. The figures are indicative of increase in number of local and international articles in all journals except in case of *Pramana*.

Table 4: Number of local and international articles published before and after the transfer

Journal	Local articles		International articles	
	Before	After	Before	After
<i>Bulletin of Materials Science</i>	444	457	114	328
<i>Indian Journal of Microbiology</i>	285	292	21	122
<i>Indian Journal of Pediatrics</i>	813	983	234	390
<i>Indian Journal of Surgery</i>	232	483	62	114
<i>Journal of Biosciences</i>	184	220	199	238
<i>Journal of Chemical Sciences</i>	154	378	45	183
<i>Journal of Genetics</i>	59	100	91	276
<i>Pramana</i>	714	569	543	509
<i>Sadhana</i>	159	202	82	124
<i>Trans. of the Indian Institute of Metals</i>	294	368	152	170

3.4 Subscription cost

The subscription cost of the journals is indicated in Table 5. The print version of *Indian Journal of Microbiology* had moved to Springer International (Germany) after the 5th year of transfer from Assoc. of Microbiologists of India to Springer-India and it was available only online. *Trans. of the Indian Institute of Metals* was available only with Springer International (Germany) after the transfer. The subscription model of the two journals have changed in those years from print to online.

Table 5: Subscription cost (in Rs) of journals before and after transfer

Journal	Before 5 years	Before 4 years	Before 3 years	Before 2 years	Before 1 year	Year of Transfer	After 1 year	After 2 years	After 3 years	After 4 years	After 5 years
<i>Bulletin of Materials Science</i>	250	250	250	300	300	300	300	300	400	400	400
<i>Indian Journal of Microbiology</i>	NA	800	800	800	800	3600	4000	3650	4350	4650	€ 259
<i>Indian Journal of Pediatrics</i>	2200	2500	2800	3000	3500	3500	4500	6000	6500	7000	7500
<i>Indian Journal of Surgery</i>	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
<i>Journal of Biosciences</i>	200	200	200	250	250	250	250	250	400	400	400
<i>Journal of Chemical Sciences</i>	NA	NA	250	300	300	300	300	300	400	400	400
<i>Journal of Genetics</i>	200	200	200	250	250	250	250	250	300	300	300

<i>Pramana</i>	300	300	300	500	500	500	500	500	750	750	750
<i>Sadhana</i>	250	300	300	300	300	300	400	400	400	400	400
<i>Trans. of the Indian Institute of Metals</i>	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	€ 620

NA – information not traceable

3.5 Periodicity/Frequency of Publishing

Most of the journals continued publishing with no change in frequency (Figure 1), except in the case of two journals, *Journal of Biosciences* and *Journal of Genetics*, where there is a change in frequency.

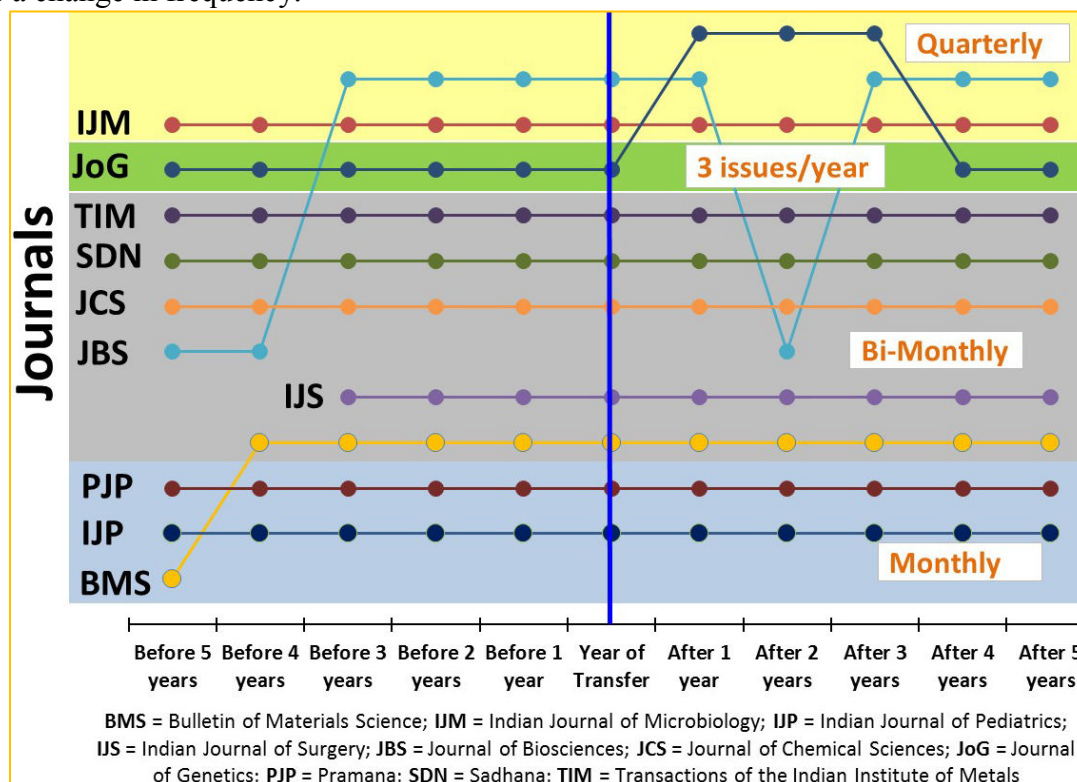


Figure 1: The trend of frequency of publishing of ten journals before and after transfer

3.6 Citations

The study explores number of citations received by the journals under study before and after moving to a commercial publisher on 31 October 2015. The total citations received by the articles published in the ten journals before and after five years of the journal transfer are elicited from *Web of Science* and *Scopus* databases. For Journals which are not covered by *Web of Science* in some years, citations and number of articles published in those years are taken from *Scopus* database. The citations received by the articles are given in Table 6.

Table 6: The trend of citations to articles published before and after the

Journal	Before 5 years	Before 4 years	Before 3 years	Before 2 years	Before 1 year	Year of Transfer	After 1 year	After 2 years	After 3 years	After 4 years	After 5 years
<i>Bulletin of Materials Science</i>	146 3	175 7	111 1	107 0	186 7	127 6	156 9	839	648	107 3	573
<i>Indian Journal of Microbiology</i>	289	220	150	145	106	330	685	285	329	305	388
<i>Indian Journal of Pediatrics</i>	135 8	134 2	194 7	180 0	151 0	144 4	920	798	697	635	507
<i>Indian Journal of Surgery</i>	NA	NA	239	156	129	55	58	56	151	113	118
<i>Journal of Biosciences</i>	184 0	173 1	643	113 1	101 8	224 6	130 0	899	716	621	767
<i>Journal of Chemical Sciences</i>	NA	NA	580	149 3	698	558	969	930	798	502	553
<i>Journal of Genetics</i>	173	330	183	227	376	199	750	495	456	428	226
<i>Pramana</i>	112 9	103 6	131 5	144 9	570	826	877	881	660	469	483
<i>Sadhana</i>	280	252	285	166	186	176	132	228	66	57	12
<i>Trans. of the Indian Institute of Metals</i>	194	260	203	145	130	79	261	177	163	220	74

NA– information not available

4. CONCLUSION

This study has noted definite changes in the journals when transferred to a commercial publisher, although the precise reasons for the changes are not known. In most of the journals the Editorial boards had not changed much in terms of their composition, Indian and Foreign members. There was an appreciable rise in number of articles published after the change to commercial publisher. The number of articles from authors outside India showed an increase in all journals, except in the case of *Pramana*, where there was a slight decrease in contributions from India as well as outside India. The noticeable hike in subscription cost of the journals are found only in case of journals which are moved again to some other commercial publishers. Seven of the ten journals maintained the same periodicity/frequency of publishing before and after the change.

This study was limited to only few journals and that too of only one publisher (Springer). A study covering more Societies and commercial publishers would enable us to study in-depth the logistics of such transfers; the changes in the subscription models and circulation; changes in access links, access platforms, all of which will affect the usage of these journals in one way or the other.

REFERENCES

1. ALPSP (2009) When a society journal changes publisher - ALPSP guidelines for good Practice, ALPSP Advice Note 18, Reviewed 06/01/09, http://www.sparc.arl.org/sites/default/files/presentation_files/When%20a%20society%20journal%20changes%20publisher.pdf
2. Springer (2010) A closer look at Springer's partnership with the Indian Academy of Sciences, Society & Partner Zone Issue 12, Regional Highlights, <http://www.springer.com/gp/partners/society-zone-issues/a-closer-look-at-springer-s-partnership-with-the-indian-academy-of-sciences/4424>
3. Robinson, Andrew (2011) Societies and online journal models, *Serials*, Vol. 24(1), pp. 56-59
4. Seadle, M. (2001) In defense of (some) commercial journals, *Library Hi Tech*, Vol. 19(2), pp. 110-112
5. JISC Collections (2011) Society Publishing: problems resulting from journals transferring between publishers, JISC Collections Report, 2011, <http://www.jisc-collections.ac.uk/Documents/Reports/jrnl%20transfer%20paper.pdf>

Sharing Information Resources in Digital Environment

Suvarna Walimbe

suvarna.walimbe@ionexchange.co.in

Ion Exchange (India) Ltd. Navi Mumbai - 400 701

ABSTRACT

The focus of this article is on advancement in information sharing at Ion Exchange (India) Limited (IEI). It explains the information resources including digital resources & techniques used to share the information embedded in these resources. Knowledge management system (KMS) is a supporting system for sharing the information in this digital era. IEI is a multinational company & therefore the information seekers are dispersed at multiple locations. The latest technologies like library management software, document management software, knowledge website are used for information storage, dissemination & its security. This has made the challenging task very easy with respect to accessibility & ease of use.

Keywords : Knowledge management, document management, knowledge website, document repository, OPAC

1. INTRODUCTION

Ion Exchange (India) Limited (IEI) established in 1964 is a pioneer in water and wastewater treatment in India with a strong global presence. Around 30 years ago, the organisation set-up its central library to cater to the information requirements of the R&D division. Gradually, this library transformed from being a central library to becoming a central knowledge repository and information service provider for IEI, a multi-location and multinational organisation.



2.2. Information and documents repository

Proprietary information of the organisation is collated using various knowledge capturing tools. It covers knowledge developed in-house and acquired from outside (e.g. collaborators). This information is obtained and maintained in 'Knowledge Centre' which acts as an information repository.

Both have a comprehensive and efficient information resource dissemination systems that help us share the information with all employees and clients.

KMS uses effective methods like knowledge audit and interviews with subject experts from various divisions to help capture the tacit knowledge and document it in a proper format through:

- Training modules on various subjects
- Articles, case studies, troubleshooting
- Projects related information - design document, operation and maintenance, marketing information, statistical data, etc.
- Product information – design, process know-how, sales, application guides, brochures, presentations, photographs, installations, operation manuals, test certificates, price lists, etc.

3.TOOLS USED TO LINK PEOPLE AND INFORMATION

To search for the right information from a vast array of information available is a skill. Hence, information retrieval plays a crucial role during information search. Information retrieval is the technique of storing, recovering and often disseminating recorded data especially with a computerised system.

3.1. Web based library catalogue

It enables users to search for specific information from the resources available with the help of various advanced search facilities.

After locating the information resource, the user sends a request to the knowledge centre. Knowledge centre will send the information to the user by internal courier if it is a hardcopy or by e-mail if available in a softcopy format.

3.2. Knowledge website

IEI knowledge portal launched in 2004, shares vital information to geographically dispersed employees and their clients.

The website gives exhaustive information about

- Products and services of IEI
- Answers to FAQs on various technologies used in the field of water and wastewater treatment
- Solutions to total water management in all the industrial sectors

A separate section is accessible only by employees and gives the information which is useful for all new entrants as well as various team members of IEI in design, sales, marketing, erection, commissioning, maintenance, etc.

Information covered:

- Training modules
- Case studies, troubleshooting and articles authored by employees
- Business newsletters
- Technology updates

- Virtual library – online magazines
- Manuals/guides for equipment design, sales, installations, operation and maintenance, etc.

An interactive section of knowledge website is '*Ask the Expert*' where the users can seek the help of the subject experts from the organisation for getting the answers to their technical queries. We are also planning a 'discussion forum' on this platform which will have interactions on specific requirements.

Search and navigation of information available on this site is possible with the help of advanced search facility. Each page on the site is indexed manually which helps users to locate the appropriate information conveniently in a short time.

Some of the information is user-specific and access (security, passwords, firewalls, authentication, etc.) is given only when required after approvals from the respective authority.

3.3 Document Management System (DMS)

IEI's major business comes from Engineering Procurement Construction (EPC) projects of water and waste water treatment. Technical documents based information is an essential tool for engineers during project or product development.

DMS has created a very exhaustive database of all the documents which are generated at each stage of a project (starting from an offer to execution as well as operation and maintenance). A user can search and retrieve documents from this database as per their requirement.

The documents also cover archival data which consists of projects from 1975. The documents of that period were scanned and transformed into softcopies & now it is available on the server with proper indexing. Key information related to projects/products is collated and the indexing is done manually. Precise indexing enables the document search using all possible attributes/keywords.

Access is facilitated with proper security, passwords, firewalls and authentications.

User Interface of DMS software is available on each user's PC.

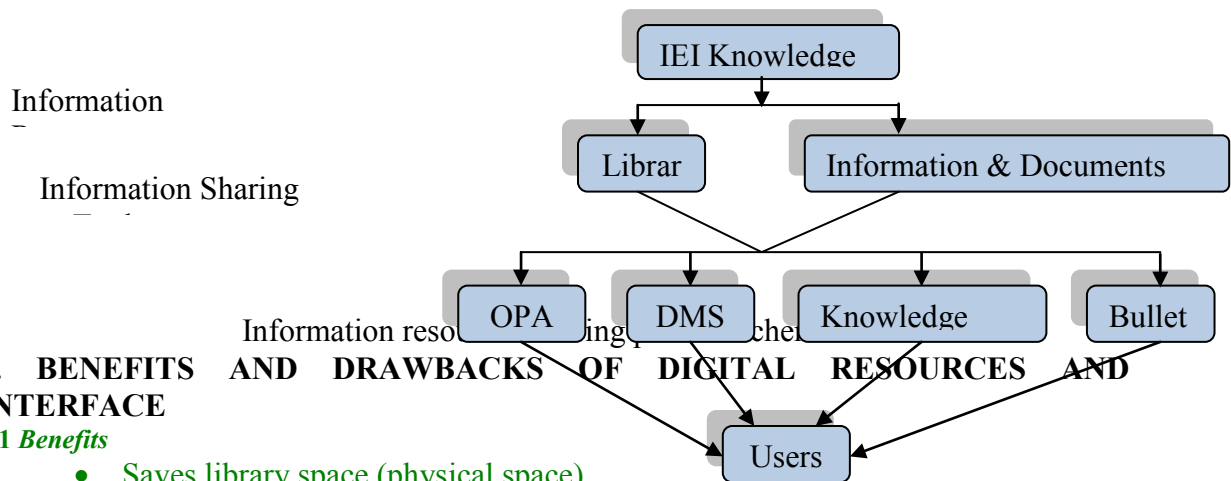
3.4. News bulletins created by Knowledge Centre

- Water Business and Industry News – Covers latest news on current happenings, market information, business opportunities, new technologies and research related to IEI's business. This information is scrutinised by browsing multiple business newspapers, project update newsletters, magazines and various websites
- Technical Update - Provides brief contents of articles published in various journals

The two newsletters mentioned above are sent to the concerned people through e-mail as well as made available on knowledge website.

4. CREATING USER AWARENESS

- Knowledge website alert bulletin informs what is new on the website
- E-mailers about 'New arrivals in library'
- E-mailers pertaining to specific areas of business which inform users about what is available on the knowledge website
- Induction trainings
- Knowledge website, OPAC and DMS user training



5. BENEFITS AND DRAWBACKS OF DIGITAL RESOURCES AND INTERFACE

5.1 Benefits

- Saves library space (physical space)
- Can provide information immediately without delays
- Easy information dissemination
- Employees can share the information available through discussion forums on website
- Allows collaboration and exchange of ideas through facilities like 'Ask the Expert'
- Rich search options and rapid full-text search
- Integrated search of all document formats, repositories and data types
- Multiple accesses (accessed by more than one individual)
- Better leverage of individual search
- 24x7 access
- Ability to track usage
- Cost effective
- Avoids human dependence of information sharing and collaboration
- Preserves documents in original form
- Ensures security and safety of documents (allowing recovery from physical damage or loss of documents)
- Creates the policy for archiving old documents

5.2 Limitations

- Virtual library/knowledge website can face issues such as virus attack
- Websites can face problems from site hackers
- All users may not have access to computers
- Discontinuity in server connectivity causes accessibility interruption
- Fast changing technologies make the current hardware and software obsolete in a short period
- Cost of content refreshing - Digital preservation is an ongoing operation requiring considerable recurring expense
- Data security - It is very easy to copy, replicate and distribute digital information. Enforcing copyright in digital environment is a major issue
- Network bandwidth - With the increasing number of users, multi-media content, web sites, bandwidth available for accessing digital libraries is going to be a serious issue

6. WAY AHEAD

Any business organization has to keep pace with advancements to sustain or grow in the market. So our next plan is to make the information available in hands of people through mobile phone applications & we have already started working on it.

7. CONCLUSION

Knowledge managers who have worked in a period when the digital resources were unavailable or just new, will certainly feel the vast difference in the availability of resources, ease in sharing, its effect on providing quality information services and also with regards to the cost of maintaining the libraries as well as knowledge centres. It has certainly given us an opportunity to cater to our customers in a technology driven approach.

Acquire to Access E- Resources through Consortia in Management Science Institutions: A Study

J.Shivarama¹, Sheela.V² and Akhilesh Kumar Sankhwar³

¹*shivaramatoo32@gmail.com*

³*akhilesh.sankhwar@tiss.edu*

Tata Institute of Social Sciences, Mumbai – 400088

²*she579@gmail.com*

Karnataka State Open University, Mysore-570 006

ABSTRACT

Information is considered as a vital resource for communication/ dissemination of knowledge of one individual to another from the very early stage of human civilization to till today and thereby has become an inevitable element of all human activities and developments. Generally, the concept of 'Library Co-operation' emerged for rendering better services to users' community through borrowing & Lending of documents in formal way. 'Library Resources' is the term that implies to personnel, material, functions or activities available in a library for satisfying the user needs & demands to acquire their desired knowledge. Library co-operation is a very old concept and a form of resource sharing. The new object of resource sharing has changed the old concept due to multi-dimensional growth of published documents through R&D activities in recent past, cost of the information, advancement of newly invented technologies for information processing and dissemination, etc. Present day consortia are metamorphosed through several forms, such as Inter library loan or library cooperation or resource sharing from, time immemorial, with an aim to provide better services to their user community through electronic gadgets.

Libraries are the service-oriented organizations. The main aim of every library is not only to fulfill the needs of the users but also to fulfill their demands. The libraries should always aim at providing quality services with the available resources. With the advent of Internet and World Wide Web (WWW) popularly known as web provides tremendous opportunities for both publishers and library professionals to provide variety of services to users' community.

In view of the above it is necessary to understand the existing best practices in e-resources sharing and participate in consortia based activities for better exchange of resources between and among the management institutions. Therefore the above study was proposed to understand the state-of-the-art e-resource sharing, networking and consortia activities.

Keywords: E-Resource Sharing, Consortia, Management Science.

1. INTRODUCTION:

Information is considered as a vital resource for communication/ dissemination of knowledge of one individual to another from the very early stage of human civilization to till today and thereby has become an inevitable element of all human activities and developments. The rapid progress of information technology through R & D activities all over the world now tries to satisfy the information need of the human being in diverse manner. The explosion of information, in multidimensional form and voluminous development has urged the libraries to adopt new philosophies and technologies for collection development and reduce the costs of information. Today, most of the librarians are faced with economic problems, especially in developing countries to collect all the new generated information and to satisfy the high degree of aspiration for knowledge of the users. The main task of a librarian is to adjust the input resources with the desired output by adopting various alternatives for taking effective decisions and extending the services smoothly. As the information demand of the user to a greater extent is beyond the control of the capacity of librarians much of the exercise rests on the input resources.

Consortium is now a common term in the information field, which denotes sharing of library materials, man power and money. The term was developed out of the age-old concept of library cooperation. Basically, consortia mean group of libraries come together with common interest to form consortium. One of the libraries or agencies works as coordinator for identification of libraries for each publisher, negotiation, legal matters etc. The aim of consortia is to achieve what the members of the group cannot achieve individually. In addition to an increasing number of consortia, there are now Consortia of consortia. Providing ever-widening circles of collaborative possibilities and projects. An example of this is The Albert Library.

2. VIRTUAL LIBRARY CONSORTIA IN INDIA

The tremendous information revolution and proliferation have brought about drastic changes to the function and service in all types of libraries in India during last two decades. Many libraries in India till today are not in a position to afford to procure all documents and subscribe to core journals in major disciplines or CD-ROM databases, due to their financial crunch. As a result, in India, library networks started with the initiatives of NISSAT in forming CALIBNET in 1986, DELNET in 1988 and other networks subsequently to promote resource sharing among libraries. The UGC (University Grant Commission, India) setup INFLIBNET in 1988. There are many libraries in India have setup consortia among themselves for resource sharing e.g. Astronomy libraries in India. These libraries jointly formed consortia for resource sharing amongst the libraries, such as, Indian Institute of Astrophysics (IIA) Library, Inter-university Centre for Astronomy and Astrophysics (IUCAA) Library, National Centre for Radio Astrophysics (NCRA) Library, Nizamiah Observatory (NO) Library, Physical Research Laboratory (PRL) Library, Raman Research Institute (RRI) Library, Tata Institute of Fundamental Research (TIFR) Library, Uttar Pradesh State Observatory (UPSO) Library. The main objectives of these consortia are for better resource sharing, to reduce information costs, for speedy delivery of documents, to keep abreast of new developments etc. All the libraries in India are not able to come under any consortia system and more information generated by Indian scholars in different subject fields is

not fully represented in the international scenario. That is why, there is a necessity to prepare Indian databases and link them up with consortium activities. Also, no efforts have been made in India to network public libraries. Networking is very much essential in this sector to cater to information need of the general public, where more than 70% of the total people are residing in rural areas. Much emphasis should be given at the national level in India for the development of documentary information resources, because it is considered as vital resources to promote the development of economy, science, technology and culture etc.

3. ADVANTAGES OF VIRTUAL LIBRARY CONSORTIA

- ❖ Access to collections by the College library users.
- ❖ Streamlining the Inter Library Loan
- ❖ Effective collection developments.
- ❖ Access to print, electronic resources of wide range databases.
- ❖ Utilization of rare collections.
- ❖ Preparation of Union Catalogues.
- ❖ Provision of bibliographies.
- ❖ Avoid duplication in technical work and collection.
- ❖ Marketing of information services and resources.

Consortium acts as a platform for cooperation of library services among the college libraries. It will also provide value added services and resources to library users.

4. DISADVANTAGES OF VIRTUAL LIBRARY CONSORTIA

Firstly, there is the funding problem entering consortia requires initial investments on licenses and information and communication technology. Here we face the problem that most libraries at the beginning of the year have allocated nearly 100% of their funds to the day to day operations and services which means that there is little scope for decisions during the course of the year for further investments. In the rapid changing environment of electronic publishing this is a very dangerous thing to do. Secondly, libraries are not prepared to cash in the savings offered by not handling the print edition of the journals. Their work procedures are still centered around the physical document; staff are not trained in handling electronic documents etc. therefore, many libraries are reluctant in entering consortia agreements especially where publishers impose payments for off consortia delivery of documents, either in electronic or paper format. Thirdly there will often be investments to be made in local- consortium based central hardware set up, mounting of data, development of interfaces, administration of access etc. however those problems are precisely to be solved not by the single library but in cooperation between the participating libraries.

5. MANAGEMENT SCIENCE EDUCATION: INTERNATIONAL SCENARIO

Management in all business areas and organizational activities are the acts of getting people together to accomplish desired goals and objectives efficiently and effectively. Management comprises planning, organizing, staffing, leading or directing, and controlling an organization (a group of one or more people or entities) or effort for the purpose of accomplishing a goal. Resourcing encompasses the deployment and

manipulation of human resources, financial resources, technological resources, and natural resources, because organizations can be viewed as systems, management can also be defined as human action, including design, to facilitate the production of useful outcomes from a system. This view opens the opportunity to 'manage' oneself, a pre-requisite to attempting to manage others. Management can also refer to the person or people who perform the act(s) of management.

6. LITERATURE REVIEW:

(a) Security Concept in Consortia:

Shiva Kanaujia and Satyanarayana(2004) have discussed the security and data security concepts in the present scenario of library networking. Gives reason to build up a security system and safeguards to secure data in networked libraries. Discusses the methods of ensuring security in information network. Many a new security solutions have been stressed here.

(b) Services of successful consortium:

Jagdish Arora(2004) has elaborated upon services and characteristics of a successful consortium and how the INDEST Consortium fulfils it. The article also elaborates on strategic implementation steps taken by the INDEST consortium to ensure optimal use of electronic resources provided to the member libraries. The article proposes formation of a national consortium around INDEST and UGC-INFONET Consortium involving institutions of higher education and research. As a consortium of libraries, it would bring together various institutions receiving financial support from major Ministries / Departments of Government of India, namely the MHRD, Ministry of Information Technology, Ministry of Science and Technology and its various departments like Department of Biotechnology, Department of Scientific and Industrial Research, Department of Ocean Development and Department of Environment.

7. DATA ANALYSIS AND INTERPRETATION:

Under this sub heading an attempt was made to present the data collected through Questionnaire and same analyzed using MS-Excel package for frequency distribution of the data.

Table :1Opinion About the Electronic journals

Opinion	No. of Respondents	Percentage
Very Useful	9	52
Useful	5	30
Uncertain	3	18
Not Useful	0	0
Not at all useful		0
Total	17	100

From the table 1 it is clear that 82% of the respondents favor the usage of electronic journals and 18 % of them are neutral.

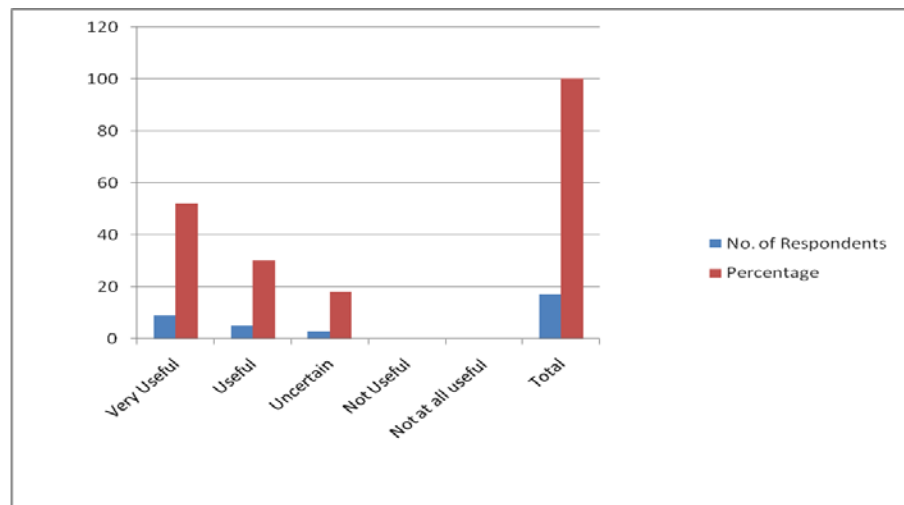


Table: 2 About the Search engines

Opinion	No. of Respondents	Percentage
Very Useful	11	64
Useful	2	12
Uncertain	4	24
Not Useful	0	0
Not at all useful	0	0
Total	17	100

From the above table No. 2 it is clear that 76% of the respondents are saying Search engines are useful, 24% percentage of them uncertain.

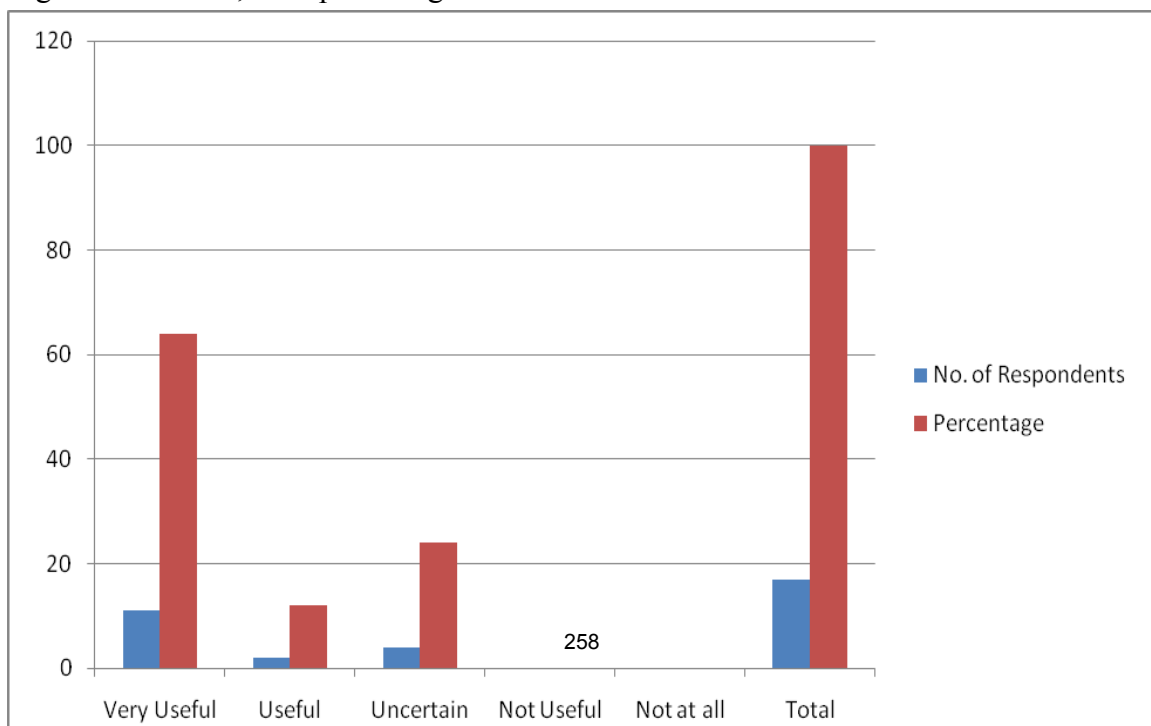


Table: 3Opinion Regarding Library Website (Federated Search)

Opinion	No. of Respondents	Percentage
Very Useful	8	48
Useful	2	12
Uncertain	6	35
Not Useful	0	0
Not at all useful	1	5
Total	17	100

From the above table No 3 it is clear that 60% of the respondents favor the usage of library website, 35 % of them are neutral and 5% respondents say that not at all useful.

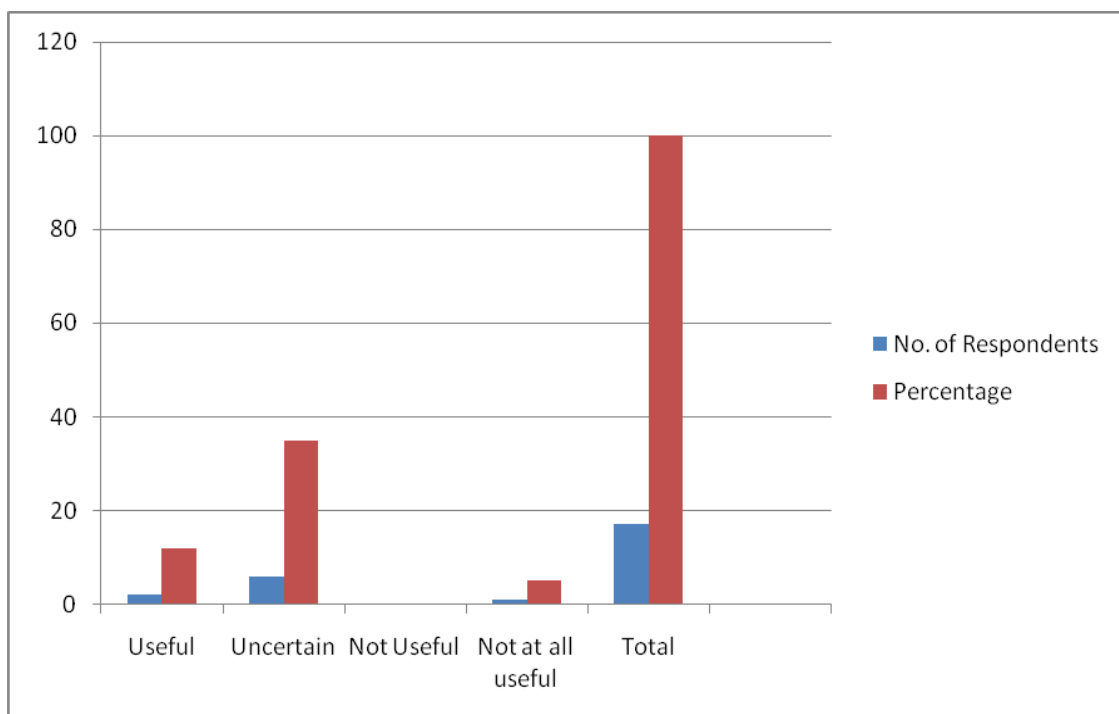


Table: 4Opinion Regarding Web OPAC's (Online public access catalogues) (Intact & world cat)

Opinion	No. of Respondents	Percentage
Very Useful	8	47
Useful	3	18
Uncertain	5	30
Not Useful	0	0
Not at all useful	1	5
Total	17	100

From the above table No 4 it is apparent that 65% of the respondents favor for the OPAC's, 30 % of the respondents are uncertain, 5% clearly mentioned not at all useful.

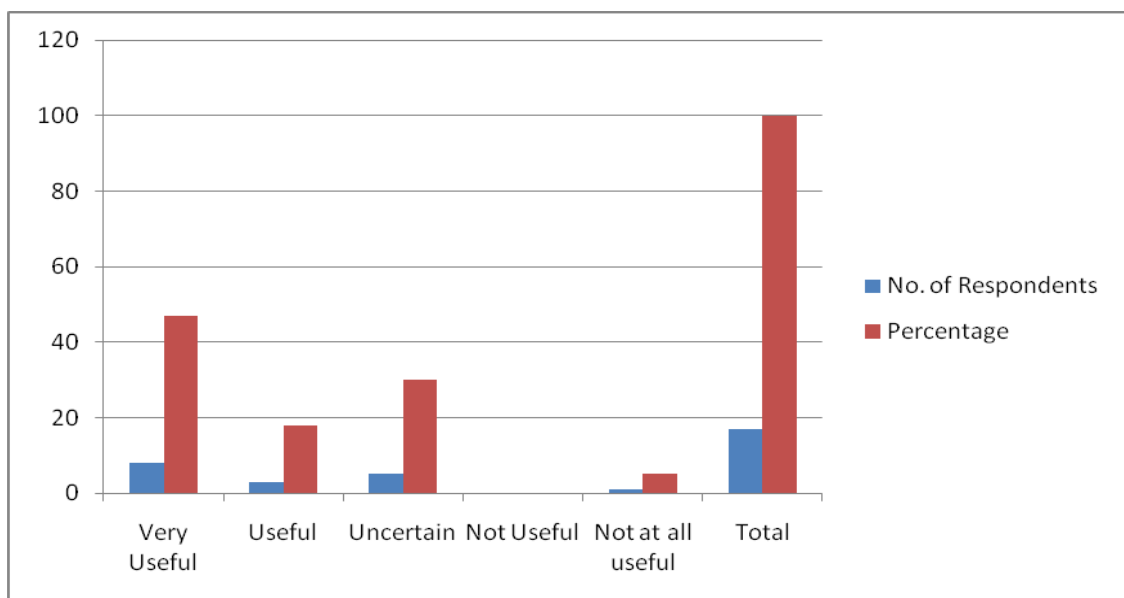


Table: 5Opinion Regarding Library Consortia Source

Opinion	No. of Respondents	Percentage
Very Useful	7	42
Useful	5	30
Uncertain	4	23
Not Useful	1	5
Not at all useful	0	0
Total	17	100

From the above table No 5 it is clear that 72% of the respondents favor the usage of library consortia source, 23 % of them are neutral and 5% respondents say that not all useful.

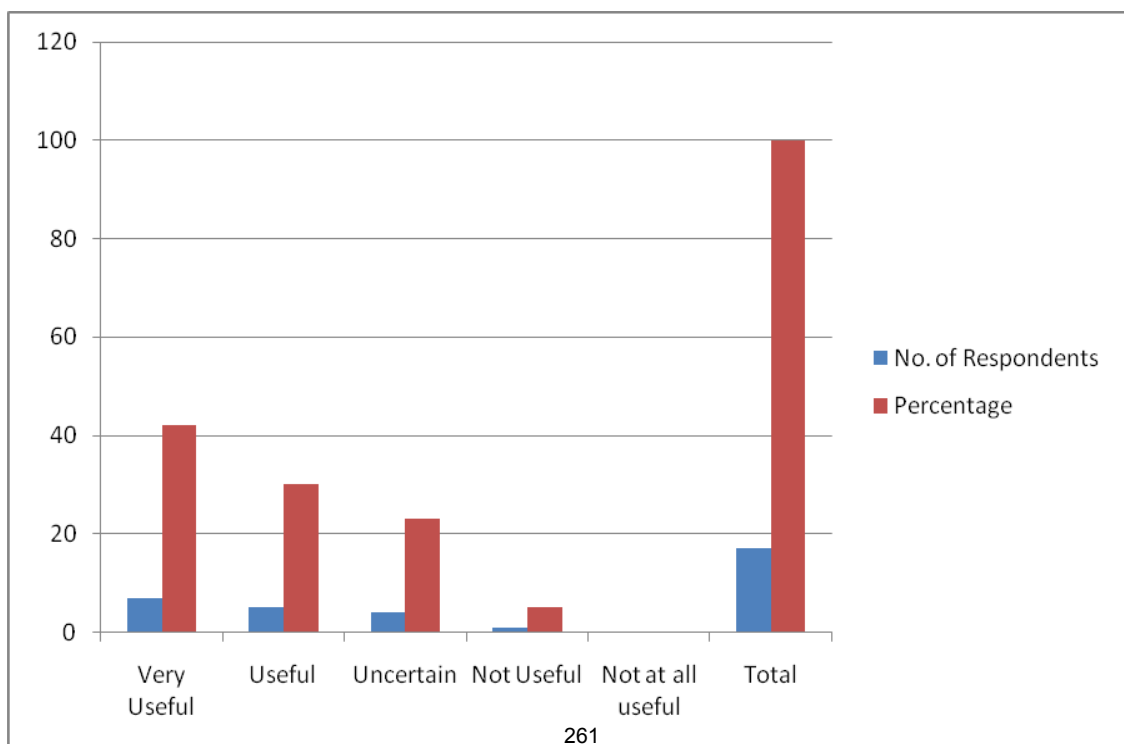


Table: 6Awareness about consortia sharing

Opinion	No. of Respondents	Percentage
Strongly agree	11	65
Agree	3	18
Neutral	2	12
Disagree	0	0
Strongly disagree	1	5
Total	17	100

Table No. 6 highlights that 83% of the respondents favor the usage of consortia sharing, 12 % of them are neutral and 5% are saying not at all useful.

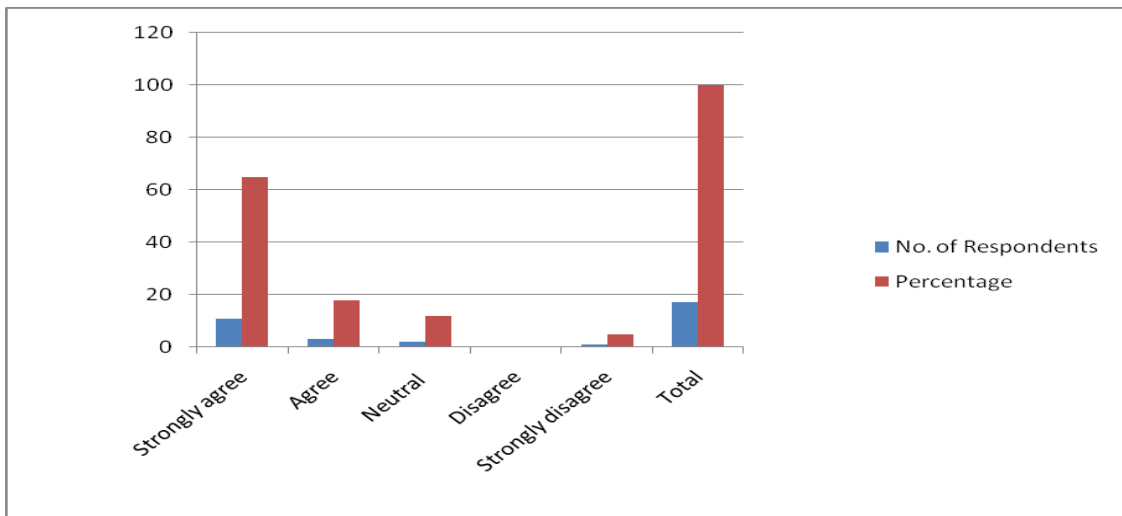


Table: 7Management Science have implemented consortia with other institutions

Opinion	No. of Respondents	Percentage
Strongly agree	4	24
Agree	5	30
Neutral	5	30
Disagree	2	11
Strongly disagree	1	5
Total	17	100

Table No. 7 indicates that 54% of the respondents favors the usage of have implemented consortia with other institutions, 30 % of them are neutral, 11% are disagree and 5% are strongly disagree.

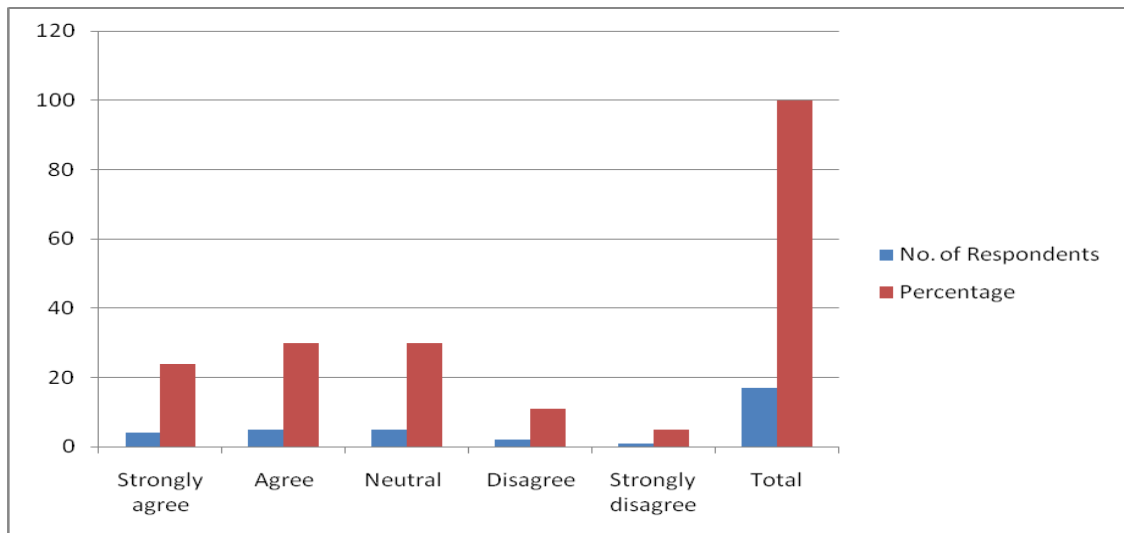


Table: 8Table reveals Cost effectiveness of consortia sharing

Opinion	No. of Respondents	Percentage
Strongly agree	4	24
Agree	6	35
Neutral	5	30
Disagree	1	6
Strongly disagree	1	5
Total	17	100

Table No. 8 gives the 59% of the respondents favor Cost effectiveness of consortia sharing , 30 % of them are neutral, 6% are disagree and 5% are strongly disagree.

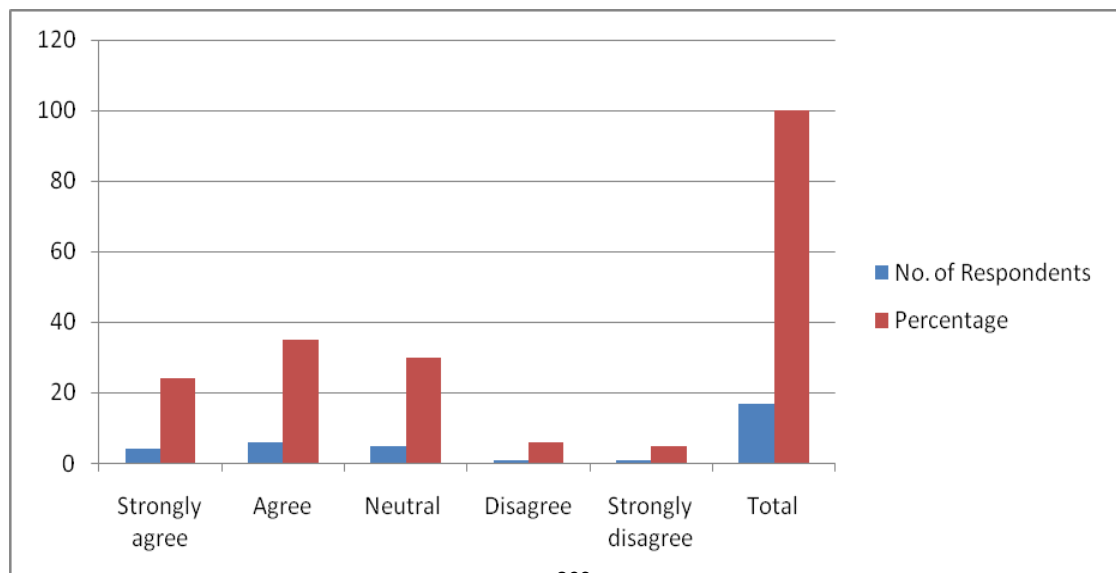


Table: 9

Table: 9 Opinion about e-resource sharing among management science college libraries is desirable

Opinion	No. of Respondents	Percentage
Strongly agree	8	48
Agree	6	35
Neutral	1	6
Disagree	1	6
Strongly disagree	1	5
Total	17	100

Table No.9 shows that 83% of the respondents agree resource sharing among management science college libraries is desirable, 6 % of them are neutral, 6% are disagree and 5% are strongly disagree.

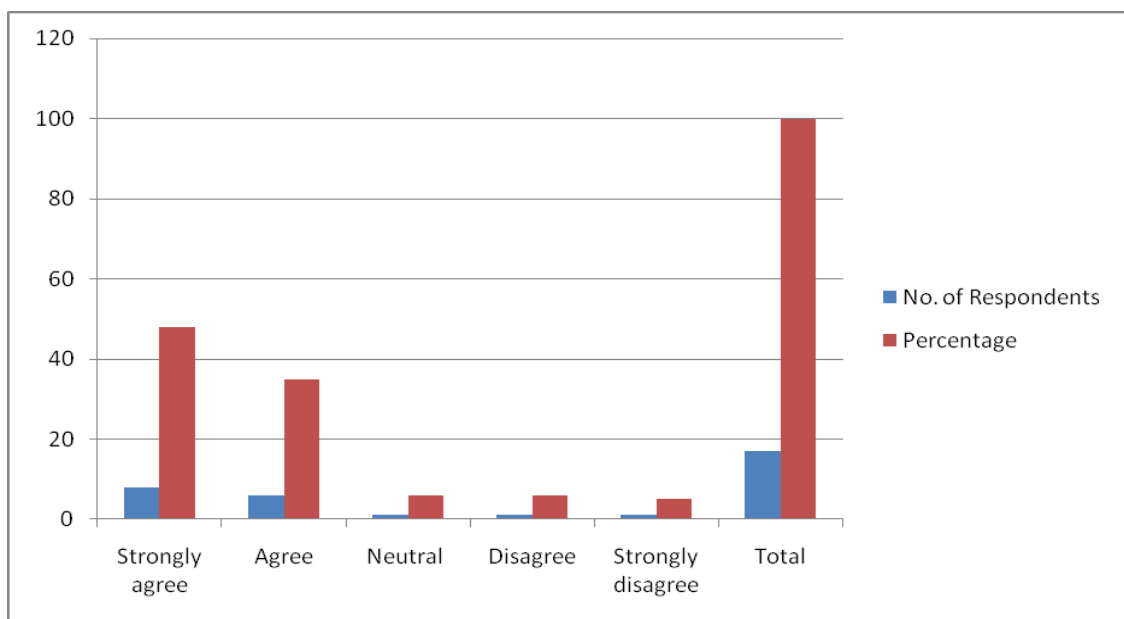


Table: 10 Opinion regarding management science college libraries have written policy on e-resource sharing

Opinion	No. of Respondents	Percentage
Strongly agree	5	30
Agree	5	30

Neutral	6	35
Disagree	1	5
Strongly disagree	Nil	Nil
	17	100

Table No 10 divulge that 60% of the respondents favor management science colleges in Bangalore libraries have written policy on resource sharing, 35% of them are neutral and 5% of them disagree with the statement.

8. KEY FINDINGS OF THE STUDY:

On the basis of survey conducted by questionnaire and interviewing the library users and library authorities can be observed and the results are tabulated and show through the graph with the interpretation. Some of the key findings are mentioned below-

- * At the first instance, the librarians should make themselves clear about the usefulness of a resource sharing program. They should try to know which of its library resources can be shared with what library and vice-versa. That is, the librarians must familiarize themselves with the nature and collection of the participating libraries.

- * Means of communications should be developed and established among the participating libraries. They should make their library resource know to each other. This could be done by publishing and distributing:

- (f) List of latest additions
- (g) List of periodicals being currently subscribed
- (h) List of back sets of periodical publications available
- (i) List of standard reference resource available and
- (j) Various bibliographic publications on various fields of specialization.

- * Compilation of union catalogue of the holdings of these libraries may be undertaken by any one of them. The ideal library to take up this job would be the Institute of Petroleum Exploration, library being more resourceful than others. As an alternative subject wise union catalogues may be compiled by the participating libraries.

- * Librarians must establish close contacts with the library users and library authorities to know the advantages, drawbacks and limitations of co-ordination in resource sharing.

9. CONCLUSION:

While print journals continue to dominate both from users point of view and publishers revenue, e-Journals have made an all-round big impact on economics, access and user base. Pricing models for e-information must result in a significant reduction in the per use of information. Pricing should be market- based not formulaic.

The underlying prices should be publishers' responsibility. Consortia models are different but they share many common interests. Pricing archiving and copyright issues are yet to be tackled globally. Pay-per-view is not yet popular. Libraries and providers must jointly develop and agree upon what constitutes an effective measure of the use and value of electronic information so both parties can demonstrate better returns on investment. For

any form of consortium contract to work, it must be fair and equitable to both parties. To reap the benefits of e-information and consortia movement we need to overcome the rigid administrative and audit rules India, we need to network the minds of administrators and librarians. Consortia efforts are time consuming, frustrating and difficult to build and sustain. But still, they are potent, social, economic and political forces in reducing the unit cost of e-information and increasing the resource and user base and help libraries to achieve more collectively than they could accomplish individually. It is satisfying to note that few librarians in India have taken up consortia initiatives to provide access to e-journals, which probably is the only way to satisfy increasing information requirements of vast number Indian academic and Management science professionals.

REFERENCES:

1. Allen Kent (2009) Resource Sharing in Libraries Why How When ? Next action steps. Pp.327.
2. Bhattacharya (G). Library science with a slant to documentation and information studies, Vol.34 (2) June 1997, pp.69-83.
3. Chikkamalliah et al. 2002. *"Resource sharing & cooperative acquisition of electronic information resources through consortia: A case of IIM libraries"* National Conference on 'Consortia Approach for Content Sharing among Libraries', Organized by ASSIST and VTU, Belgaum, Bangalore, 21-31 December.
4. Cholin, V S and Karisiddappa, C R. 2002 *"Consortia approach for academic libraries: Emerging solution for optimum utilization of resources"* National Conference on 'Consortia Approach for Content Sharing among Libraries', Organized by Mangalore University and ASSIST, Mangalagangothri, Mangalore, 27-29 May.
5. Goudar, I R N. 2001 "Consortia approach for accessing commercial electronic information sources" Workshop on 'Creation and Management of Digital Resources' Organized by UNESCO-NISSAT, University of Mysore, 18-20 June 2001.
6. Kalam, A. P. J. Abdul. Digital library and its multi dimensions: inaugural address to the International Conference- ICDAL- 2004. New Delhi, Bigyan Bhavan, 24th February 2004.
7. Kaul (H.K). Library resource sharing and networks. Virgo Publication, New Delhi, 1999.
8. Kaul, H.K. and BABY, M.D. Library and information networking: NACLIN 2002. DELNET, New Delhi, 2002. p. 388.
9. Murthy (T.A.V). Resource sharing and consortia for India. Proceeding, IIT Seminar, Kharagpur, Feb. 2002: pp.14-15.
10. Satyanarayana, N.V., Krishnan, S. and Arora, J. (2004) Library consortia and resource sharing initiatives in India: *A White Paper. Bangalore, Rajiv Gandhi University of Health Sciences*, pp.54.

Sharing Information Resources Through Digital Library Consortium

J. Shivarama¹ and Adithya Kumari, H.²

¹*shivaramatoo32@gmail.com*
Tata Institute of Social Sciences, Mumbai

²*adithyakumarih@gmail.com*
Yuvaraja's College, University of Mysore, Mysore

ABSTRACT

Sharing of their library resources is being practiced since long time. The primary purpose of establishing a library consortium is to share physical resources including books and periodicals amongst members. However, the mode of sharing resources has gone under a transformation with infusion of new information technology from print-based environment to digital environment. The emergence of Internet, particularly, the World Wide Web (WWW) provided for delivery of information with greater speed and economy. The libraries and information centers, as heavy consumers of electronic journals and online databases, stand to benefit greatly from this technology-driven revolution. The libraries with their diminishing or at the best static financial allocations have to consider new ways to consolidate global resources amongst them in order to maximize their limited financial resources. The present paper discusses about need for digital library consortia, provision of digital library consortium at global level, consortia of consortia, their services and challenges and issues of LIS professionals.

1. INTRODUCTION

The concept of library consortium is not new, and it refers to co-operation, co-ordination and collaboration between the libraries for the purpose of sharing information resources. A library consortium is “a community (a cooperative) of two or more information agencies which have formally agreed to coordinate, cooperate in, or consolidate certain functions to achieve mutual objectives” (Narasimhan, 2002). More specifically, it is “a group of libraries that agree to pool their resources by allowing the users of each institution some type of access to the resources of all other institutions, either through inter-library loan or borrowing privileges” (Murthy, 2002). In fact “library consortium is a community of value creating entities, generating value through an aggregation of library units within and across organizations. The value creation could be enhanced through resource sharing processes, products and service offerings of the participating library units in a consortium” [Jayaprakash & Rao, 2006].

2. DIGITAL LIBRARY CONSORTIUM INITIATIVES AT THE GLOBAL LEVEL

During the current decade majority of the academic libraries have exploited the advances in information technology and moved from organizational self-sufficiency to collaborative mode. The global development of OCLC in USA is a main example. Some

of the major academic library consortia of the world and their URLs are depicted below:

Table-1 Digital library Consortium Initiatives at the Global level

COUNTRY	CONSORTIA	URL
USA	The Washington Research Library Consortium (WRLC)	http://www.vvrlc.org
	Virtual Library of Virginia (VIVA)	http://www.viva.lib.va.us/
	Ohio library and Information network Ohio LINK	http://www.ohiolink.edu/
	Georgia's Galileo (GALILEO)	http://galileo.gsu.edu/hornepahe.cgi
	Pennsylvania Academic Library Consortium, Inc. (PALCI)	http://www.lehig.edu/~inpalci/
UK	Consortium of Academic Libraries in Manchester (CALIM)	http://www.calim.ac.uk/
	Consortium of University research libraries (CURL)	http://www.curl.ac.uk
	Joint Academic Network (JANET)	http://www.et.brad.ac.uk/help/janet.html
ASIA	Korean Education & Research Information Service (KERIS) in Korea	http://www.keris.or.kr/english/index.jsp
	China : China Academic Library and Information System (CALIS)	http://www.calis.edu.cn/
	India-INDEST	http://www.paniit.ac.in/indesty
	India-INFLIBNET	http://www.inflibnet.ac.in/info/ugcinfonetAigeinfonet.jsp#7

• 3. DIFFERENT CONSORTIA SERVICES IN DIGITAL ERA

A library consortia formation can be at local, state wide, national and inter institutional level for making available the resources and services available both within the premises of members and outside for the benefit of members. Some of the services one can think to provide through consortia include –

- Union catalogues: Books, Journals, Technical Reports, and Conference Proceedings
- Shared library systems – Hardware, Software and other infrastructure
- Shared professional expertise – Develop and realize consortia goals
- Human resource development – Training staff and users
- Electronic contents licensing for providing access to
- Bibliographic databases, e-Journals, Full text reports, Conference Proceedings etc.
- Inter Library Lending and Document Delivery services
- Electronic content loading – Contents generated by members and acquired on common server.
- Physical storage for Digital curation – Old back volumes and less used documents.
- Seminar/training programmes – Professional development to serve user community better.
- Development of enabling technologies – IR systems, Portals and other web interfaces
- Evolve standards for techniques, hardware, software and services for the benefit of consortia members.

4. CONSORTIA OF CONSORTIA

In addition to an increasing number of consortia, there are now Consortia of consortia, providing ever-widening circles of collaborative possibilities and projects. An example of this is The Albert Library. Out of the library organization members of The Albert Library, one member is a representative from the NEOS library consortium. NEOS members include Alberta Universities, colleges, university-colleges, and special libraries (eg. Hospital libraries).

Consortia Canada is an example of consortia of consortia. Consortia Canada is a consortium of 140 library consortium across Canada that see the benefit of working together on projects of mutual benefit. The initial project of Consortia Canada was a national site license for an electronic database.

OCLC is an example of International consortia of consortia. The International Coalition of library consortia is an informal, self-organized from around the world. The Coalition serves primarily higher education common interest. At times during the year, ICOLC may conduct meetings dedicated to keeping participating consortia informed about new electronic information resources, pricing practices of electronic providers and vendors, and other issues of importance to directors and governing boards of consortia.

\

5.NEED AND PURPOSE OF THE DIGITAL CONSORTIA IN E-PUBLISHING ENVIRONMENT

Libraries are the service-oriented organizations. The main aim of every library is not only to fulfill the needs of the users but also to anticipate their demands. The libraries should always aim at providing quality services with the available resources. The advent of Internet and World Wide Web (WWW) popularly known as web provides tremendous opportunities for both publishers and LIW professionals to provide variety of services to users' community.

The print journals continue to dominate both from user's point of view and publishers' revenue. The advent of e-publishing has brought a revolution in journal publication, subscription, access and delivery mechanism. Print journals publishing costs include high article processing costs, high production and marketing costs. E-journal production and access costs are increased further due to infrastructure, customer support, IT savvy human resources, etc. While these costs form the base, other pricing factors include number of nodes, multiple campuses, access mode, training, perpetual access, etc. A study indicates that one of the US University Science Library spends 76% of its journals budget on titles of 10 major publishers like Elsevier, Springer, Wiley, Harcourt, Kluwer, Plenum, Blackwell, AIP, Marcel Dekker and Taylor Francis. This holds good for most of STM institutions too. The dwindling library budgets and growing number of journals force libraries to form consortia for accessing e-journals. The old concept 'consortia' means a strategic alliance of institutions having common interests.

Resource sharing in recent years has been of much concern to the library and information science professionals. Recently, a number of papers, treatises and monographs have been written on "Resource Sharing". The different aspects of resource sharing are so well documented that there is no dearth of literature on the different aspects of resource sharing. The analysis of the literature produces in different forms would help in knowing the present and future of this activity. A number of conferences both at the national and international levels have been held. In view of the ever-mounting cost of reading materials and the non-availability of certain primary documents have led library and information scientists to think of evolving ways led library and information scientists to think of **evolving** ways and means through which the resources of one resource Centre could be utilized to others.

6.DIGITAL CONSORTIA SERVICES: CHALLENGES AND ISSUES FOR LIS PROFESSIONALS

While print journals continue to dominate both from users point of view and publishers revenue, e-Journals have made an all-round big impact on economics, access and user base. Pricing models for e-information must result in a significant reduction in the per use of information. Pricing should be market- based not formulaic. The underlying prices should be publishers' responsibility. Consortia models are different but they share many common interests. Pricing archiving and copyright issues are yet to be tackled globally. Pay-per-view is not yet popular. Libraries and providers must jointly develop and agree upon what constitutes an effective measure of the use and value of electronic information so both parties can demonstrate better returns on investment. For any form of consortium contract to work, it must be fair and equitable to both parties. To

reap the benefits of e-information and consortia movement we need to overcome the rigid administrative and audit rules India, we need to network the minds of administrators and librarians. Consortia efforts are time consuming, frustrating and difficult to build and sustain. But still, they are potent, social, economic and political forces in reducing the unit cost of e-information and increasing the resource and user base and help libraries to achieve more collectively than they could accomplish individually. It is satisfying to note that few librarians in India have taken up consortia initiatives to provide access to e-journals, which probably is the only way to satisfy increasing information requirements of vast number Indian academic and Management science professionals.

In the Indian context there are lot of issues and challenges before the LIS professional for proper understanding, implementation at different level extremely difficult one. Therefore the study identifies the some of the major issues and challenges for effective implementation of consortia in the Indian context were listed out.

Members of a consortium may belong to different parent organizations, following different administrative rules. The subject areas covered, geographical location and user categories are other variations. The other players in the game like publishers, aggregators, vendors, subscription agents and document delivery centers may have their own policies. As a result one has to look into number of issues broadly grouped under three categories viz. strategic, technical and practical as given below.

<i>Strategic</i>	<i>Tactical</i>	<i>Practical</i>
Mission	Programs	Governance
Lobbying Fund raising Education Purchasing	e-Journal subscription Database access Union catalogue Digital libraries Archiving Resource sharing Access rights Outsourcing	Governing board Council Task Forces Interest groups (o) Implementing agency coordinating
Funding	Services	Staffing
Parent organization Funding agency Government Membership Service fees	Cataloguing Training Consultation Preservation Document Delivery Copyright	Program staff Support staff Volunteers Student trainees

Geographical coverage	Technology	Payment
National	Website development	Negotiation
Regional	Shared infrastructure	Bill to library
State	Shared systems	Central funding
Local	Digital Library	Vendor billing
		Aggregator billing
		Deposit account
		Document delivery bill
Library Types		

National
Public
Academic
Special
Subject based

7. CONCLUSION

Digital networking, technology, co-operation and collaborations over the years with the digital repositories and Internet Archive illustrate, mining its web, books and television holdings, the digital era offers an incredible opportunity for libraries to reinvent themselves as a data-rich nexus of innovation that unlocks the vast wealth of societal knowledge they hold and to bring together scholars, citizens and journalists to use all of this data to reimagine how we understand our global world.

BIBLIOGRAPHICAL REFERENCES:

1. Kalev Leetaru (2016) Reimagining Libraries In The Digital Era: Lessons From Data Mining The internet Archive
<http://www.forbes.com/sites/kalevleetaru/#2b44ae4214ea>
2. Younis (A.R). Resource sharing networks in developing countries. In Kent Allen, (Ed.). Encyclopaedia of Library and Information Science. Mared Decker, New York, Vol.41, 1986, p.304-320.
3. Lancaster, F. W. Electronic publishing and their implications for libraries. In Beyond 1984: the future of library technical services. Peter Gellatly (Ed). Haworth Press, New York, 1983. p. 245.
4. <http://www.inflibnet.ac.in/econ/guidelineforugcinfonetdlc.pdf> retrieved on 05-04-2016.
5. NARASIMHAN (G N). Resource sharing focus on history ILL and document delivery, cooperative collection development – assumptions, problems, solutions.

- National Conference on Information Management in E-libraries, Kharagpur, 2002. Proceedings. p. 556-564.
6. MURTHY (T A V). Resource sharing and consortia for India. Information management in e-libraries. National Conference on Information Management in E-libraries, Kharagpur, 2002. Proceedings. p. 14-15.
 7. JAYPRAKASH (A) and KOTESHWAR RAO (M). Consortia based resource sharing among libraries and information centers in digital era. National Conference on Information Management in Digital Libraries, Kharagpur, 2006. Proceedings.

Library Changing Technology Landscape, Trends, and the Traditional Roles of LIS Professionals in Modern Era

M.Muthu¹, Mahendra N Jadhav² and Bholeswar Kisan³

¹ *mmuthu78@gmail.com*

Indian Institute of Technology Madras, Chennai-36

ABSTRACT

The advancement of ICT has brought a lot of changes not only on the LIS Services but also on the roles and expectations of the LIS Professionals. A pattern of gradual change in a condition, output, or process, or an average or general tendency of a series of data points to move in a certain direction over time, represented by a line or curve on a graph. (Business dictionary). There is a real danger that LIS Professionals will be left behind if it still insists on the old role of the traditional librarians. So it is important that there is a new change in paradigm. As the saying goes, change or perish. This paper is mainly highlights for Current Trends, What's HOT Today? Usage of Web Resources, Emerging Areas, Trends, Library Changing Technology Landscape, Changes in Library Services, Changing Paradigm, Changing Library Roles, Environment, Traditional Roles of LIS Professionals, Concepts of Web 2.0, Strategic Thinking, Best Practices, Attributes of Service Quality in LIS, Tasks, Creativity, Customers' Expectations and so on.

Keywords/Descriptors:

Emerging Areas, Trends, Traditional Roles of LIS Professionals, Concepts of Web 2.0, Strategic Thinking, Attributes of Service Quality in LIS, Tasks, Creativity, and Customers Expectations.

1. INTRODUCTION:

We live in an Information Society where the development of information technology and telecommunication networks is accompanied by a corresponding increase in knowledge, with a rapidly growing flow of information. This new information environment requires new skills in seeking, processing and using information. The base for individual ability to understand and use information is a qualitative, ongoing learning process.

Learning and education are important topics in the information society and the educational situation is changing for several reasons, which develop from the social, cultural, political and economic changes in the society. The role of librarians and information professionals in this new environment has been strongly influenced by these changes.

1.1. Current trends:

Before discussing on the new roles of LIS Professionals in the new era, let's first look at the current trends discussed in most recent literature of LIS Management. These current trends somehow or rather will have a bearing in shaping librarians and information professionals in the new era. They are summarized as follows;

- A vision towards information and knowledge rich society
- Access role replace custodial role

- Competency- based assessment/training
- Customer-focused/customer-centered, user oriented approach in provision of services
- Globalization of information
- Growth of electronic / internet resources
- Information management recognized as an important discipline
- Information recognized as commodity (information brokerage, information entrepreneurship, fee-based information)
- Information recognized as power/strength/weapon
- Information strongly link to decision-making, strategic management, competitive advantage, innovation, R&D
- Integrated and widespread ICT applications
- Knowledge management – leveraging organization
- Knowledge-based economy – information and knowledge as drivers to boost the economy
- Leadership skills
- Librarians expanded & changes in digital environment
- Librarians is designated as cyber librarians
- Librarians need new management knowledge and skills
- Library functions in information and knowledge-based society
- Mushrooming of information systems – need for Information System Management (ISM)
- New breeds of information professionals: CIO, CKO, Information consultants and analysts
- Revamping of curriculum – redesign curriculum to accommodate changes and new trends
- Role of digital/electronic/virtual library
- Specialized knowledge & skills in library and information management
- Strategic alliances, partnership and collaborations
- Trend to develop digital contents to facilitate access

1.2. Recent Trends & Developments:

- Collection Development to Content Development
- Conventional Education to Web-Based Education
- Conventional Vs. Web Based Learning
- Establishment of Knowledge Commission
- Impact of ICT on Societal and National Development
- Impact of Information and Knowledge Society on Education, Training and Research
- Information Society-Knowledge Society
- Library Cooperation to Resource Sharing Networks/Consortia
- Library Professionals to Information Professionals
- Primary Focus on Professional Knowledge and Skills (Technology, Management and Communication)

- Recent Trends and Developments in LIS Education and Research
- Role of Information in Planning, Decision Making, Innovations and National Development
- Traditional Library to Digital Library

1.3. What's HOT Today?

- | | |
|---|---|
| <ul style="list-style-type: none"> ➤ Being connected 24/7 ➤ Blogs ➤ Cell phones & texting ➤ Citizen journalism ➤ Faceted browsing ➤ Fast delivery and vodcasting ➤ Folksonomies ➤ Gaming & virtual realities ➤ Instant gratification ➤ Mashups ➤ Metasearching ➤ Online photo sharing ➤ Open source ILS desktop applications | <ul style="list-style-type: none"> ➤ Open WorldCat ➤ OpenID or one-time ➤ Plugins, add-ons, & extensions authentication ➤ Podcasting, screencasting ➤ RSS feeds & aggregators ➤ Social bookmarking ➤ Social networking ➤ Tagging ➤ User comments and ratings ➤ Web applications replacing ➤ Widgets and gadgets ➤ Wikis |
|---|---|

1.4. Explosive Growth & Usage of Web Resources:

- | | |
|--|--|
| <ul style="list-style-type: none"> ➤ Digital Information Resources ➤ E-learning (online learning) ➤ ICT Trends ➤ Information Portals and mortals ➤ Metadata Standards | <ul style="list-style-type: none"> ➤ Online information services ➤ Search Technology ➤ Subject Gateways ➤ Web Technology |
|--|--|

1.5. Emerging Areas:

- | | |
|---|---|
| <ul style="list-style-type: none"> ➤ Changes in user behavior ➤ Effective digital storage and retrieval system ➤ Expanding user expectations | <ul style="list-style-type: none"> ➤ Extensive use of mobile devices ➤ Impact of ICT on special libraries ➤ Networked social environment |
|---|---|

2. TRENDS:

- Libraries address the groups and communities they serve
- Libraries provide access to diverse collections and services
- Users – participants in the choice of provided services
- Libraries – centers for information literacy, catching up with technology advancement, a key factor for human capital development
- Libraries – centers for transfer of expensive digital information inaccessible to citizens
- Libraries – an economic development factor

2.1. *Mega Trends:*

- Data as a reusable resource
- Digital Preservation
- E-publishing & born digital materials
- Mass & custom digitization
- Network support of teaching, learning & research
- New forms of discovery
- New models of Scholarship systems
- Reduction of digital divide

2.2. *Key Trends:*

- A move away from quick fix' content to providing more analysis/research content
- A move towards supporting colleagues in the use of content and resources
- Creating unique, bespoke high value services
- Developing digital content/managing digital collections
- Managing centralized e-services
- Managing content licensing
- Using social network tools or similar behind firewalls
- Virtual delivery of services and content

2.3. *Three Trends in Libraries:*

- Open Access and Scholarly Communication
- Delivery at the Time of Need
- Efficient and Intelligent Workflows

2.4. *Four Technology Trends every Librarian needs to know:*

- Augmented reality
- Discovery
- Large-Scale Text
- Open hardware

3. LIBRARY CHANGING TECHNOLOGY LANDSCAPE:

The following are some of important items of new technologies on which LIS Professionals need to seriously think about improving their competencies for their effective utilization to deliver need based high quality information services to user community.

- Customer expectations and preferences
- Demographic shifts
- Digital Information Resources
- Digital Rights Management
- Diversity/age/ethnic/economic/educational
- E-Learning
- Facilities
- Funding
- ICT Trends
- Information Portals and Vortals
- Metadata standards
- Online Information Services
- Pressure to merge/consolidate
- Publishing
- Search technology
- Subject Gateways
- Technology
- Web Technology
- Wi-Fi and RFID Technology

3.1. Changes in Library Services:

- Database searching
- Electronic reference
- E-publishing
- Information literacy program
- Library promotion and marketing
- Online access to library catalogues, databases and the Internet
- Online circulation service
- Online/offline access to digital resources
- Public relations services

3.2. Changing Information Needs:

The Changing information need is a great challenge to the LIS Professionals in all libraries in India and abroad. It helps the users in the following ways;

- Developing effective and efficient literature search techniques
- Effective use of modern information handling tools and techniques
- Enabling the users to do critical analysis
- Generating the capacity among users to raise queries
- Identifying information as the key for decision making
- Identifying various related information sources and services
- Integrating information with practical utility
- Organization and manipulation for different applications
- Realizing the need for information
- Understanding the utility of information in related applications

3.3. Maintenance Factors-(Herzberg):

- Company policy and administration
- Technical supervision
- Interpersonal relations with the supervisor
- Interpersonal relations with peers
- Interpersonal relations with subordinates
- Salary
- Job security
- Personal life
- Working conditions
- Status

3.4. Factors Affecting Next Generation Libraries-Changing Paradigm:

- The way people access information – from traditional library visit to network access from place of his convenience
- With the convergence of computer technology and telecommunication, the digital media has over taken print media. There is rapid movement of technologies towards Nano storage and real-time access
- The transition of libraries from information storage and retrieval to information facilitators and aggregators. Instead of ownership of information the present generation gives importance to access to information
- From information precious library environment to vast, readily and to some extent freely available information society

- Libraries are going for consortia rather than stand-alone which made possible to have access to more number of journals in science and arts
- Availability of full-text databases through digitalization helped to have open access to information rather than closed access
- Collaboration made it possible for global access to information. Now information can be accessed 24x7 instead of fixed hours
- The changing methods of information search, today it is text or touch, but next generation search technology is ought to include reflectivity, density, tone, speed, and volume
- In this new information environment the user is considered as consumer of knowledge

3.5. Revolutionary Changes:

- | | |
|--|--|
| <ul style="list-style-type: none"> ➤ ATM Revolution ➤ Authorship Revolution ➤ Cellular Revolution ➤ Digital Reservation Revolution ➤ Electronic Revolution ➤ Information as Commodity Revolution | <ul style="list-style-type: none"> ➤ MTV/Video Games Revolution ➤ Mutability Revolution ➤ Network Revolution ➤ New Majority Student Revolution ➤ Personal Computing Revolution ➤ User Expectation Revolution |
|--|--|

3.6. Changing Library Roles:

- | | |
|--|---|
| <ul style="list-style-type: none"> ➤ Libraries as Consumers ➤ Libraries as Intermediaries & Aggregators ➤ Libraries as Publishers | <ul style="list-style-type: none"> ➤ Libraries as Educators ➤ Libraries as R&D Organizations ➤ Libraries as Entrepreneurs ➤ Libraries as Policy Advocates |
|--|---|

4. PLANNING ENVIRONMENT:

- | | |
|---|---|
| <ul style="list-style-type: none"> ➤ Changes in Academic Libraries ➤ Changes in Technology ➤ Changes in Publishing | <ul style="list-style-type: none"> ➤ Changes in Education ➤ Changes in Research Environment |
|---|---|

4.1. Analysis of Environment:

- | | |
|--|---|
| <ul style="list-style-type: none"> ➤ Five Force model ➤ PEST Analysis <ul style="list-style-type: none"> ❖ Political situation ❖ Economic situation ❖ Social environment ❖ Technological environment ➤ SWOT Analysis | <ul style="list-style-type: none"> ❖ Strengths ❖ Weaknesses ❖ Opportunities ❖ Threats ➤ BCG matrix ➤ GE matrix ➤ Ansoff Matrix ➤ Value chain analysis |
|--|---|

5. TRADITIONAL ROLES OF LIS PROFESSIONALS - (RICHARD HARRINGTO, 2001):

- | | |
|--|---|
| <ul style="list-style-type: none"> ➤ Business Manager ➤ Change Agent, i.e. Technology Application Leader | <ul style="list-style-type: none"> ➤ Collaborator ➤ Custodian ➤ Database Manager |
|--|---|

- Educator
- Enabler/facilitator
- Evaluator
- Facilitator
- Fund-raiser
- Guide
- Image Maker
- Information Adviser/Instructor
- Information advocates
- Information Broker for both Print & Electronic Media
- Information gurus
- Information Manager

- Innovator/Web Designer/Builder/Manager Site
- Intermediary
- Knowledge
- Librarian
- Multi-media user
- Negotiator
- Policy Maker
- Provide network support
- Public Relations Officer
- System Designers
- Teachers/Trainers

5.1. Skills of Librarians 2.0:

- Able to look at new technologies and services with a critical eye
- Are agile
- Aren't afraid of taking risks
- Build their networks
- Create partnership
- Don't give up easily
- Keep up
- Market ideas and communicate effectively
- Question Everything
- Understand their users

5.2. Concepts of Web 2.0:

- Collaboration
- Community
- Ownership
- Perpetual state of being in beta
- Personal data
- Personalization
- Radical trust
- Remixable
- Self-expression
- Sharing
- Transparency
- Web-based
- Wisdom of crowds

5.3. Strategic Thinking:

- Being creative-moving beyond logic
- Dealing with many inputs at once
- Discriminating between events
- Exploring systematically
- Having a conceptual framework
- Integrating data with theory
- Linking process and output
- Responding to an audience/environment
- Scanning widely
- Seeing the big picture
- Selecting the right data
- Transferring learning from one experience to another

5.4. ICT Skills:

- Ability to Adopt New Technologies
- Database Development
- Digital Archiving and Preservation
- Technology-Savvy Librarians

- Troubleshooting
- New Technologies

5.5. Skills to Manage Social Media:

- Build a contingent of friends
- Community information
- Follow and be followed in return
- Give it time
- Instruction sessions
- Library news and events
- Link wherever possible
- Links to articles, videos, etc.
- Maintain communication
- New additions to your collection
- Post pictures
- Print advertising
- Respond to people
- Solicit feedback
- Talk to people

5.6. Generic Skills of LIS Professionals in Libraries:

- A commitment to life-long learning
- Ability to build partnerships and alliances ;(Public Private Partnership)
- Appropriate information literacy skills
- Critical, reflective, and creative thinking
- Effective communication skills
- Effective team relationship skills
- Problem-solving skills
- Professional ethical standards and social responsibility
- Project management skills
- Relevant information and communications technology and technology application skills
- Self-management skills

6. SEVEN BEST PRACTICES-(RICHARD LESTER, 1989):

- Breaking down organizational barriers between departments
- Closer relationships with customers and suppliers
- Eliminating layers of management creating flatter organizational hierarchies
- Global focus
- Improving human resource skills
- Intelligent use of new technology
- Simultaneous continuous improvement in cost, quality, service, and product innovation

6.1. Value-Adding Activities:

- Customer Service
- Development
- Distribution
- Final Production
- Intermediate Production
- Marketing
- Procurement
- Raw Material Processing
- Research
- Selling

6.2. Attributes of Service Quality in LIS:

- Aesthetics
- Conformance
- Durability (obsolescence / update ness)
- Features
- Perceived quality
- Performance
- Reliability
- Serviceability (time & cost)

6.3. *Delivery at the time of Need:*

- Multiple Access Points
- Convenience more important than content
- Information Easy to Find and Constantly Updated
- Library catalog no longer utilized by constituents

6.4. *Efficient and Intelligent workflows:*

- Adopt new technologies as they emerge
- Breaking down of Silos
- Adaptability and Flexibility
 - ❖ RDA
 - ❖ Linked Data
- Cross Training and Continuing Education
- Understanding Why and not just How

6.5. *Looking Beyond Traditional Libraries:*

- A balance of best sellers, text books and must have books
- Facilitate a “good library experience” – user focus
- Going beyond books – scholarly information, innovative services, etc.
- Integration with curriculum and pedagogy
- Look at the future needs and offer services
- Proactive in nature – topical displays, recommended readings, public lists, etc.

7. TASKS FOR LIBRARIANS IN THE DIGITAL ERA- (ZHOU FUTHERMORE, 2005):

- Describe the content and attributes of items (metadata)
- Design the technical architecture of digital library
- Design, maintain and transmit add-valued information products
- Ensure information security
- Establish friendly user interface over network
- Manage e-mail and print accounts
- Manage servers
- Offer training and guidance
- Plan, implement, and support digital services such as information navigation, consultation and transmit services
- Populate and evaluate websites
- Protect digital intellectual property in network environment
- Provide network support – both physical and social
- Select, acquire, preserve, organize and manage digital collections
- Select, organize and manage print and electronic collections
- Set up relative standards and policies for the digital library
- Understand the needs of users and endeavor to meet them

7.1. Issues & Trends in Information Systems in an Electronic Environment:

- Technological
- Economic
- Human resources and users
- Socio-political
- Library service and Organizational Changes
- Structured and unstructured information environment
- Legal

7.2. Ten ways to Encourage Creativity into Your Workplace-(David Kayrouz, 2008):

- Accept diversity and ambiguity
- Allow time to make connections
- Capture ideas
- Encourage curiosity
- Encourage free and open communication
- Engage in artistic pursuits
- Engage in serious play
- Reward effort
- Special place
- Understand the role

7.3. What helps Creativity Flow?-(Michael Kerr):

- A clear and bold vision of the future
- A fun, inspiring meeting room
- A healthy sense of humor
- Accessible and open leaders
- Bold, audacious goals and targets
- Brainstorming on a regular basis
- Confident egos
- Embracing healthy conflict and debate focused on ideas not personalities
- Giving people more autonomy
- High levels of trust
- Hiring people with varying perspectives and backgrounds
- Idea championing language
- Leaders recognizing innovators
- Open and honest communication
- Recognizing that “90% good” is sometimes all you can ask for to move forward on an idea
- Recognizing that NOT changing, not trying anything new is often the biggest risk
- Simple, plain, everyday language
- Simplified rules and processes
- Teams that interconnect with other teams

7.4. What Blocks Creativity? - (Michael Kerr):

- A conflict-adverse culture
- A lack of open and honest communication
- A lack of trust
- A risk-adverse attitude and culture
- A stuffy, stifling meeting room
- A vague or confusing vision
- Analysis paralysis & waiting for perfection
- Big egos
- Blame-storming
- Buzzword jargon
- Hiring similar personalities and profiles
- Idea-killing language

- Inaccessible leaders
- Leaders who take credit for others' ideas
- Micromanaging projects and people
- Seriousness
- Small, unexciting goals and targets
- Teams working in isolation
- Too much red tape

7.5. Tips for Creativity & Innovation:

- Be Curious
- Daydream
- Fresh view
- Learn from your mistakes
- SWOT Analysis
- Take a risk
- Visualizing

7.6. Customers' Expectations in Libraries at Present:

The Expectations of Users vary from one environment to another environment, Institutional programs, priorities, vision, activities and specialization. Based on the experience and exposure in the area of Libraries, it has been observed that the expectations of Users in Libraries generally are;

- Clear directions and way guides
- Continual improvement
- Continuous interaction
- Disaster Management
- Display and demonstration of information about staff
- Effective & Efficient workflow
- Electronic resources access and delivery
- Information literacy
- Proper communication facilities
- Proper documentation of facilities and services provided
- Quality initiatives and accuracy
- Speedier service delivery mechanism
- Web based initiatives and resources
- Well organized collections
- Well placed users complaints system
- Well-designed forms for availing services

7.7. Library Should Be:

- Accessible
- Comfortable
- Compact
- Constant in environment
- Economic
- Extendible
- Flexible
- Organized
- Secure
- Varied

7.8. The Future:

- Modern day libraries are more concerned with their digital collections
- Librarians are trying to redefine their discipline in order to describe, house and access all manners of computer stored information
- In future libraries will be judged by their overall relevancy to the people they serve
- Librarians need to develop domain knowledge to understand their clients

8. CONCLUSION:

- 21st Century compelled Library professionals to Information Professionals through “Education for Information”
- LIS Schools and Educators must be committed to act as qualitative Problem Solvers and Effective Information Managers
- Possessing broad range of capabilities to meet the highest demand in the information sectors (academic, corporate, government) to meet the challenges in new millennium.
- Quality Assurance is not the Destination but a journey to continuously improve
- The format and the mode of access to information resources have changed because of the electronic environment in libraries and the industry brought about by ICT
- Librarians, users and systems developers alike must cope with the changing and emerging technological environment to adequately respond to user needs
- Libraries promote reading which results in scholarly communication, knowledge creation and enlightenment.
- Libraries provide an economically efficient method of organizing information and knowledge that are relevant to our needs.

BIBLIOGRAPHY:

1. Gupta, D K (2001), “Librarians' changing role in distance education: need for training”, *Journal of Library Administration*, 32 (1-2), pp. 225-31.
2. Harish Chandra (2009) “Capacity building measures to meet the challenges facing LIS profession, *Library and Information science in digital age*, Vol.2, New Delhi, EssEss Publications, pp.700-709.
3. Hashim, Laili bin et al., (2012), “Preparing New Era Librarians and Information Professionals: Trends and Issues”, *International Journal of Humanities and Social Science*, Vol. 2 No. 7; April, 151.
4. Muthu, M & Jadhav, Mahendra N (2015), "Professional Ethics for LIS Professionals in Digital Era", *Current Trends In Library & Information Science In Digital Era*”, Edited by Dr.Ashish Kumar Sharma et al., Satyam Publishing House, New Delhi, pp. 302-316.
5. Muthu, M & Jadhav, Mahendra N (2015), “Mobile Technology for LIS Services: Tips and Tricks”, *Transforming Libraries and Librarianship*”, Edited by Dr.Sanjay Kataria et al., KBD Pub., Delhi, pp.461-471.

6. Muthu, M & Nehru, R (2014), "Leadership Skills for Library Professionals in Modern Era", *Vidyawarta-Interdisciplinary Multilingual Research Journal*, Vol.2, No.5, Jan-Mar, pp. 63-70.
7. Muthu, M & Veerapandi, M (2014), "Benchmarking: A Play for Vital Role in Libraries", at National Conference on Information Management in the Knowledge Era on 25th October 2014 Paper presented at DRBCCC Hindu College, Chennai-72, Ed by P Ganesan and K Sridhar, pp.454-466.
8. Muthu, M (2013), "User Education and Their Innovative Strategies in Libraries: An Overview", *International Journal of Professional Development*, Vol.2, No.1, Jan-Jun, pp.46-54.
9. Muthu, M (2014), "Competencies, Types and their Strategic thinking for LIS Professionals in Modern Era", *International Journal of Librarianship and Administration (IJLA)*, Vol.5, No.1, pp. 61-80.
10. Muthu, M (2015), "Role of College Librarians for the Qualitative Improvement of Education: A Modern Era" "Transformation of Knowledge Resource Centers in Collaborative Era", Vol.I, 1st Ed., Edited by Dr. Dharmaraj K Veer & Dattatraya T Kalbande, pp. 1-20, Agri-Biovet Press, New Delhi.
11. Muthu, M (2015), "Web-Based Reference Tools: An Overview", *Transition in Librarianship*, Edited by Dr.S.Dhanavandan & Dr.M.Tamizhchelvan, Dominant Publishers & Distributors Pvt Ltd., New Delhi, pp.214-236.
12. Muthu, M et al., (2013), "Knowledge Management in Libraries" *Pearl: A Journal of Library and Information Science*, Vol.7, Issue.1, Jan-Mar, pp.17-27.
13. Muthu, M et al., (2014), "Information Resource Management (IRM), Principles, Process, Key Concepts and their Strategies for Libraries in Modern Era" at National Conference on Information Management in the Knowledge Era on 25th October 2014 Paper presented at DRBCCC Hindu College, Chennai-72, Ed by P Ganesan and K Sridhar, pp.403-415.
14. Muthu, M et al., (2014), "Knowledge Management, Principles and their Strategies for Libraries in Modern Era", *Proceedings of the UGC Sponsored National Seminar on Knowledge Management in Electronic Environment: Opportunities and Challenges*, pp.160-165, held on 21-22 March, Paper presented at Alagappa University, Karaikudi.
15. Muthu, M et al., (2014), "Library Building, Planning and their Principles for Libraries in Modern Era", *Vidyawarta-Interdisciplinary Multilingual Research Journal*, Vol.1, Issue.5, Jan-Mar, pp.184-189.
16. Muthu, M et al., (2015), "E-Learning: A Play for Vital Role in Educations & Libraries", *Transition In Librarianship*, Edited by Dr.S.Dhanavandan & Dr.M.Tamizhchelvan, Dominant Publishers & Distributors Pvt Ltd., New Delhi, pp. 129-148.
17. Muthu, M et al., (2015), "Rethinking of an Innovative LIS Services for Libraries in Digital Era", *Knowledge Librarian-An International Peer Reviewed Bilingual E-Journal of Library and Information Science an Online Journal*, Vol.2, Issue.2, Mar-April, pp.31-66.

18. Muthu, M, et al, (2013), "A Changing Role of Libraries in Digital Era", *International Journal of Emerging Trends in Library and Information Society*, Vol.1, No.2, pp. 55-71.
19. Muthu, M, et al., (2013), "Information Literacy and their Strategy: A Play for Vital Role in Libraries & Higher Education", *International Journal of Emerging Trends in Library & Information Society*, Vol.1, No.3, pp. 171-192.
20. Muthu, M, et al.,(2013), "Librarianship, Competencies and their Traditional Roles for Libraries in Digital Era", *"International Journal of Digital Information and Knowledge Management*, Vol.1, No.3, pp. 191-212.
21. Muthu, M, et al., (2014),"Marketing of LIS Products & Services in Modern Era", *"Lingaya's Journal Of Professional Studies"*, Vol. 8, No.1, Jul-Dec, pp. 96-105.
22. Muthu, M, et al.,(2014), "Leadership, Professionalism and their Strategies for LIS Services in Modern Era". *Dynamics of E-Resources and Digital Libraries*. Edited by Dr.P.Sivaraman, New Delhi: Avon Publications, pp. 108-122.
23. Muthu, M, et al.,(2015),"Stress Management: A Play for Vital Role in Libraries". *Vidyawarta Research Journal [Interdisciplinary Multilingual Research Journal]*, Issue-09, Vol-01, Jan-March, pp. 189-195.
24. Muthu, M. (2012) "E-Books: An Overview", *Information Studies*, Vol.18, Issue: 4, Oct, pp.253 -276.
25. Pemberton, M J & Nugent, C R (1995), "Information studies. Emergent field, convergent curriculum", *Journal of Education for Library and Information Science*, 36 (2) pp.126-138.
26. Sivaraman, P & Muthu, M (2014), "Digital Reference Service: A Play for Vital Role in Libraries", Paper Published-Souvenir in Honour of Prof.Dr.A.Manoharan, DLIS, Bishop Heber College, Trichy.
27. Sivaraman, P & Muthu, M, (2015), "Web 2.0: The Renaissance in Library and Information Management", *KIIT Journal of Library and Information Management*, Vol.2, Issue.1, Jan-Jun, pp. 64-71.
28. Strategic Thinking, Retrieved from:[<http://www.sergaygroup.com/Smart-Talk/Strategic-Thinking.html>] Accessed on 15.08.2015.
29. Varalakshmi, R S R (2009), "Future of Library and Information Centres in Knowledge Society of India: The Expected Role of Knowledge Professionals", *DESIDOC Journal of Library & Information Technology*, Vol. 29, No. 2, March, pp. 75-81.

Go Where the Users Are

Maya Carvalho e Rodrigues

Nirmala Institute of Education, Altinho Panaji Goa 403001

ABSTRACT

Marketing of products in industries is very much essential to increase sale and consequently to gain the profit, however in academic environment like university and colleges promotion and marketing of library and information sector is required to make the students and faculty aware of the various library services. To promote the collection in use it is necessary to market library products. Marketing of library and information products and services approach aims at determining the needs, wants and demands of the target clients through designing and delivering appropriate products and services more effectively for the purpose of achieving organizational goals and objectives.

Keywords: Library Promotion, Marketing of Library Services

1. INTRODUCTION

Academic libraries are finding that incorporation of marketing concepts and techniques can facilitate the achievement of important organizational goals. Marketing of library and information products and services is an area which is now beginning to attract the attention of research scholars, market researchers. Marketing approach is mainly useful to academic libraries to improve their image and to attract more and more students and faculty. It helps the library staff to upgrade their innovative knowledge both within their organizations and as a profession within the society. It is the need of the hour to adopt this concept. Libraries are discovering that by using marketing principles and techniques, they can understand better their users' needs, justify funding, communicate more effectively with a variety of external audiences, and achieve greater efficiency and optimal results in delivering products and services that meet the identified needs of their clients. Different marketing concepts provide libraries with the tools for collecting and analyzing useful data about information needs of customers, which assists in designing, developing and delivering appropriate services.

2. DEFINITION OF MARKETING

Marketing is a process which carries goods from producers to ultimate consumers. Marketing, in its broader sense, is the social instrument through which the material goods and culture of a society are transmitted to its members. Marketing, in the library context, refers to those instrument through which information (both raw and processed) are transmitted to its members.

Kotler has rightly defined: "Marketing is the analysis, planning, implementation and control of carefully formulated programs designed to bring about voluntary exchanges of values with target markets for the purpose of achieving organizational objectives. It relies heavily on designing the organization's offering in terms of target markets needs and desires, and on using effective pricing, communication, and distribution to inform, motivate, and service the markets."

Dragon neatly defined the concept of marketing and outlined its major aspects as "follows. "Marketing is a systematic approach to planning and achieving desired exchange relations with other groups. Marketing is concerned with developing,

maintaining, and/or regulating exchange relations involving products, services, organizations, persons, places or causes."

Zachert and Williamss considered that 'marketing is planning that focuses on products, place or mode of delivery, adjustment of cost/price to the market, and promotion to specifically targeted segments of the special librarian's market."

To sum up for the various activities in marketing. They are:

- Market research and customers' analysis
- Development of products and services
- Pricing
- Distribution
- Promotion
- Evaluation of products and services

3. LITERATURE REVIEW

Shapiro observed that marketing mix can be applied in marketing library and information services that is the four P's product, price, place and promotion. Products in Librarianship refer to services or general reference and information services offered by the library. Products are the information, reference, and supplementary services that add value to the traditional library services such as personal assistance, referral services, on-line data base searches, document delivery and interlibrary loan. Pricing in the library is usually that of time and effort the user spends in travelling to the library as well as the time and effort spent in searching for and examining library resources and cost of a forgone alternative the products offered. Price is important in marketing in the world of information as it is elsewhere.

4. NEED OF LIBRARY MARKETING OF LIBRARY SERVICES

- To promote the use of available reading material in the library and create awareness among the users.
- To optimize the use of information within limited resources and manpower.
- Limited Budget for library needs to market services and generate funds for library
- To improve the image of the library.
- Due to information explosion, readers require precise and correct information for their research and study.
- Organization of Information Literacy programme on regular basis at various level.
- Organization of workshops/ training programs about awareness of resources available in the libraries and Information centers.
- Organization of Training programs to library staff with modern technologies and expertise people.
- Attract the people by organizing book exhibitions of new books with the help of vendors or the material available in the library should be displayed at prominent place

Fidzani (1995) outlined the **OBJECTIVES** of user education as:

- to introduce students to facilities and resources in the library;
- to develop library skills;
- to make students independent users and learners in the library;
- to develop capabilities as self-sufficient users;

- to establish the library as the Centre of academic activity;
- to provide basic understanding of the library so that users can make efficient use of library material and services; and
- to educate users about information sources and resources and how to exploit such resources effectively and efficiently

Information marketing by university libraries in India is **ESSENTIAL** in order to:

- Promotion of the use of information resources;
- Create perception of need and thereby create demand;
- Ensure the optimum use of information.
- Improve the image and status of the libraries and library professionals.
- Tackle the problems of rising costs of reading materials, journals, and databases;
- Cope with the information explosion;
- Introduce cutting-edge information technology systems in library services;
- Balance shrinking funds;
- Save libraries from devaluation
- Save libraries from declining reader-support;
- Uphold the dictum that information is power.

5. SEVEN PRINCIPLES OF MARKETING IN TERMS OF LIBRARY AND INFORMATION SCIENCE

There are seven principles of marketing; these principles are also applicable to Library and Information services. These principles are Product, Price, Place, Promotion, Participants, Physical evidence and Process. These principles are described in brief.

- **Product:** Academic Libraries are providing good number of services to their users through various ways e.g. List of Additions (Whatever material added to the library it is communicated to users either printed list or through email). Now OPAC is accessible to all users through internet. Current Content Service, SDI service, Web based services etc. These services are the product of libraries. Hence library professionals have to promote and market their products among the users.
- **Price:** Price factor is important from the point of view of the budget of the Institution. Without budgetary provision, no library can purchase reading material. No library can be self-sufficient by considering the academic output of the institution, faculty improvement, students' growth; the institution has to make the provision in their budget. Not even for the reading material but for providing qualitative services, it requires financial provision. Internet connectivity should be provided to students with no extra cost.
- **Place:** Services are intangible; they cannot be normally stored, transported or inventoried. Services production cannot be separated from selling. In case of library services, personalized services like SDI are provided to the selected users by collecting what are the areas in which they require information. Library instructions shall be conducted either in the library or computer laboratory to provide hands on training to all segments
- **Promotion:** Promotion is another important phenomenon in marketing. It requires mechanism by which target groups are informed about the resources available in library and Information Centre. Promotion of what we have in the library. Users may not be aware or familiar with the library system. Hence it is

essential that every year new students are joined with the library and at the beginning of the academic year, they must be provided awareness programmes. Word of mouth campaign is the best mechanism for promoting the user of library services. The primary promotion tool is library instructions in the form of workshop, seminars, lectures etc.

- **Participants** :The success of any programmes is depend on the feedback of the participants hence participants involved in promoting and marketing of the library services provided by library professionals, their feedback will help to get the lacunas in the system and it will help to improve the services and library system.
- **Physical Evidence** :According to Shostack “ a physical object is self-defining ; a service is not “ Hence in educational sector the marketing task is “ defining for the services what it cannot define for itself “ Evidence for the service can be both peripheral and essential. Physical evidence can support the marketing programmes by providing adequate service to the library users. It can make the service tangible.
- **Process**:process is related to the process management, it consists of process planning , control, operation planning, facilities to be available with users, scheduling, quality of services etc.

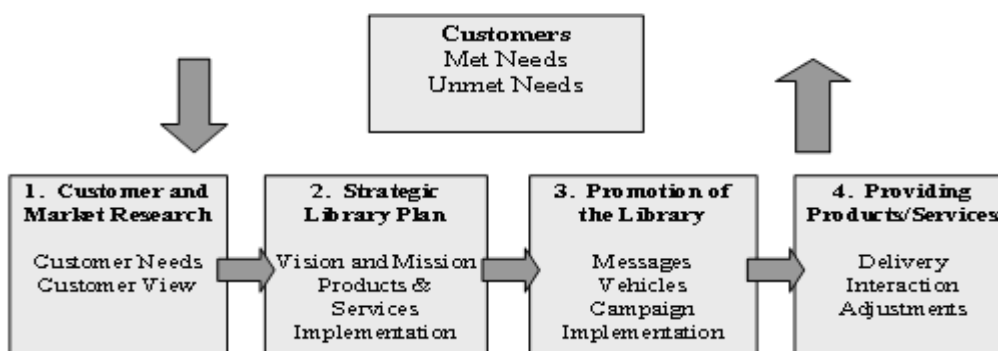
7Ps of Marketing Strategies of libraries	
7 Ps	Definition
Product	Products or services of the general reference and information service department. This is, of course, the information, reference, and ancillary services that add value such as personal assistance, referral services, online database searches, document delivery, and interlibrary loan.
Price	Pricing of use of the library is usually that of the time and effort the user spends traveling to the library, as well as the time and effort spent
Place	Place of service, based upon knowledge of the market of a library, is essential in order to identify users and their discrete information needs and wants. To expand the service area, the library may have branches, bookmobiles, or electronic access, etc.
Promotion	Promotion includes utilizing persuasive information about general information services, and communicating this information to target market segments that are potential users. Five kinds of promotion include: publicity, public relations, personal representatives, advertising, and sales promotion.
Participants	All human actors who play a part in reference and information services delivery, namely the library's personnel.
Physical Evidence	The environment in which the reference and information services are delivered that facilitates the performance and communication of the service.
Process	The procedures, mechanisms and flow of activities by which the reference and Information services are acquired.

6. STRATEGIES FOR MARKETING LIBRARY AND INFORMATION SERVICES IN ACADEMIC LIBRARIES

In order to sensitize and maintain good relationships with students and faculty the librarian has to see that he/she put in various efforts to market the library . Among these efforts are the introduction of current awareness service; exhibition and display, selective dissemination of information; bulletin boards; complaints/suggestion boxes,

cliente education course, electronic bill board, audio-visual services, online dissemination of information via the internet technology by creating links for current information on the library portal. Eye-catching displays, interactive web sites, aggressive advocacy, advertising, direct marketing, book sales, friends' groups, contests, good media relations, public presentations and other new technologies. Knowledgeable and enthusiastic staff members are also great promotion tools used to persuade the library users. Electronic resources in CD-ROMs are also displayed for awareness creation and they are made available to users free of charge upon requests for access. Current information on scholarships and other opportunities from newspaper, magazines and internet are photocopied and placed on the notice board for users' consumption.

Marketing Planning Process



A strategic marketing plan includes:

- Customer and Market research that generates data on customer needs and perspectives on library service.
- The context of current and future opportunities and challenges facing the library that allow it to clarify its vision, mission, and prioritized services.
- Long-term goals to achieve, such as “Faculty understands the value of the library’s role in supporting the campus’ teaching mission.”
- Objectives to accomplish, such as “A librarian will contact each new faculty member within the first term of the faculty member’s appointment.”
- The description of the desired elements of the library’s image as perceived by others.
- The most important key messages to deliver frequently and consistently to others through the most appropriate communication methods.
- Prioritized key audiences, such as library users, campus administrators, government officials, as well as how and when to communicate with them.
- Implementation of strategies, for delivering key messages and services as appropriate to key audiences.
- Evaluation for measuring outcome achievement that represents progress toward goals and suggests how to improve communication and service delivery.
- Incorporating assessment information into market research to adjust and improve the planning and service implementation processes

7. WHY MARKETING?

Information professionals must understand that it is essential to actively market their services. Library marketing is critical for any information professional in order to spread the word about their library. Marketing is not just about developing and promoting new services and products but also about bringing awareness to students and faculty to developed and implement with the ongoing enhancement of the services and products should follow. When the library is marketing its collections, in particular, the availability of new acquisitions like a new online patent database or a set of electronic journals, must be communicated to clients who need them. New services like online versions of examination papers, the development of an e-print archive of institutional research papers, the use of plagiarism detection software and online thesis submission must all be publicized to potential users. For new products or services, part of the planning must involve the creation of a marketing and promotional strategy and the allocation of responsibility to library staff to ensure that the plan is carried through.

To market a library's resources and information services is not difficult. Wolfe's (2005) observation, "Library public relations, promotions, and communications: a how-to-do-it manual" is a very useful guide for library marketing. A few suggestions for marketing the library services to the students and faculty

- Create a library web page for the users. A webpage is a good way of promoting library information services and resources.
- Emails containing new library resources and tips on finding information are of great value at the critical stage.
- Use library wall space. The library can display different language study tools such as bilingual dictionaries, English thesaurus, dictionary of synonyms and antonyms, subject-related dictionaries and encyclopedias.
- Attend academic lectures if the department you are responsible for has a prominent number of users. Librarians can meet users to discuss and gather information about their needs as well as to promote the offered information services.
- Links to "Help" services from all appropriate library web pages, where assistance may be needed

8. HOW THE ACADEMIC LIBRARIAN ENHANCE THE LIBRARY IMAGE

As the intellectual Centre for the college faculty and students by applying marketing concepts such as.

- Write stories for the university newsletter on topics such as new information technologies available at the library.
- Organize seminars to promote underused reference materials, underutilized reference skills, and new information technologies, such as online searching.
- Participate in freshman orientation; organize visit to the library and give a refresher course on research methodology.
- Work with department chairmen in collection management and publicize holdings within these groups.
- Include the library in the university's promotional literature.
- Reach out to disciplines where online research can benefit teachers and the students.
- Announce all new library services, acquisition and staff expertise

- To develop the products e.g. creation of databases, Union Catalogue, etc.
- To give wide publicity among the users, institutions affiliated to universities, list of additions are to be publishing in local newspapers etc.
- To establish good public relation with user community.
- To conduct surveys of the users to know their needs, requirements from the library and improve the services and research products as per the requirements.
- To provide career guidance and counseling service by the library to users

9. BENEFITS OF MARKETING ACADEMIC LIBRARY

- Marketing enables librarian or information manager to understand the real needs of users for taking good management decisions, which will in turn help in providing maximum information services to users more efficiently and effectively.
- Librarian or information manager is not only interested for the people who do use the services regularly. He is also interested in non-user groups. Marketing play a vital role to identify the information needs of non-users and helps to provide them with necessary information.
- Librarians and information managers need to present their services as an indispensable part of the organization and try to justify the claim that their clients/users cannot do their job efficiently or effectively without a library service. In this way, marketing techniques will help libraries and information services receive more funding from their patrons
- Marketing may help to improve the image of the library and information profession through collection of revenue performing different services to users.

10. CHALLENGES FACED BY LIBRARIANS

Challenges and difficulties faced by the students and faculty , but it is also very important to consider the challenges to information librarians. Here are some of the major challenges

- **Create a positive image**-One of the biggest challenges faced by information librarians is to create a positive image as most users hold negative attitudes towards librarians.
- **Be proactive**-All professional librarians have got to communicate with users about their services because exchanges between the service agent (librarians) and the customer (users) can elicit information about customer requirements, and also permit the services agent to explain the organization's products and how these can meet the customer needs(Rowley, 1998).
- **Build good relationship**-According to (Curry & Copeman 2005), quality reference service involves a relationship between the user and librarian within a "Cycle of Dimension of Service": willingness to assist user; knowledge (how to assist user); assessment (of user's need), and action (physically moving with the user).
- **Create a welcoming environment**- Librarian needs to develop the ability to create a welcoming environment, be patient, and build confidence with the users. When librarians are friendly and welcoming and helpful, users are encouraged into the library, whereas, in a library where the librarians are unfriendly and lazy, users are driven away. It is reported the personality of the librarian determines the rate of utilization of the library by its users.

- **Know how to communicate well with users from different cultures-** Information librarians need to learn ways of styles because the way people communicate varies widely between one aspects of communication style is language usage
- **Respect for cultural differences-language.** Librarians are not changing their style because of users communication difficulties; they are unaware of the language used and of the need to provide definitions or demonstrations of “peer reviewed”, “call number” “ full-text”, “subject heading” or “Boolean search”. (Wang & Frank 2002) recommend that information services in libraries that are sensitive to and encompass differences in culturally influenced styles are more likely to be responsive to the information needs and interests of users. As information librarians become more aware of cultural differences, they will become better listeners and communicators and could communicate better with users from different cultural background

11. CONCLUSION

Marketing approaches are proving to be effective in assisting academic libraries to adjust to changes in its client base and will ensure that services delivered continue to fit the needs. The products and services provided by libraries range from knowledge access and research support to printing services and the provision of information skills, supported by one on one assistance and advice. Strategies examining the distribution and delivery of services and their successful promotion will ensure that those who need information are provided it. Libraries need to achieve an imaginative design of service and products, and develop communication methods and a feedback mechanism to improve service. - Application of marketing techniques is veryimportant in improving the capabilities of library’sinformation services towards attaining satisfaction of users. And the market philosophy which also requires that library management focuses on the identification of users’ needs rather than library needs. Librarians and information managers seem to be reluctant to become fully involved in marketing their information products and services and when they attempt to market their information services they neglect or fail to understand the behavior of the user. The librarians should understand the nature of information, needs of users, the transfer process between people and information. Understanding of this new dimension of library and information services will help concerned policy makers in formulating appropriate plans and programs to make the library and information services most effective, andlong sustainable.

BIBLIOGRAPHY

1. Dhiman, A. K. (n.d.). Service Marketing mix and Library information centres. 456-460.
2. Dragon, A. C. (1979). Marketing the library. *Wilson library bulletin*, 53 (7), 498-502.
3. Gupata, D. K. (2003). Marketing of library and information services:Building a new disciplines for library and information science education in Asia. *Malayasian journal of library and information science*, 8 (2), 95-108.
4. Gupta, D. K. (2009). Marketing library and information services:A study of periodical literature. *Annals of library and Information sciences*, 56, 217-226.
5. Kedadamath, G. C. (n.d.). Marketing of library and information services.

6. Kotler, P. (1985). *Marketing of a non profit organisation*. New Delhi: Prentice Hall of India.
7. Madhusudan, M. (2008). Marketing of library and information and information services and Products in University libraries: A case study of Goa University Library. *Library Philosophy and Practice* .
8. Patange, J. T. (2013). Marketing of library and information products and services. *Global journal of human social science linguistic education*, 13 (1).
9. Patil, S. K. (2014). Library promotion practice and marketing of library services: A role of library professionals. *Procedia-Social and Behavioural Sciences* , 249-254.
10. Raina, R. (1998). Marketing in library and information context. *DESIDOC Bulletin of information technology*, 18 (3), 7-10.
11. Shapiro, B. B. (1981). *Marketing of non profit organisation*. London: Aslib.
12. Sharma, A. K. (2009). Marketing and Promotion of Library Services. *ICAL* , 461-464.
13. Spalding, H. B. (n.d.). Marketing academic libraries in USA-challenges and opportunities.
14. V, Z. M. (1986). Marketing measures for information services. *special libraries* , 61-70.
15. Veeramani, M. a. (2010). A study on the need of marketing techniques for academic libraries in Kuwait. *International Journal of Educational Research and Technology*, 1 (1), 72-78.

Skills and Competencies Required for Engineering College Librarianship

Bavesh N Patel

bhaveshlib@gmail.com

Gharda Institute of Technology, Lavel, Khed

ABSTRACT

In today's competitive times, a librarian needs to be a good administrator and quick learner. Today's engineering college libraries are dealing with traditional library services and Electronic collections, open access, digital archives management, data curation etc. To manage engineering library with new generation service needs skilled library professionals with unique skills and competencies. Engineering Library professionals should have excellent communication skills, good IT skills, a strong academic aptitude and an attitude to serve the people if he/she wants to join the profession. This paper will provide an overview of the competencies required for the engineering college library professionals in India.

Keywords: Skills, Competencies, Engineering college librarian, AICTE

1. INTRODUCTION

Librarianship is changing. It is expanding into content development and production, and extending beyond buildings, collections, and services as we have known them. Today's librarian is a combination of traditional knowledge and advanced technological know-how. ^[1]Modern librarians need to be comfortable and conversant with technology, be willing and able to speak in public, and possess people skills and a commitment to lifelong learning, as the profession and the expertise necessary for success are constantly changing. ^[2]

Today information can be obtained from virtually anywhere; the library remains the only central location where new information technologies can be combined with traditional knowledge sources to support the social and educational patterns of learning, teaching and research. But if the library is to continue its pivotal role in the college learning experience, it needs to evolve to meet changing pedagogies and learning modes, and the evolving needs of students and instructors. ^[3]

Information technology has led to new formats for library collections, and new roles for librarians. Science and engineering libraries subscribed to online systems, purchased CD-ROM counterparts to the print indexes, and offered mediated search services for the early online systems and full-text databases. As per the AICTE guidelines, modern Infrastructure and resources is available in engineering institutional libraries like text books, Reference Books, E-Journals from internationally reputed publishers, Internet facility, NPTEL Video, Library Automation etc. To run the engineering college library a library professional must possess diverse knowledge and new skills to perform his/her job efficiently.

2. WHAT IS COMPETENCY?

According to Oxford Learning Dictionary, Competency means “the ability to do something well” or “a skill that you need in a particular job or for a particular task”. ^[4]Whereas the Business Dictionary defines competency as “A cluster of related abilities, commitments, knowledge, and skills that enable a person (or

an organization) to act effectively in a job or situation. Competence indicates sufficiency of knowledge and skills that enable someone to act in a wide variety of situations. Because each level of responsibility has its own requirements, competence can occur in any period of a person's life or at any stage of his or her career.”^[5]

3. WHAT IS SKILLS?

According to Business Dictionary, A Skill means “An ability and capacity acquired through deliberate, systematic, and sustained effort to smoothly and adaptively carryout complex activities or job functions involving ideas (cognitive skills), things (technical skills), and/or people (interpersonal skills)”^[6] whereas according to Oxford Learning Dictionary defines skills as the “ability to do something well” or “a particular ability or type of ability”^[7]

4. ENGINEERING EDUCATION IN INDIA

The All India Council for Technical Education (AICTE) is the statutory body and a national-level council for technical education, under Department of Higher Education, Ministry of Human Resource Development. Established in November 1945 first as an advisory body and later on in 1987 given statutory status by an Act of Parliament, AICTE is responsible for proper planning and coordinated development of the technical education and management education system in India.^[8] The details of the approved programs/institutions and intakes for the year 2013-14 (up to October 2013)^[9]

S. N.	Programme	No. of Institutions	Intake
1.	Engineering and Technology	6214	2934580
2.	Management	3764	449829
3.	MCA	1571	122644
4.	Pharmacy	1419	168287
5.	Architecture	165	12870
6.	HMCT	119	9337
7.	Applied Art and Craft	67	4866

5. ENGINEERING COLLEGE LIBRARIANSHIP IN INDIA:

In India engineering colleges refer to the AICTE Approval process handbook guidelines for the development of college libraries. The approval process handbook mentions the required area of Central Library with reading Room, Books Title and volumes, required National and International Journals, Subscription of e-journals, Computers availability, Digital Library facility with multimedia facility, Reprographic facility, Document scanning facility, Document printing facility, Library books/non books classification as per standard classification, Availability of NPTEL facility, and Computerized indexing with bar coded / RF tagged book handling is desired.

Due to strict norms of AICTE about the engineering college library position is much better than the traditional college libraries approved by the UGC. But difficulty in the context of engineering librarianship is shortage of quality of manpower due wages, promotions are not accordance with AICTE.

The majority of workforce of library professionals in India comes to Engineering Librarianship after completing traditional mode of LIS curriculum and may not possess the science or engineering knowledge background. There are many LIS

Schools are in India but their incompetent curriculum creates the huge gap in skills required for modern librarianship in India. Our LIS School's curriculum doesn't have any scope of specialized librarian like Engineering Librarian, Medical Librarian, and Law Librarian etc.

If Indian Engineering Graduates want to compete with Global Engineers then we must have good Engineering Libraries with Specialized Engineering Library professional who possess the core knowledge of engineering.

6. COMPETENCIES TO BE DEVELOPED BY THE NEW AGE LIBRARY PROFESSIONAL WITH REFERENCE TO ENGINEERING COLLEGE LIBRARIANSHIP

The success of libraries as organizations is determined by the actions of individual who work in those libraries; the success of those individuals in carrying out the mission of those libraries is in large measure a reflection of the type and quality of leadership. Successful library leaders demonstrate certain skills that are instrumental in the delivery desired outcomes. We usually think of the demonstration of these skills as competencies. ^[10]

6.1.KNOWLEDGE AND SKILLS:

The basic Knowledge and Skills will be useful for novice library professional at the time of establishment of engineering college library.

6.2.ABOUT AICTE APPROVAL PROCESS HANDBOOK

The engineering librarian must have the knowledge about AICTE guidelines required for the libraries. The approval process handbook of AICTE provides all the guidelines related to the library. As per the guidelines mentioned in approval process handbook librarian have to submit the library statistical data to AICTE or affiliated universities wherever required.

6.3.ROUTINE LIBRARY MANAGEMENT:

- Procurement of Books: requisition, Quotation, Purchase order
- Technical Processing of Books: Accessioning, cataloguing, Classification, Stamping and label pasting, Bar-coding incase Library is automated.
- Serials subscriptions: Subscription of National and International print journals
- Circulation Service
- Photocopying

6.4.LIBRARY AUTOMATION:

The Library automation, because the library automation will help you in easily searching of information (Books, Journals, CD's) available in library and will save the time of Library professional as well library user. Library professional must be aware of:

- What are the popular Open Source and Commercial Software available in nearby market?
- Is available library software compatible with Library Standards?
- Are you conversant with Open Source Library Software (Koha, Newgenlib, and E-Granthalaya)?
- Support service is available in case, you prefer commercial software?
- How will you enter Library Books data? By manually or by importing from Excel sheet?

- Whether imported data is accurate or not? If not then you have edit each record manually. It will be time consuming activity but it will be authentic data for forever reference.
- How barcode can be generated? Do we require barcode printer? What data should be printed on barcode (e.g. Class No, Accession No etc.)?
- What are the various reports can be generated from this library software?

6.5.ONLINE BOOK PROCUREMENT:

To save the time in procurement books the prefer the e-commerce website like flipkart.com, amazon.com, sanpdeal.com, sapnaonline.com and much more. Many books are available in these websites with huge discounts. The library professional must insist to the management, for the procurement of Books through this e-commerce website.

6.6.ONLINE JOURNAL SUBSCRIPTION:

As per the AICTE it is mandatory the technical/engineering institute to subscribe the online journals. Follow the procedure for the subscription of online journals for your library.

The online journals subscriptions are available for calendar year. I.e. January-December cycle.

- What package you have to subscribe for the calendar year?
- What are the vendors is providing the subscription service for individual package?
- Receive the pro-forma invoice from the authorized vendor.
- Please confirm the Goods Office Committee (GOC) rates for the foreign currency.
- Make the payment as per the term condition.
- How will you provide the online journal access to your user? User name password basis or IP based authentication? If you wish to provide the IP based (it is preferable) access to your user then you have to give the global IP provided by the Internet Service Provider (ISP) of your institute and it will be available with your system administrator. The global IP will be unique globally for your institute. This IP you have to give online journal provider. The user will be automatically authenticated when he will access the journal from institute Local Area Network (LAN). In many cases your institute name will be published at the home page of subscribed online journal provider.
- The negotiation skill required with E-journal provider regarding payments, legal terms and conditions.

6.7.BUREAU OF INDIAN STANDARDS - BIS

Some engineering curriculum required standards as part of fulfillment engineering course. Earlier it was difficult task to procure the BIS standard for library. Now, the same standards are available online and can purchase the BIS standards online for our library by making quick online payment. To access the BIS standard purchased from BIS, we have to install the software provided by the BIS.

6.8.OPEN ACCESS RESOURCES IN ENGINEERING EDUCATION:

Now a day's many open educational resources from reputed universities for engineering education are available freely through internet. It is known as Open Educational resources (OER), Open Course Ware (OCW). The library professional of engineering libraries must be aware of these resources and literate the students how to use these resources for accomplishment of engineering degree. The following are the prominent OER available worldwide:

1. MIT Open Course Ware: <http://ocw.mit.edu/index.htm>
2. NPTEL (India) IIT's Video: <http://nptel.ac.in/>
3. Open Learn: <http://www.open.edu/openlearn/free-courses>
4. E-Ghyankosh (IGNOU): www.eghyankosh.ac.in
5. TUFTS OpenCourseware Repository: <http://ocw.tufts.edu/TuftsOER>

7. AWARENESS ABOUT TECHNICAL ENABLE LEARNING INITIATIVES IN INDIA

7.1.NATIONAL MISSION ON EDUCATION THROUGH INFORMATION AND COMMUNICATION TECHNOLOGY (NMEICT)

The Government of India has initiated a project on National Mission on Education through Information and Communication Technology (NMEICT). The objective of this project is to provide NMEICT network connection to universities, colleges and institutes all over India. The NMEICT invites proposals from the teachers, researchers and industrial experts to enhance the NMEICT project in the form of e-content, e-tools, etc. ^[11]

Many projects like developed under the NMEICT are NPTEL, Virtual Labs, Talk To Teacher, Spoken Tutorial, E-Yantra, Fossee, E-Kalpa, Robotics For Education, Virtual Learning Environment, Aakash Educational Portal etc. Library professional take initiative to advantage from projects started under the mission NMEICT for institute library and users.

7.2.COMPETENCIES THAT REQUIRED TO POSSES IN LIS PROFESSIONAL:

TECHNOLOGICAL KNOWLEDGE COMPETENCIES:

- Operating Systems- Windows, Linux
- MS-Office, Open Office: Word Processing, Graphics, Excel and Presentations
- Database Management Systems
- General Purpose programming
- Web page development and Content Management: HTML, PHP, Joomla, Drupal

7.3.Social Media:

Many world libraries are using social media to fulfill a range of objectives, with most focused on promotion. The library professional must aware about what are the social media available and how can be used effectively for the benefit of its user.

7.4.EMERGING TECHNOLOGIES IN EDUCATION:

The acceptance of emerging technologies in education will force the change in services of library. The professionals of engineering libraries develop the necessary skills for providing new services for the following technologies.

- Cloud Computing
- Mobile Technology
- Game-based learning
- MOOCs
- Learning Analytics
- Internet of Things (IoT)

7.5.LEGAL ISSUES RELATED TO THE ACADEMIC LIBRARY ENVIRONMENT

- Knowledge of copyright (basic understanding of Indian copyright legislation and how it applies to libraries-photocopying, fair use etc)
- A knowledge of various license models related to service and resource provision.
- Knowledge of Intellectual Property Right (IPR) and Digital Right Management (DRM)

7.6.INTERPERSONAL SKILLS

The librarians should have the following skills:

- Adaptability, flexibility, and eagerness for new experience and knowledge
- Change Management
- Decision Making
- Initiative
- Innovation
- Writing skills:
- Presentation skills:
- Marketing

The Library professional can obtain an internationally recognised English language qualification who wish to boost your career, study in an English-speaking country or simply gain a certificate to demonstrate your level of English correctly we have the right exam for you. The wide range of English Language examinations are conducted in India by Cambridge University through British Council offices in India. The above mentioned skills are covered in this English Language Examination. The library professional must take this opportunity to become skilled at their English Language skills.

8. ADVANCED LEVEL COMPETENCIES:

8.1.EMBEDDED LIBRARIANSHIP:

‘Embedded librarianship takes a librarian out of the context of the traditional library and places him or her in an “on-site” setting or situation that enables close coordination and collaboration with researchers or teaching faculty.’ It may further enable librarians in the research environment to collaborate with the faculty members or researchers and be integral part of research teams in undertaking projects. ^[12]

8.2.INSTRUCTIONAL DESIGN (ID):

Instructional design is a process for systematically designing effective instructional materials and learning opportunities. Good instructional design involves needs assessment, development, evaluation, implementation, and maintenance of the learning system. ^[13]Instructional design is one of the newer educational trends in the learning/educational field. The acquaintance of ID will open new opportunities for aspirant engineering library professionals.

8.3.FINANCIAL LITERACY:

People need help understanding money. Your library can play an important role in providing effective, unbiased financial and investor information. Engineering libraries welcome to use these ideas and resources to start a financial literacy program in your library.

9. GLOBAL AWARENESS:

9.1.ACCORDING TO IMLS^[14] THE LIBRARY PROFESSIONAL

- Use 21st century skills to understand and address global issues
- Learn from and work collaboratively with individuals representing diverse cultures, religions, and lifestyles in a spirit of mutual respect and open dialogue in personal, work, and community contexts
- Understand other nations and cultures, including the use of non-English languages

9.2.READING SKILLS MUST FOR 21ST CENTURY LIBRARY PROFESSIONALS:

The academic librarian must spare the time in reading of various types of material related to his/her professional life and personal life. The world is very changing fast and keeps the pace with global development; the reading habit will help them to take right decisions at any stage of life for career development. Without this skill the library professional may high chance become obsolete in future.

10. CONCLUSION:

Enormous resources are available about competencies for library professional available reputed universities website across the world. The competencies mentioned in these resources may vary in different types of libraries. It is not easy bringing together all competencies required for the fulfillment of engineering library professional. These competencies can be developed by hard work, enthusiasm, with open mind and desire of individuals who works in engineering librarianship in colleges.

REFERENCE:

1. Campbell, Cen (2013). Start-Up Librarian: Expanding our skills into new arenas. Retrieved October 29, 2015, from <http://www.americanlibrariesmagazine.org/article/start-librarian>
2. Schwartz, Meredith (2013). How to Become a 21st Century Librarian. Retrieved October 20, 2015, from <http://lj.libraryjournal.com/2013/03/careers/how-to-become-a-21st-century-librarian/#>
3. Are libraries in India ready for the 21st century learning process? (2014). Retrieved October 20, 2015, from <http://indiatoday.intoday.in/story/are-libraries-in-india-ready-for-the-21st-century-learning-process/1/379741.html>
4. Competence (2014). Retrieved October 10, 2015, from <http://www.oxfordlearnersdictionaries.com/definition/english/competence>
5. Competence (2014). Retrieved October 10, 2001, from <http://www.businessdictionary.com/definition/competence.html#ixzz3KARKik2u>
6. Skill (2014). Retrieved October 10, 2001, from <http://www.businessdictionary.com/definition/skill.html#ixzz3KASpaWZp>
7. Skill (2014). Retrieved October 10, 2001, from <http://www.oxfordlearnersdictionaries.com/definition/english/skill>
8. MHRD (2014). All India Council For Technical Education (AICTE). Retrieved October 5, 2015, from <http://mhrd.gov.in/technical-education-9>

9. MHRD (2014). Annual Report 2013-2014. Retrieved October 5, 2015, from http://mhrd.gov.in/sites/upload_files/mhrd/files/document-reports/AR2013-14.pdf
10. Stephens, S. A & et.al (2009) Developing Core Leadership Competencies for the Library Profession. Retrieved October 12, 2015, from <http://llama.metapress.com/content/m374189w0q200307/fulltext.pdf>
11. NMEICT (2014). Retrieved October 12, 2015, from <http://www.nitdgp.ac.in/nmeict-ws/index.html>
12. Pujar S. M. (2014, December 1). Embedded librarianship: Are we ready for it?[Blog] Retrieved October 15, 2015, from <http://spujar.wordpress.com/2011/04/07/embedded-librarianship-are-we-ready-for-it/>
13. ACRL (2014). Instructional Design for Librarians: The What, Why, and How of ID. Retrieved April 20, 2015, from <http://www.ala.org/acrl/conferences/instructionaldesign>
14. IMLS (2015). 21st Century Skills definition. Retrieved April 2, 2015 from http://www.imls.gov/about/21st_century_skills_list.aspx

USEFUL LINKS:

BIS Standards Online: <http://www.standardsbis.in/Gemini/home/Home.action>

E-Content by MHRD: <http://mhrd.gov.in/e-contents>

OCLC Webjunction Competency Index for the Library Field 2014: <http://webjunction.org/content/dam/WebJunction/Documents/webJunction/2014-03/Competency-Index-2014.pdf>

English Language Examination: <http://www.britishcouncil.in/exam/cambridge/which>

Seven Simple Steps to Improve User Satisfaction in Library

Anand Dodamani

anand.dodamani@tiss.edu

Centre for Library and Information Management Studies
Tata Institute of Social Sciences, Mumbai

ABSTRACT

“A satisfied customer is the best business strategy of all” says Michel LeBoeuf. It is true. Even M. K. Gandhi had this feeling when he said, “A customer is the most important visitor on our premises. He is not dependent on us. We are dependent on him. He is not an interruption in our work. He is the purpose of it. He is not an outsider in our business. He is part of it. We are not doing him a favor by serving him. He is doing us a favor by giving us an opportunity to do so”. This paper enumerates and describes seven simple strategies being practiced at Sir Dorabji Tata Memorial Library, Tata Institute of Social Sciences to satisfy its users. These can be adopted by other libraries to improve their user satisfaction.

Keywords: User Satisfaction, Library Usage, User Studies.

1. INTRODUCTION:

This paper enumerates and describes seven simple strategies being practiced at Sir Dorabji Tata Memorial Library, Tata Institute of Social Sciences to satisfy its users. These can be adopted by other libraries to improve their user satisfaction.

1.1. MAKE LIBRARY USERS FEEL IMPORTANT:

Making users feel important is the first step towards improving the user satisfaction. Library, if it is academic, may receive a variety of users including students, teachers, staff, research scholars and visitors from other places. Whenever a user comes to any service point in library, receive him with a smiling 'hello'. Then ask the person how you could help him. This approach creates a pleasant environment and encourage the user to express his needs freely without holding them back.

Try to help people by going out of your way to satisfy their information needs. For example, if you are working in Book Acquisition Department and receive any query from user pertaining to some other department in the library, then please try to attend it (if it is within your limits) instead of making the user run from pillar to post. Or else, guide the user to the concerned department with complete details like whom to contact and where. When people feel important, they are more likely to be happier with your services. As Kate Nasser says, 'Caring words cost nothing'. So practice this strategy to see the positive change.

1.2. CONDUCT PERIODIC USER SURVEYS:

Surveys are very important. They are the most reliable methods of collecting real feedback from the users. Library being a service oriented institute, should focus more on conducting periodic surveys to understand the effectiveness of its services. Library surveys help to improve, modify and discontinue the existing services, if essential. They also support the decision to start or not to start any new service, if planned. It is through periodic surveys that the library can obtain vital statistics with regard to library usage, users' behavior, effectiveness of collection, attitude of the staff etc.

Today a number of online tools are available for conducting user surveys. Survey Monkey, Typeform, Gogle Forms, Survey Planet etc. are few example for them. These tools are cost effective, less time consuming and more reliable. Library can create their own survey questionnaires and send them online to their users with a request to respond. The online surveys fetch more number of responses if kept small and simple. The data and information obtained through such surveys will be very helpful in reducing the number of unhappy users and thereby improve the user satisfaction.

1.3.EDUCATE AND EMPOWER THE USERS:

'Education is the most powerful weapon we can use to change the world' says Nelson Mandela. The library should understand this fact and conduct regular orientation programmes on how to use library. Small workshops on 'Information Literacy' can be designed focusing on specific group of users. Whenever there is any academic gathering in the campus, the library should try to use that opportunity to spread awareness about the new databases added to the collection, new services introduced and about using reference management tools etc. These small actions, if implemented meticulously, can not only promote library services but also bring more visibility to library in the campus.

1.4.PRACTICE TEAM WORK:

'Talent wins games but, teamwork wins championships'. Teamwork is very important in serving library users effectively. Even though each staff member in library works in a specific department with a specific job profile, they should develop a spirit of teamwork. Library managers should spend more time with their colleagues. It will help them understand their work and suggest ways to improve the quality. When both the staff and officers in library work together, respect and support one another, library can achieve its goal of user satisfaction.

1.5.RESPOND QUICKLY TO USER QUERIES/ FEEDBACK:

Library is a service point and it is natural for it to receive number of queries, complaints and suggestions from the user community every day. The library managers should patiently go through the concerns expressed by their users with regard to library collection and its services. They should attend the queries and listen to the concerns in order to understand and resolve them. A quick response is worth a thousand logical responses. Hence, the library managers should try to respond to the queries received through letters and emails as early as possible. This very act of the managers will be the first step in addressing the concerns expressed by unhappy users in library.

1.6.NEVER SAY 'NO' FOR ANY GENUINE REQUESTS:

Library staff and managers should adopt a golden rule of 'never saying no' to their library users. Sometimes, the user may request for a book or any journal article which is not in your library collection. In that situation, the library should try to fulfill that request by arranging the material through Inter Library Loan service. The staff should put their heart and soul together in co- coordinating with other libraries in the arrangement of books on Inter Library Loan.

Sometimes, users may request for the things which otherwise are not permitted as per the established rules of the library. If the requests are genuine and do not pose any serious threat to the transparent functioning of the library, the managers may consider such requests to help the users. Such kind acts will improve the image of library as an entity committed to the service and information wellbeing of its users.

1.7.MAKE EVERY DEPARTMENT UNDERSTAND THE IMPORTANCE OF CUSTOMER CARE:

In libraries, the User Services Team or the Book Circulation Desk is usually responsible for the smooth functioning of the library services. The staff working in this department are very much aware of the importance of customer care services and are trained in managing and maintaining the business relationships with the users. It is true that the users first approach the user services desk when they come to library and it is essential for the staff working in this department cultivate the culture of good customer care services.

The other departments in library viz. Book Acquisition Department, Periodicals Department, I.T. Department etc. are also equally responsible for the public image of the library and act very cautiously and diplomatically when interacting with any library user. The success of good customer service and great customer satisfaction can be achieved only through the collective efforts of the staff members.

2. CONCLUSION:

To sum up, the user satisfaction in library depends on many small things that the library staff do every day knowingly or unknowingly. From greeting the library user with a simple smile to helping him get a rare book from other library, every act of each of the library staff contribute towards the success of achieving great customer satisfaction. The staff should understand the information needs of their users correctly; should act honestly and transparently while providing library services; should be willing to listen to the problems and concerns expressed by the users; should be open to any suggestions. The seven points discussed above, if considered and followed seriously, would improve the user satisfaction in library.

REFERENCES:

- Ranganathan, S. R. (1957). *The five laws of library science* (2nd ed.). Bombay,: Asia Publishing House.
- Edwards, B. (2009). *Customer service skills*. Worcestershire: ABC Training Solutions
- Edward, Stephanie. (2009). *Best service guide for customer service professionals*. Wiltshire: Customer 1st International Ltd.
- 24 quick-fire tips to improve customer satisfaction. (n.d.). Retrieved January 19, 2016, from <http://www.callcentrehelper.com/24-quick-fire-tips-to-improve-customer-satisfaction-38154.htm>
- Why customer satisfaction important: 6 reasons. (2015). Retrieved January 19, 2016, from <https://www.linkedin.com/pulse/why-customer-satisfaction-important-6-reasons-salah-al-ghamdi-mb>

Need for Change Management in Libraries: A TISS Experience

Yogita Parmar¹, Rakhi Tomar² and Brijesh Kumar Verma³

¹*yogita.parmar@tiss.edu*

²*rakhi.tomar@tiss.edu*

³*bkverma@tiss.edu*

Tata Institute of Social Sciences, Deonar, Mumbai

ABSTRACT:

In today's technological environment change management has become very important factor in the modern library and information services. Libraries are putting their maximum effort to deal with the Change Management strategies to serve the latest need of the library patron. This paper discusses Why change management is needed in libraries and areas of change management in the libraries to facilitate their expansion, resources management and service performance. Libraries and information Centre can prove the value of their staff, services and existence to management through effective change management techniques adopted by them in rendering effective services to its patrons. The key to success of libraries lies in their ability to predict, manage, and exploit change in all areas of work. Change management emerging as a key factor which must be added to any information professionals skill. The library and information sector can take the opportunity to control the organizational information strategies, coordinate and drive the technologies and promote library use and benefits through proper change management techniques.

Keywords: Library and Information Centre, Change Management, Staff Training, Staff Development.

1. INTRODUCTION:

Change has always been a norm of life. The developments in technology, increasing needs of society, and the emergence and growth of global organizations are some of the factors that have contributed to the need for change. Planning, implementing and managing change in a fast changing environment is increasingly the situation in which most organizations now work. People are normally resistant to change as change affects structures and procedures, job security and terms and conditions, social structures etc. Identification of the need for change and leading organizations through that change, therefore needs effective change management.

2. WHY NEEDED:

Due to information explosion vast amount of information is available on the Internet, and its widespread use, really presents librarians with an opportunity to play multi-dimensional role. In the present technological or Internet era the professionals have to manage different types of roles and services provided by them. Librarian has to work as:

- **Library Manager:** Today's librarians act as technical processors of information taking care of information quality.
- **Information Manager:** To meet the different information needs of the user librarian need to know how to manage and deliver appropriate information services.

- **Information adviser or instructor:** Librarian should ensure that user & staff know how to access relevant sources of information (literacy).
- **System & Networking:** For delivery of information to their users in an appropriate manner librarians need to develop and design appropriate systems.

The present scenario represent that Library and Information professionals are multifaceted group of employees. In order to maximize these talents and resources available, library professionals requires to update their skills and to have necessary knowledge to survive in this dynamic environment to continuously move in ahead with the society.

Factors affecting change management in libraries can be internal or external. Minor factors affecting change management in libraries are such as house reallocation of responsibilities, alteration in Library timings, or minor variations in the library arrangement or change in add-on service or new responsibility etc. Change in librarian or head of the organization, New Goal, re-engineering, restructuring, change in the work process, upgrade or use of new technology or automation of entire process etc. External factors of change are mergers, new management, glottalization, collaborations, funding increases or cuts, new need of the patron and competition.

3. FACTORS AFFECTING CHANGE MANAGEMENT IN LIBRARIES:

1)Globalization: Due to globalization interactions of different libraries is possible across continents, countries and cultures. Technological tools connect institutions, nations, continents and integrate resources and services. Terms like global villages, global communities and global networks are all the outcome of technological changes. This has brought the challenges and added new responsibilities to library professionals as how to exploit the potentials of IT to access and making available the information to the end-users.

2)Localization: Due to the availability of vast volume of information on the web, the most serious concern of web users is that the information on the web becomes outdated very fast. Websites for example change location or some are here today and tomorrow gone completely. Appropriate tools and techniques must therefore be designed to archive vital information for future retrieval and use.

3)Digitization & Preservation:The globalization and localization of information depends on digital technology. There are now virtual libraries, communities, cyber villages and cyber-cultures. Information professionals need to understand the changes brought by the digital systems and its impact on information storage, retrieval and communication possibilities.

4)Migration: E- books, E- journals, electronic universities, E-learning, E- Publishing, E-commerce, electronic banking and electronic libraries all this reflects the migration of our systems to electronic formats. This migration possess challenges and changes in library services. Library professionals need to understand how this migration system helps in providing effective services to patrons and how electronic publishing impact on academic scholarship.

5)Scholarly Communication:Due to the changes in scholarly communication in the new media environment. The information professionals need to understand the challenges of how to manage the new media in a hybrid environment along with

traditional paper-based resources. Information Professionals needed to possess new skills in handling of multimedia, electronic, digital or virtual resources.

6)Information Technology Perspectives:Information Technology have influenced all spheres of human endeavor. IT has their impact on library and documentation centers. The main features of IT changes & techniques include:

- Increased computer usage to speedier processing
- Good data storage – for example, optical storage media
- Digitization of information – text, graphics, photographs speed, sound video
- Data transfer between different systems and media
- Improved telecommunication, such as ISDN with greatly increased capacity for decreased size of equipment; increasing reliability of hardware and software
- Easy integration of various activities; cooperation, Consortium and formation of network systems. All this features of IT emphasis the change management issues of the library and information centers.

4. AREAS WHERE CHANGE MANAGEMENT CAN BE IMPLEMENTED :

We are living in a period of significant change work places are also changing from hierarchical closed systems to a new open, flexible and often virtual environment. In library and information centers change management issues can be adopted in the following main areas of work.

1. Collections: Traditionally collections were accessed by users using handmade card catalogues either by tittle, author, series etc. With the implementation of e-technology resources can be accessed from anywhere in the world. Therefore libraries can adopt change management strategies in E-Resources, Latest and Updated Collection On line Resources, INTERNET, Intra net Access Need based Collection

2. Cataloguing: The major changes nowadays observed by the most of libraries is card cataloged is replaced by **E-Cataloging**, Meta data, Bibliographies Bibliographical Database, On line Databases OPAC and Web OPAC, Union Catalogues.

3. LIS Professionals & Staff Services: The staff of the modern library are more Approachable, Knowledgeable, Competent, Skilled Customer Service Excellence, User Friendly. Therefore LIS staff need to upgrade their skills according to the new skills introduced in LIS field.

4. Access to other Libraries:With the introduction of new services such as document delivery services and Interlibrary loan services new changes brought about in library services are Flexibility Reading Promotional Activities, Events Book Readers Clubs, E-Newsletters, E-mailers Library Orientation, Feedback and Suggestions such changes need to be incorporated by libraries accordingly.

5. Information Technology: In the present era major changes observed in Information Technologyfiled are such as High speed computers, Servers, Web servers Automation, Internet Access, Wi-Fi, Library Web Page, RSS, Library 2.0, RFID Digital Library, Blogs, Institutional Repositories

6. Help desk: Major changes observed in user oriented services are Customer Service Desk, Dedicated Help Tele. Line Integrated Information Desk, Research Desk E-Help desk, Inquiries, Global Reach.

5. WHAT CHANGES NEEDED:

What are the necessary changes needed in the libraries? What indicators will signal success? What to change in the library and information service environment can be viewed from various perspectives as follows:

1. Digital Libraries: In today's technological era digital libraries are likely to replace traditional libraries, such as an on-line card catalogue replacing a book collection. The reason for this could be that the digital medium tends to be better for searching & reading than the physical medium. Therefore knowledge about digital library and the skills required to build up digital collection needed.

2. Distributed Library System: Libraries today provides document delivery at the doorstep. Distributed Library is the new version of the Mobile Library and available at Internet. Here there is no need for the library patron to visit library to borrow books, they can easily search on line catalogue on INTERNET and also can raise request to borrow the books or documents. The library delivery person will deliver that book at the doorstep and keep process cycling. These changes can be implemented by all Libraries to improve their services and full fill the need of the readers at their door.

3. Institutional Repositories: The progress of modern technology in fields of information and Internet has made Institutional Repositories a prime field to carry out open access resources. The important functions of IR is the optimization and sharing the digital resources, information and knowledge via web based network technologies to satisfy user's demand for instant full text information retrieval from any desk, even outside the library. An Institutional Repository provides on line collection, preservation, and dissemination of information. Library include materials such as research journal articles, before (preprints) and after undergoing peer review, and digital versions of theses and dissertations, administrative documents, course notes, or learning objects. Therefore libraries can develop Institutional Repositories to meet the emerging and the changing needs of users.

4. Library 2.0: Library 2.0 includes on line services like the use of OPAC systems and an increased flow of information. With Library 2.0, library services are constantly updated and re valuated to best serve library users. Library 2.0 facilitates the design and implementation of library services by encouraging feedback and participation. The critical issues involved in change management is how to make these changes generally acceptable within the libraries. Thus, the issue of participation, manipulation and resistance become of some significance in the management of any type of change. All of these issues are strategies to influence the response of individuals within the organization to the changes.

6. IMPACTS AND CHALLENGES FOR LIBRARY AND INFORMATION SERVICES:

There are various developments which have provided new challenges for library and information services :

1. From Developments in Information Technology: Due to the developments in Information technology vast amount of information is available on web. Users are now able to access any information from any part of the world. The result is that users hardly visit the libraries nowadays. Because of Digitization the information is delivered in electronic form, and users are becoming increasingly reluctant to use physical materials, perceiving the Internet to be the answer to all their informational needs. Due to advances in Information & Communication technology the end-user access requires training and real-time support, and expert database searches demand subject knowledge. Therefore there is need for trained information professionals who are prepared to accept changes in their roles.

2. From the Changing Economy: The demand for information is increasing at a very high speed and delivery and high productivity will be essential for the library in order to compete with other services that are now available. Fluctuations in the economy directly affect the library's growth, the services it can offer, its staffing levels, and its ability for strategic development. Conflicts between budgetary constraints and the desired level of financial resources must lead to a move towards providing services that will generate income and improve funding, as cost-effectiveness and efficiency become increasingly important to the library's survival. E-commerce may empower the traditional process of library work, and may provide opportunities for new partnerships.

3. From the Changing Educational and Learning Environment: The learning needs of library users are changing. Lifelong learning requires that varying levels of informational materials be available to users at all different stages of the learning process. Due to the increasing diversity of users the library professionals need to be a subject specialist. In addition, the development of hybrid and virtual libraries means librarians must acquire new competencies and skills. Libraries need to change their services according to the advances in learning environment. The role of the librarian must change with them. Due to the advances in electronic communication the user's dependence on the traditional library is reduced. In the future, librarians will have to handle more complicated legal, ethnic, technical and advocacy issues

7. RESPONSES OF LIBRARIES TO CHANGES IMPLEMENTED:

1. Responses To Developments in Information Technology: The Developments in information technologies have provided opportunities to libraries to provide innovation-driven and customer-oriented services. With the development of the electronic and digital collections, libraries are being transformed they now range from a physical entity through hybrid operations to the virtual library. Libraries provides proactive support and training to users and are focusing on supplying access to information resources, acquiring them, using the full range of appropriate technologies now available. Useful information resources are being selected via the Internet, organized and made easily accessible to the user. These collection of Internet Resources pages are being maintained by professional staff. Librarians are now also being trained to provide deeper subject knowledge. They now support the new technological innovations such as Internet and are actively involved in collaborative digitization projects.

2. Responses To the Changing Economy: Nowadays libraries have begun to seek financial resources from business sponsors. Libraries are using their consortia power to obtain better prices for information resources. Libraries maintain partnerships between entrepreneurs, government, schools and media by developing diversified programmes. Libraries are now applying the principles of e-commerce to the library

work process and are adapting business system design methods to library management.

3. Responses To the Changing Educational & Learning Environment: Libraries are adapting to the changing educational and learning environments by making their resources both physical and on line resources available to the users via electronic networks on 24/7 basis with the support of I C T. Libraries nowadays are creating user profiles where they can develop a collection that reflects the needs of the whole community there by attracting all social groups. Libraries are also developing cooperative on line learning and educational programmes aids and are training staff to cope with changes in the learning environment.

4. Responses To Changes in Scholarly Communications: Libraries are monitoring changes in scholarly publishing by providing advice, for example on journal prices; by pointing scholars towards journal cost- effectiveness; by encouraging appropriate publishing, for example in reasonably-priced journals; and by finding alternatives to print resources, such as electronic publishing and research archives.

8. HOW CHANGE MANAGEMENT ISSUES ARE BEING HANDLED BY SDTM LIBRARY :

1. The software migration from Slim++ to Koha:

The main purpose behind adopting Koha software is to develop Networked Library System for all four TISS campus. The history of library automation in SDTM Library began from 1994 Computerization Started with SLIM DOS based System. Later on in 2014 SLIM Lx Linux based system was introduced for two campuses. In 2014 LMS Migrated to Koha which interrelated FOUR Campuses (Mumbai, Tuljapur, Hyderabad, Guwahati). Factors that have contributed to the need for new software are the earlier software had become obsolete and no development taking place on old SLIM Lx version (New product SLIM 21 had been launched) which was having Dull Interface, Not Web based, Cannot support Multi Campus Libraries. Prohibitive cost for new version.

How Data Migrated from Slim to Koha software:

- To bring Data back Up from SLIM (PostgreSQL)
- Took help from Algorithms (SLIM)
- Extracted data from PostgreSQL tables from slim software
- Exported data in Excel Sheets to be validated

Data Validation :

- Segregating bibliographic data into existing item types
- Converting them into Excel sheets of manageable numbers
- Make small teams of 2-3 people to manage work
- Validating records
- Opportunity to clean up data
- **New coding pattern for categories :** Patron and Item Types
- **Bar-Codes:** Prefix with Campus names (T00001, H009876) Changed Barcodes of all other campuses except Mumbai
- **Patron Codes:** Common categories for all campuses FCL for faculty Group. Differentiate by MF001, TF001, GF001, HF001.

What changes were observed so far is that around 1,75, 000 bibliographic records were incorporated in new software, Over 3 lakhs patrons visit OPAC, 51,000 transactions (Issue/return/renewals) were done across four campuseskoha@tiss.

2) Data Base Searching Facilities: Data base searching facility is available to students in campus as well as Off-campus On line Access. The off campus on line access is via EZproxy Server. The full text resources is available in pdf version like Ebsco, Emeralds, Manupatra etc. The bibliographic data base like JCCC web of science, ISID, IBIS etc.

3) Working hours: Library access facility is available to students on 24x 7 basis. The staff are working in different shifts in library, so that students can avail maximum benefit of the library services. Library is kept opened on Sundays as well as on public holidays. The issue counter is opened from 9-am -8 pm on normal working days. On public holidays and Sundays counter timing are from 10- am -4 pm.

4) Students Strength: The intake of students is high every year. Students from Masters, Diploma, Full time and Part time Scholars as well as Executive Post graduates students. With the increase in the students strength new computers and new reading spaces and infrastructure are being provided.

5) Users Behaviors: The information needs of the users varies according to their course content. Considering the needs and expectations of the users library is adopting the change management techniques accordingly.

6) Cyber Library: Earlier before the establishment of cyber library the students were having access facility for resources mainly from 9 am-9 pm using the infolibnet Centre of library. With the development of cyber library students can use library facilities on 24x7 basis. There are separate Cyber Libraries for Master's Students and Research Scholars, which have more than 150 work stations. This provides 24/7 facilities it provides seamless access to e-books and e resources.

7) M K Tata Memorial Learning Centre for Visually Challenged: Earlier Students use to accompanied with them one reader who will usually helps them in reading the contents of the book and making them understand the each aspects of the same. With the establishment of M K Tata Memorial Learning Centre for Visually Challenged, this problem is solved. This Centre provide students with innovative teaching techniques and philosophy. The Centre has acquired latest technologies to assist visually impaired readers. Assistive Technology and Software used are JAWS Pro Talking software (Ver. 10.0), Kurzweil 1000, Magic Magnification Software Pro, Talking Typing Teacher Pro, Optical Braille Recognition (OBR), Prisma Magnification Device for Low Vision, Zoom-Ex Instant Text Reader. The Centre provided opportunity to visually challenged people to compete on terms of equality with their sighted peers.

8) Collections: With the increase in the number of different courses and students there is a major change observed in the collections of the library. Library employs a strong collection development policy and on an average, three thousand books are added to the collection every year. With the increase in the intake of students collections of the library is also changing. New spaces are being provided for the book racks and stack rooms. New racks and stacks room are also extended floor wise.

9) E- Resources: The access to e-resources is available to students via the Library Homepage, which provide access to full-text scholarly research articles beyond the physical wall of the library. Some databases are subscribed by the library paid basis and some of the databases are subscribed under UGC Info net Digital Library

Consortium. Off-campus On line Access to Library electronic resources are accessible remotely/off campus from anywhere and from any location, including foreign countries by TISS students, faculty, staff via the Library EZproxy Server. Library users with valid user accounts may access a variety of Library subscribed resources including e-journals, databases, e-books and e-learning materials etc listed in the Library Home Page.

10) Academic & Research Programmes:SDTM Library also offers Academic & Research Programmes in information Science. Currently PG Diploma in Digital Library & Information Management (PGDLIM), Master of Library and Information Sciences (MLIS), and PhD programmes are being offered through its Centre for Library and Information Management Studies.

9. CONCLUSION:

Rapid changes are taking place in the information environment and managing change in the libraries and information centers is the greatest challenge of libraries. Library personnel play key role in managing the process of change in the libraries. Change management and staff development go hand in hand. Information professionals must be ready to move with the challenges of digital technology, globalized information access, networked resources, a changing economy, new learning and research systems and the demands of the user communities for information that adds value to their work and libraries should act on the new area of Library 2.0 environment.

REFERENCE:

1. Pandya, C., & Pandya, S. (2010). The Contemporary Changes in the Current Scenario: Change Management in the Libraries and Information Centres.
2. Tam, L. W., & Robertson, A. C. (2002). Managing change: libraries and information services in the digital age. *Library Management*, 23(8/9), 369-377.
3. Kamila, K. (2009). Managerial Change for the Survival of Library and Information Centres in Information and Communication Technology Era.
4. *Hyperlinks:*
 - i. <http://library.tiss.edu>
 - ii. Hyperlink: <http://ir.inflibnet.ac.in/handle/1944/955>

Removing Barriers to Literacy: Marrakesh VIP Treaty!

Pralhad Jadhav¹ and Neelima Jadhav²

¹*pralhad.jadhav@khaitanco.com*
Khaitan & Co., Elphinstone Road, Mumbai

²*neelima@techmahindra.com*
Tech Mahindra Ltd, Pune

ABSTRACT

Keeping conformity with the essential goals of equal opportunity, non-discrimination, access, thorough individual progress, actual and comprehensive involvement in society, the Marrakesh Treaty to Facilitate Access to Published Works for Persons who are Blind, Visually Impaired or otherwise Print Disabled (hereinafter, the Treaty) truly stabilizes human rights and intellectual property rights (IPR), which was approved by representative from World Intellectual Property Organization's (WIPO).

The goal of the treaty is to end the book famine – the fact that only about 7% of published books are made available globally in accessible formats, such as Braille, audio and large print, and DAISY formats. In the developing world, the figure is less than 1%. This situation is partly due to barriers created by copyright law, barriers that the treaty seeks to remove.

The Treaty will facilitate import of accessible format copies from the member states by the Indian authorized entities such as educational institutions, libraries and other such institutions working for the benefit of visually impaired person. This will also facilitate translation of imported accessible format copies and export of accessible format copies in Indian languages. The Indian Copyright (Amendment) Act, 2012 is in harmony with the Marrakesh Treaty.

Keywords: Literacy, Marrakesh Treaty, Print Disabled, Visually Impaired, WIPO, Copyright, Fair Use, Authorized Entity, Beneficiary Person, Contracting Parties

1. INTRODUCTION

“Knowledge is power” wrote the sixteenth century philosopher Francis Bacon. Access to knowledge opens the door to education, employment, and a fruitful and independent personal life. While many of us enjoy unprecedented opportunities to access knowledge and information, millions of blind or partially sighted people around the world have little or no access to the books, newspapers or websites where that knowledge is found. Of particular concern are the estimated 6 million children around the globe with a visual impairment. Eighty percent of these children live in developing countries and over 90 per cent of those living in these under-resourced settings - some 4.4 million children – do not receive an education.

Despite the huge challenges associated with overcoming the global book famine, leading human rights advocates are optimistic that the early entry into force of the Marrakesh VIP Treaty, and initiatives such as the Accessible Books Consortium will support the goal of global equality of access to learning materials by people, especially children, living with visual impairment.

In June 2013, member states of the World Intellectual Property Organization (WIPO) adopted the “Marrakesh Treaty to Facilitate Access to Published Works for Persons Who Are Blind, Visually Impaired, or Otherwise Print Disabled”.

The goal of the treaty is to end the book famine – the fact that only about 7% of published books are made available globally in accessible formats, such as Braille, audio and large print, and DAISY1 formats. In the developing world, the figure is less than 1%. This situation is partly due to barriers created by copyright law, barriers that the treaty seeks to remove.

2. MARRAKESH VIP TREATY @ BACKGROUND

More than 75 WIPO member states have signed the Treaty, which was adopted on 27 June 2013 at a diplomatic conference organized by WIPO and hosted by the Kingdom of Morocco in Marrakesh.

The Marrakesh Treaty to Facilitate Access to Published Works for Persons Who Are Blind, Visually Impaired, or Otherwise Print Disabled (MVT) is the latest addition to the body of international copyright treaties administered by WIPO. It has a clear humanitarian and social development dimension and its main goal is to create a set of mandatory limitations and exceptions for the benefit of the blind, visually impaired and otherwise print disabled (VIPs).

It requires Contracting Parties to introduce a standard set of limitations and exceptions to copyright rules in order to permit reproduction, distribution and making available of published works in formats designed to be accessible to VIPs, and to permit exchange of these works across borders by organizations that serve those beneficiaries.

The Treaty clarifies that beneficiary persons are those affected by a range of disabilities that interfere with the effective reading of printed material. The broad definition includes persons who are blind, visually impaired, or reading disabled or persons with a physical disability that prevents them from holding and manipulating a book.

This Treaty is unique owing to its management of international copyright relations, which is a grappling issue. The adoption of the WIPO Internet Treaties, i.e. the WIPO Copyright Treaty (WCT) and the WIPO Performances and Phonograms Treaty (WPPT) were more or less hinged on poorly constructed foundations. They did not provide for a balance of interest, focused only on protection, did not provide for prerequisites with respect to recognizing important private and public interests, to name a few, thereby posing as hindrances to access to works. Although ratification is a start but the head start can only be fully achieved when it is optimally exploited to gain authentic benefits.

The treaty also allows for the unlocking of digital locks on e-books for the visually impaired to gain from. In other words, an Amazon Kindle book or iBook with digital rights management (DRM) could now be unlocked and printed in Braille without consultation from the right holders.

3. MARRAKESH TREATY @ INDIA

India has become the first country to ratify the Marrakesh Treaty, which facilitates access to published works for persons who are blind, visually impaired or otherwise print disabled. India ratified the Treaty on June 30, 2014, thus becoming first of the 79 WIPO(World Intellectual Property Organization) member states, who

are signatories to the Treaty, to ratify it. After 20 countries ratify this Treaty, it will come into force.

Shri Dilip Sinha, the Permanent Representative of India to the United Nations, handed over the Instrument of Ratification to Mr. Francis Gurry, Director General, and WIPO at a ceremony organized during the 28th Session of SCCR (Standing Committee on Copyright and Related Rights) in WIPO Headquarters.

India being a developing nation does not have access to many books, due to price and stringent intellectual property laws of respective countries. By way of this treaty, works across borders could be accessed and exchanged by organizations which serve the needs of the visually impaired, blind, and the print disabled thereby ensuring harmonization with regard to the limitations and exceptions so as to enable operation of such organization trans-border as well as increase overall number of works which are available, hence eliminating replication and help in escalating proficiency.

Once the Marrakesh Treaty comes into force, it will facilitate access to published works for the millions of blind, visually impaired and otherwise print disabled persons in India. It would go a long way in establishing equal rights and opportunities for education and employment for them.

The Treaty will facilitate import of accessible format copies from the member states by the Indian authorized entities such as educational institutions, libraries and other such institutions working for the benefit of visually impaired persons. This will also facilitate translation of imported accessible format copies and export of accessible format copies in Indian languages. The Indian Copyright (Amendment) Act, 2012 is in harmony with the Marrakesh Treaty.

4. COPYRIGHT AMENDMENT ACT 2012

The amendments introduced by the Copyright Amendment Act 2012 are significant in terms of the Marrakesh Treaty

4.1 Fair Use Provisions Amendment of Section 52

The section 52 of the Act enumerates the acts that will not be an infringement of copyright. These are popularly known as **fair use clause**. Certain amendments have been made to extend these provisions in the general context.

4.1.1 Fair Use Rights for the Disabled

A new clause (zb) has been added to Section 52 (1) providing for fair use of the work for the benefit of the disabled. The clause provides for the adaptation, reproduction, issue of copies or communication to the public of any work in any accessible format, to facilitate persons with disability to access works including sharing with any person with disability, for private or personal use, educational purpose or research. These rights are available to any person or organization working for the benefit of the persons with disabilities. The proviso to the clause mandates that the copies of the works in such accessible format are made available to the persons with disabilities on a non-profit basis and only the cost of production could be recovered from them. Such organization shall ensure that the copies of works in such

accessible format are used only by persons with disabilities and should take reasonable steps to prevent their entry into ordinary channels of business.

4.1.2 Compulsory Licence for the Disabled

A **new Section 31 B** has been introduced to provide compulsory licence in works for the benefit of the disabled. Any person working for the benefit of persons with disability on a profit basis or for business may apply to the Copyright Board for a compulsory licence to publish any work in which copyright subsists for the benefit of such persons. The section further clarifies that the licence is available only in a case to which clause (zb) of sub section (1) of section 52 does not apply and the Copyright Board shall dispose of such application within a period of two month from the date of receipt of application. Every compulsory licence issued under this section shall specify the means and format of publication, the period during which the compulsory licence may be exercised and the number of copies that may be issued including the rate or royalty.

The above amendments are directly or indirectly related with the Marrakesh Treaty.

5. NEED OF THE MARRAKESH TREATY

- Access to all kinds of information as everyone else.
- IP legislation is territorial – obligations and limitations are valid in the issuing country.
- There are countries with domestic exceptions
- Very few valid cross-border exchange provision exist.
- Books in accessible formats are highly expensive and specialized – Production of a book in Braille @1,500 USD.

6. SUCCESS OF THE TREATY

Libraries are the key to the success of the treaty for two main reasons:

- Throughout the world, libraries are one of the primary sources of Braille, audio, large print and digital format materials for blind and visually impaired people.
- Only blind people's organizations , libraries and other so-called "authorized entities" can send accessible format

7. MARRAKESH TREATY REMOV THE BARRIERS

The Marrakesh Treaty seeks to remove the barriers in two main ways:

- By requiring countries which ratify the Treaty to have **exceptions in domestic copyright law** for the benefit of print disabled people. This means that countries which ratify the treaty must ensure their laws allow blind people, libraries and other organizations to make accessible format copies without having to ask permission from the copyright holder (usually the author or publisher), and to distribute the accessible copies domestically.
- By making it legal to **send and receive** accessible versions of books and other printed works from one country to another. This means that the sending of accessible format works across national borders is permitted, helping to avoid costly duplication efforts in different countries by multiple institutions (that are often

publicly funded or have charitable status). It will allow institutions with larger collections of accessible books to share these collections with blind and visually people in countries with fewer resources, and to better serve print disabled people in every country by providing reading material in any language that is needed.

8. IMPORTANT DEFINITION UNDER MARRAKESH TREATY

From a practical point of view, the most important provision of the treaty for libraries is the definition of “**authorized entity**” because it defines the organization that makes and distributes the accessible format copies, and under what conditions.

8.1 Authorized Entity Article 2(c) defines an authorized entity as “an entity that is authorized or recognized by the government to provide education, instructional training, adaptive reading or information access to beneficiary persons on a non-profit basis. It also includes a government institution or a non-profit organization that provides the same services to beneficiary persons as one of its primary activities or institutional obligations”.

8.2 Beneficiary person. The treaty includes a broad definition of “beneficiary person” “the type of person the treaty is intended to benefit. There are three groups of beneficiaries:

- people who are blind;
- people who have a visual impairment that prevents them from reading printed works, and people who have a perceptual impairment, such as dyslexia that makes it hard to learn to read, write and spell correctly;
- People with a physical disability that prevents them from holding or turning the pages of a book.

8.3 Types of works. The Treaty applies to publish literary and artistic works in the form of text, notation or illustrations, including in audio form, such as audio books. Significantly, audio-visual works such as films do not fall within the definition of works, although textual works embedded in audiovisual works, for example educational multimedia DVDs, would appear to be covered.

8.4 Accessible format copy. Article 2(b) describes an “accessible format copy” “as a copy of a work in a form which gives a beneficiary person “access as feasibly and comfortably as a person without visual impairment or other print disability.”

9. MANDATORY EXCEPTIONS

Article 4(1) requires countries to provide in their national law an exception to the right of reproduction, distribution, and making available to the public “to facilitate the availability of works in accessible format copies for beneficiary persons.” The limitation or exception should permit the changes that are needed to make the work accessible in the alternative format. In addition, countries may provide for an exception to the right of public performance, such as for the public reading of a poem or a play.

Countries have significant flexibility in how they can meet the obligation in Article 4(1). One way to comply is set out in Article 4(2) whereby an authorized entity would be permitted to make an accessible format copy, or to obtain an

accessible format copy from another authorized entity, and to supply the copy directly to a beneficiary person by any means under the following conditions:

- the authorized entity has lawful access to the work;
- the conversion does not introduce changes other than those needed to make the work accessible;
- the copies are supplied for the exclusive use of beneficiary persons;
- the activity is undertaken on a non-profit basis.

Additionally, the beneficiary person or someone acting on their behalf, such as a family member or a librarian, may make an accessible format copy for the use of the beneficiary person.

Alternatively, Article 4(3) sets out that a country can also fulfil Article 4(1) by providing other limitations or exceptions in national copyright law.

10. OPTIONAL RESTRICTIONS: COMMERCIAL AVAILABILITY AND REMUNERATION

Articles 4(4) and 4(5) are optional provisions that, if implemented into national law, would restrict the freedoms allowed under the treaty.

Article 4(4) allows a country to confine the exceptions¹¹ to works that are not available on the commercial market under reasonable terms for beneficiary persons in that market. For a library, this means that it would first have to conduct a search to check whether the work is commercially available in an accessible format before it could make an accessible copy. As it would be difficult to ascertain with certainty whether a work is available in a particular format and at a reasonable cost for beneficiary persons, especially in cross-border situations, the practical effect would be to render the exception almost unworkable. It would therefore delay the making of the accessible copy, and many libraries do not have the staff or resources to undertake such checks on a case-by-case basis. The level of risk - an assessment of the likelihood of the institution being sued by the copyright owner in the event that an accessible format copy of a commercially available work is made - might mean that the library declines to offer the service at all¹². Of course, if an accessible format copy is available on the commercial market, a library can always in any case decide to purchase such a copy.

Article 4(5) provides the option to subject the exceptions to remuneration: the payment of a fee to the rights holder (for published works in library collections, the rights holder is usually the publisher). In other words, a country could adopt a statutory license rather than an absolute exception. This provision, like Article 4(4) discussed above, would also have a chilling effect on the making of accessible copies, especially for libraries in low-income countries with very limited book budgets. It is important to note that the work has already been purchased, the accessible format copy is made for the sole purpose of providing equal access to the work, and the activity is undertaken on a non-profit basis.

11. LIBRARIES AS AUTHORIZED ENTITIES

According to the Marrakesh Treaty, “authorized entities”³¹ are the only entities that may send accessible format copies to another country that is party to the treaty.

Authorized entities may send such copies either to another authorized entity, or directly to a beneficiary in the other country³². Therefore, authorized entities have a crucial role in the effective implementation of the international exchange of accessible format copies. In addition, authorized entities have a key function in the creation and distribution of accessible works within a country.

As providers of information to beneficiary persons on a non-profit basis, libraries qualify as authorized entities. To fulfil the purpose of the treaty, it is important that all types of libraries - from special libraries serving blind and visually impaired people to academic and public libraries, from well-resourced libraries in major cities and towns to small community libraries in rural areas - are encouraged to take on the role of authorized entities and are empowered to provide print disabled users with timely access to accessible materials.

In order to meet the definition in the treaty, a library must establish and follow its own practices to ensure that the persons it serves are beneficiary persons, to limit the distribution of accessible format copies to beneficiaries, to discourage the use of unauthorized copies, and to maintain due care in handling copies of works and in keeping records, while respecting the privacy of the library users.

12. CURRENT POSITION OF THE MARRAKESH TREATY

Attached below is the list of the countries who as ratified or accessioned the treaty till date.

Contracting Party	Signature	Instrument
Argentina	May 21, 2014	Ratification: April 1, 2015
Australia	June 23, 2014	Ratification: December 10, 2015
Brazil	June 28, 2013	Ratification: December 11, 2015
Democratic People's Republic of Korea	June 28, 2013	Ratification: February 19, 2016
El Salvador	October 11, 2013	Ratification: October 1, 2014
India	April 30, 2014	Ratification: June 24, 2014
Mali	June 28, 2013	Ratification: December 16, 2014
Mexico	June 25, 2014	Ratification: July 29, 2015
Mongolia	June 28, 2013	Ratification: September 23, 2015

Paraguay	June 28, 2013	Ratification: January 20, 2015
Peru	June 28, 2013	Ratification: February 2, 2016
Republic of Korea	June 26, 2014	Ratification: October 8, 2015
Singapore		Accession: March 30, 2015
United Arab Emirates		Accession: October 15, 2014
Uruguay	June 28, 2013	Ratification: December 1, 2014

13. CONCLUSION

In spite of the huge challenges ahead, the society were upbeat about the future. “There are some very exciting things happening with technology that are going to make blind people more and more equal”. “As we look ahead and we create the channels for inclusive education and inclusive services and create a much more inclusive society, you can’t help but be optimistic,” “It can only get better if we come together and manage to move along the things that we are doing, like the Marrakesh Treaty and if we can make technology more responsive to the needs of people with print disabilities, we have a great life to live.”

The Marrakesh Treaty is not only a treaty *by* and *for* persons with print disabilities – it is also a treaty for libraries, for societies, to help them become more inclusive and fair. It is the first international legal instrument, sanctioned by a UN agency that can help the UN Convention on the Rights of Persons with Disabilities to carry out part of its purpose, to promote respect for the inherent dignity of persons with a print disability.

On practical front we would request to other contracting parties please give their consent in terms of ratification or accession for the treaty to come in to force, as per Article 15 treaty will enter into force only after three months when 20 eligible parties have deposited their instrument of ratification or accession. Till date only 15 parties had deposited their instrument.

On behalf of the LIS fraternity we would request to the remaining countries please give their positive consent on the treaty at the earliest.

REFERENCE

1. Full Text of Marrakesh Treaty to Facilitate Access to Published worked for persons who are blind, visually impaired or otherwise print disabled (Source | <http://www.wipo.int/>)
2. The Newsletter on Higher Education, Issue 16 September 2014, Department of Higher Education, MHRD, Government of India
3. IASLIC Newsletter, October 2014 Issue, Kolkata
4. Summary of the Marrakesh Treaty to Facilitate Access to published works for persons who are blind, visually impaired, or otherwise print disabled (MVT) (2013) (Source | <http://www.wipo.int/>)
5. The Role of Libraries in the Implementation of the Marrakesh Treaty for persons with a print disability, Javier Francisco, Library Services to People with special needs, Lyon, 17 August 2014

A Study of Scientific Co-Operation Among SAARC Nations

Samit De

padmasamit@gmail.com

Saha Institute of Nuclear Physics, 1/AF, Bidhannagar, Kolkata-700 064

ABSTRACT

In this work we consider the scientific performances of the SAARC nations along with the mutual scientific co-operation that exists among these nations. We take the number of research publications from each country as the indicator of the state of scientific development prevailing in that country. Our main objective is to assess the role of mutual co-operations in SAARC in the overall development of these nations in the domain of science and technology. The period considered here is from the inception of SAARC. We end with some conclusions and corresponding suggestions.

Keywords: SAARC, SAARC-Scientific Publications-Bibliometric Study

1. INTRODUCTION:

In the present world, there are several associations of nation states which have taken commendable roles in the economic and political scenario of the modern world. Particularly in the south Asia region, there are two such associations namely South Asian Association for Regional Cooperation (SAARC) and Association of South East Asian Nations (ASEAN). These two associations have all most all nation states of this region of the globe as members. Incidentally they have no common members although becoming a common member is not prohibited by any agreement of these associations of nations. Particularly, India belongs to the SAARC group of nations which was established in December 1985. Other members of the SAARC are Afghanistan (joined in SAARC IN 2007), Bangladesh, Bhutan, Maldives, Nepal, Pakistan and Sri Lanka. The association SAARC is committed to peace and security of the region as per its proclamations. At the same time it is no strategic association, that is, the defense cooperation is not within the scope of this association. Its aim is to strive for the development of economy and welfare of the society. Cultural development is one of the priorities of its associations. For these purposes strong cooperation among the nations who are members of SAARC of matters of common interests are priorities in SAARC. The purpose of the present work is to develop insight into the performances of these SAARC nations with respect to the mutual cooperation in science and technology as is reflected through the research contributions of the member countries and the status of mutual cooperation in this arena. It is widely recognized that the performance in science and technology is one of the indicators of development for a nation. Here we make a comparative study to reflect upon the degree of success with which the co operations in SAARC in terms of scientific contributions are being performed vis-a-vis the general development in science and technology of the individual nation. The time span has been taken here from 1986 to 2015. We conclude with some specific suggestion. Our source of data is ISI Web of ScienceTM Core Collection. Only scientific articles published in several journals covered by Web of Science have been taken into account. Review articles, conference proceedings, letter, editorial, correspondences, etc. have been excluded. As data has been collected from Web of Science during Feb.18-28, 2016, data of Web of Science will be updated in near future for the year 2015 which may result a certain degree of variation. But this is unlikely to affect the main conclusions of the paper. Works similar in nature to our present work can be found in references [1, 2, 3, 4, 5].

2. DATA AND MAIN OBSERVATIONS:

In this section we describe the performances of different nations belonging to SAARC nations over several time periods. We refer to Table 1(Annexure 1) for the general

description of the development of science and technology of nation included in SAARC. It is generally found that the total output of these nations have steadily increased as per the data grouped through periods of 5 years from 1986 to 2015. It is also generally observed that the collaboration amongst the SAARC nations have also gone up during this period except the cases of Afghanistan and Sri Lanka in certain periods of time. It is observed that these periods are periods of political turmoil in those countries which may possibly be taken as causes of temporary reversals of scientific performances in those two countries. In figures 1-8 (Annexure 2), we graphically plot the data of total publication and inter SAARC collaboration over these years for countries Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka respectively. It is observed that in all cases the total scientific publications and inter SAARC collaboration both have increased for all countries except for some deviation in the case of Afghanistan, Sri Lanka and Maldives. It is interesting to observe that publications have increased quite extensively in the case of all countries in the period following 2005. The inter SAARC collaboration has also expanded but the rate of expansion has not been as large as the rate of expansion of total number of publication. It can be concluded that the inter SAARC collaboration is not the major thrust for the scientific development of individual nations. The data further indicates that India particularly holds a very substantial position among the nation of SAARC with its total number of scientific publication far greater in number than other nations of SAARC. In this respect the second contribution comes from Pakistan which is less than 13% of the total publication from India during last 5 years. For a closer look we analyze the scientific contribution of SAARC nations more analytically in the following. The preferences of research by the top 10 subject categories arranged in decreasing order for each SAARC country as per the number of publications indicates that the preferences of research in the subject categories are divergent in SAARC nations. There is no single subject area in which there exists a common primary thrust of different nations. This is one of the reasons for relatively less success in the cooperative research endeavors in amongst the SAARC countries. Further we give below the list of collaborating countries in order according to the number of collaborative works performed with the respective members of the SAARC. It is found that the collaboration in research is much more profound with the countries which are outside the group of SAARC nations. Particularly although India as a single country contributes quite substantially to the world research output and undoubtedly has overwhelmingly large research output compare to the SAARC nations, it can no way be concluded that India has taken lead in the development of science and technology in this SAARC region. Further we look into the collaborative research with India and other SAARC countries, Table 2 (Annexure 3) for the last 10 years. It is seen that since 2006 to up to 2014 there is a by and large steady growth of Indian collaboration with every other SAARC nations. In 2015 particularly the number of collaborative research work has shown marginal decrement which requires special mention in view of the substantial increase in the total research performance in SAARC countries during this one year time. Although this time period is too short to predict any future, it should be taken into account against the background of by and large steadily increasing performance in the previous years.

3. CONCLUSION:

It is apparent from the discussion and the data of the previous section in the scientific sector the co-operation of the nations in the domain of science and technology is not up to the mark, especially we have pointed out the current year where there is a marginal change towards decrement. It is hard to explain this phenomena on the basis of economic and political status of this region since there was no force in the region especially in creating any type of tangible instability. It should be further looked into. In order to step up co-operation of these countries, some concrete proposals should be

implemented. The countries have similar types of geographical challenges, also very naturally their social and cultural positions are akin to one another. As in the modern era the practice is to approach these problems from scientific angles, it will be of great benefit to all the member nations if some sort of institutions pursuing scientific research together on common problems of health, environment, energy etc. are created. It requires an elaborate analysis of the ground reality. Scientific and technological task force for such assessment is an immediate strong requirement for that.

ACKNOWLEDGEMENT

The author wishes to thank to Prof. M. S. Janaki (Chairperson, Library Committee) and other library personnel of Saha Institute of Nuclear Physics for encouraging to write this article.

REFERENCES

1. Wong, Chan-Yuan, Wang, Lili. 2015. Trajectories of science and technology and their co-evolution in BRICS: Insight from publication and patent analysis. *Journal of Informatics*, 9, pp.90-101.
2. Leydesdorff, Loet, Wagner, Caroline S. 2008. International collaboration in science and the formation of a core group. *Journal of Informatics*, 2, pp.317-325.
3. Sin, Sei-Ching Joanna. 2011. Longitudinal trends in internationalization, collaboration types and citation impact: a bibliometric analysis of seven LIS journals (1980-2008). *Journal of Library and Information studies*, 9(1), pp.27-49.
4. Glanzel, W., Schubert, A., Czerwon, H-J. 1999. A bibliometric analysis of international scientific cooperation of the European Eunion (1985-1995). *Scientometrics*, 45(2), pp.185-202.
5. Guan, Jiancheng, Ma, Nan. 2007. China's emerging presence in nanoscience and nanotechnology: a comparative bibliometric study of several nanoscience 'giants'. *Research Policy*, 36, pp.880-886.

ANNEXURE 1

Table 1: Publications of each countries of SAARC as well as collaboration among SAARC nations during 1986-2015 at 5 years intervals

COUNTRIES	1986-1990	COLLAB.	1991-1995	COLLAB.	1996-2000	COLLAB.	2001-2005	COLLAB.	2006-2010	COLLAB.	2011-2015	COLLA.
AFGANISTAN	20	1	4	1	5	3	15	4	94	15	207	54
BANGLADESH	723	28	1092	72	1631	93	2244	177	3828	258	6657	474
BHUTAN	5	1	11	1	10	3	35	10	81	14	164	34
INDIA	55476	53	60300	104	79996	142	102712	331	173107	714	253778	1767
MALDIVES	N.F.	N.F.	3	N.F.	12	N.F.	9	1	20	8	52	18
NEPAL	148	12	226	23	421	41	690	117	1276	236	2130	421
PAKISTAN	1587	22	2195	22	2805	27	4125	97	14871	335	31706	1275
SRI LANKA	601	16	561	9	674	13	1138	65	1805	158	2669	390

N.F. implies 'Not Found.'

ANNEXURE 2

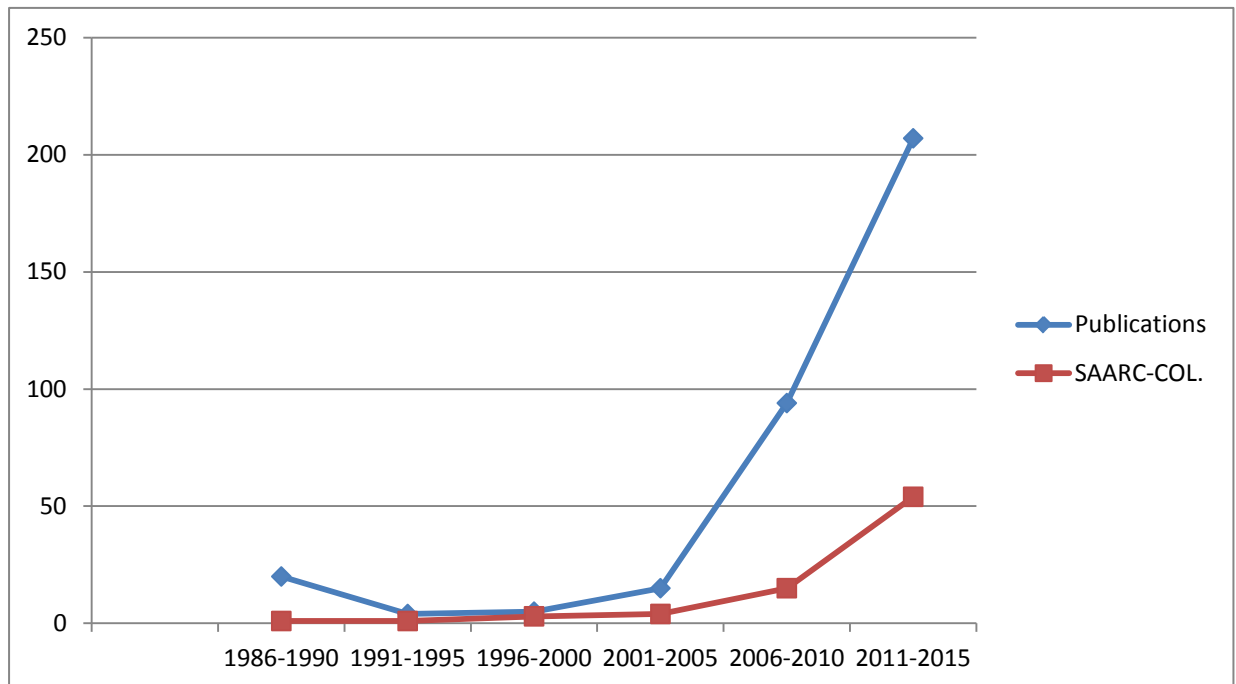


Figure 1: AFGHANISTAN

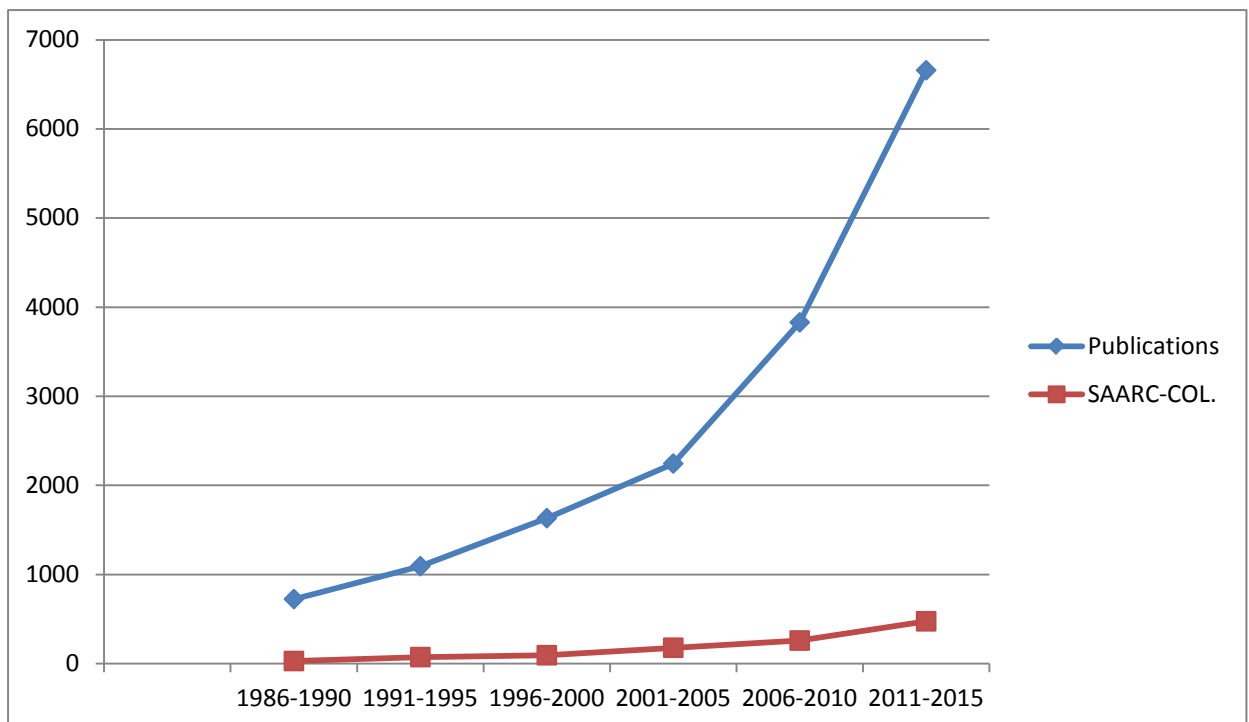


Figure 2: BANGLADESH

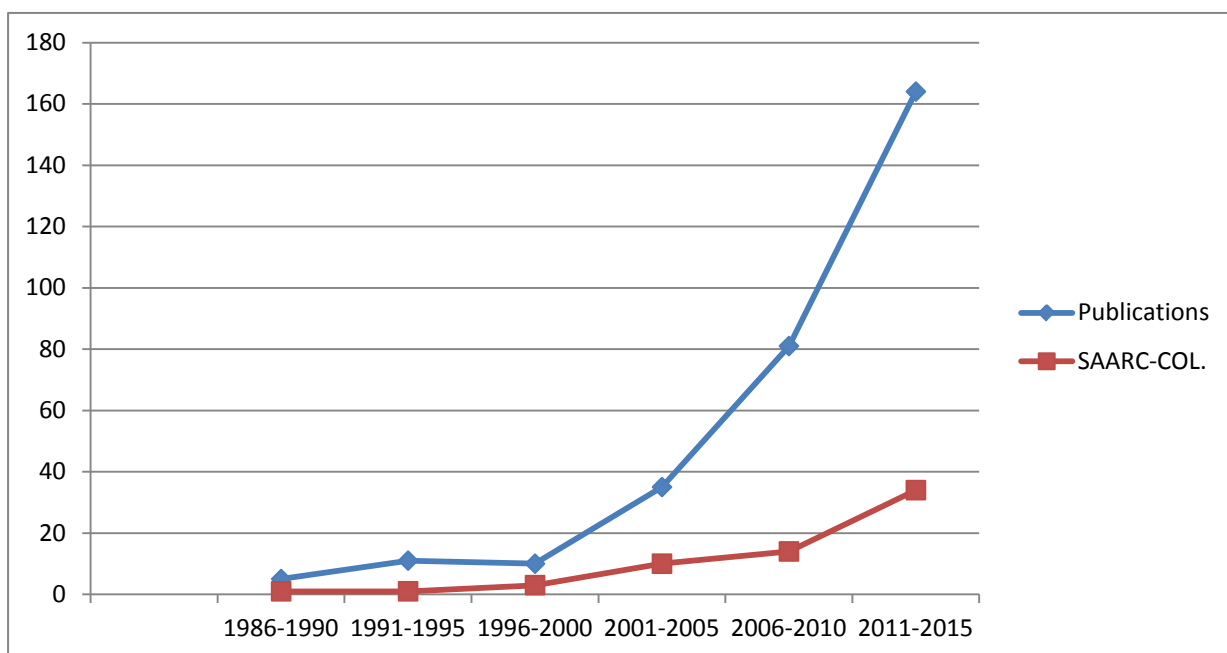


Figure 3: BHUTAN

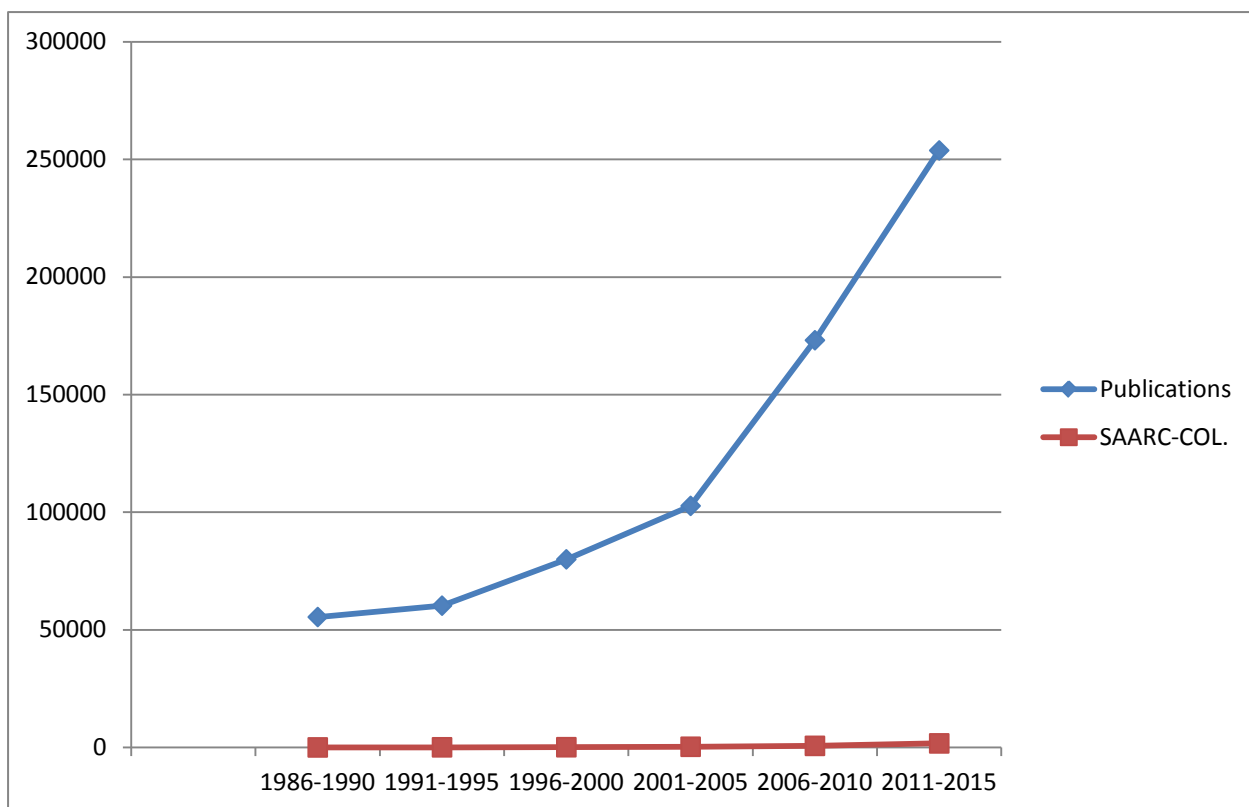


Figure 4: INDIA

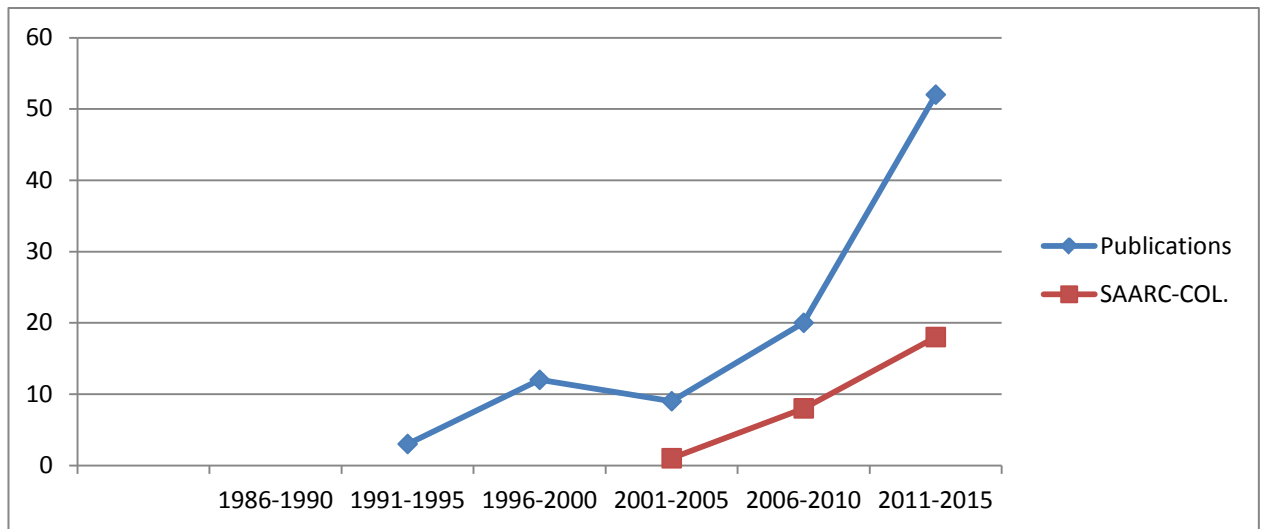


Figure 5: MALDIVES

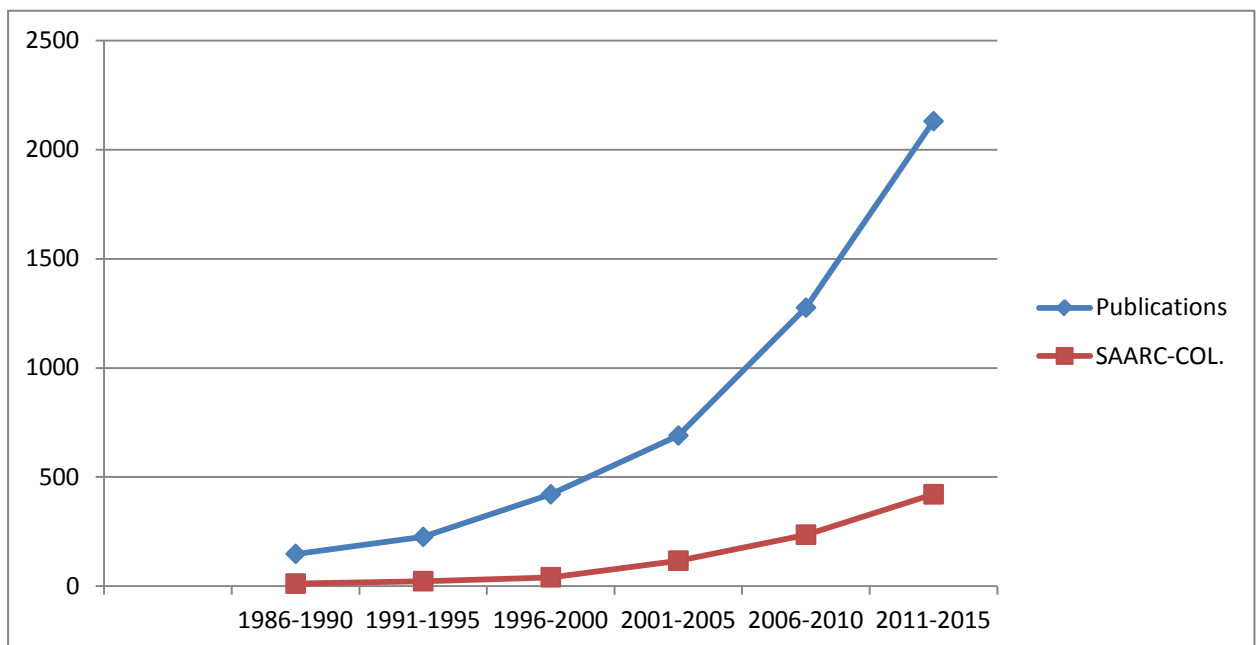


Figure 6: NEPAL

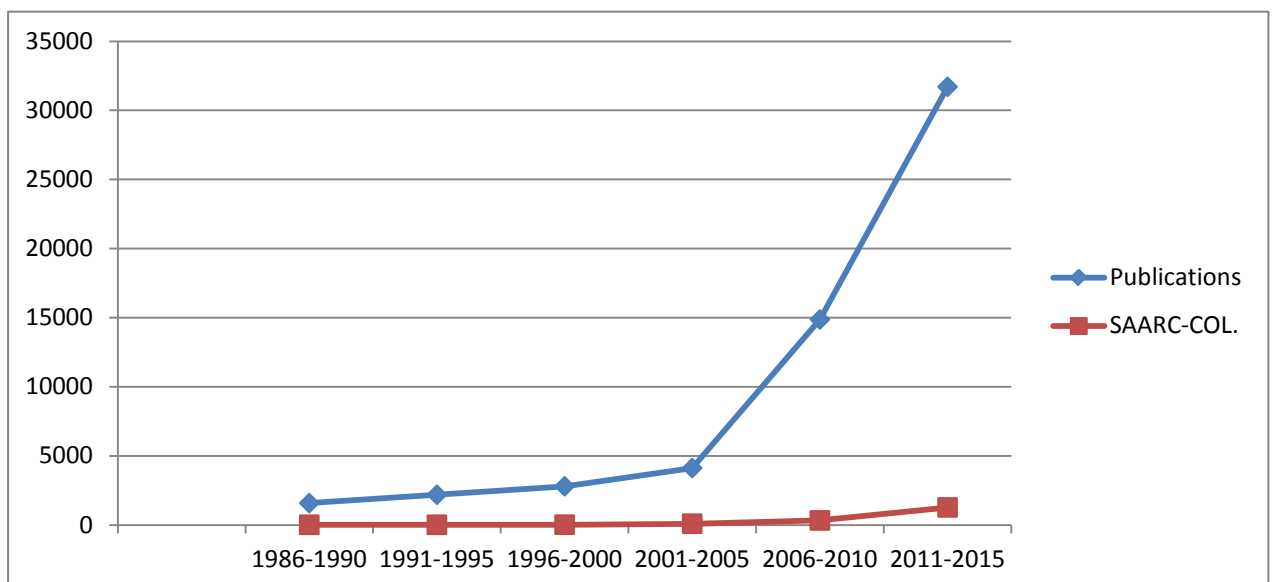


Figure 7 : PAKISTAN

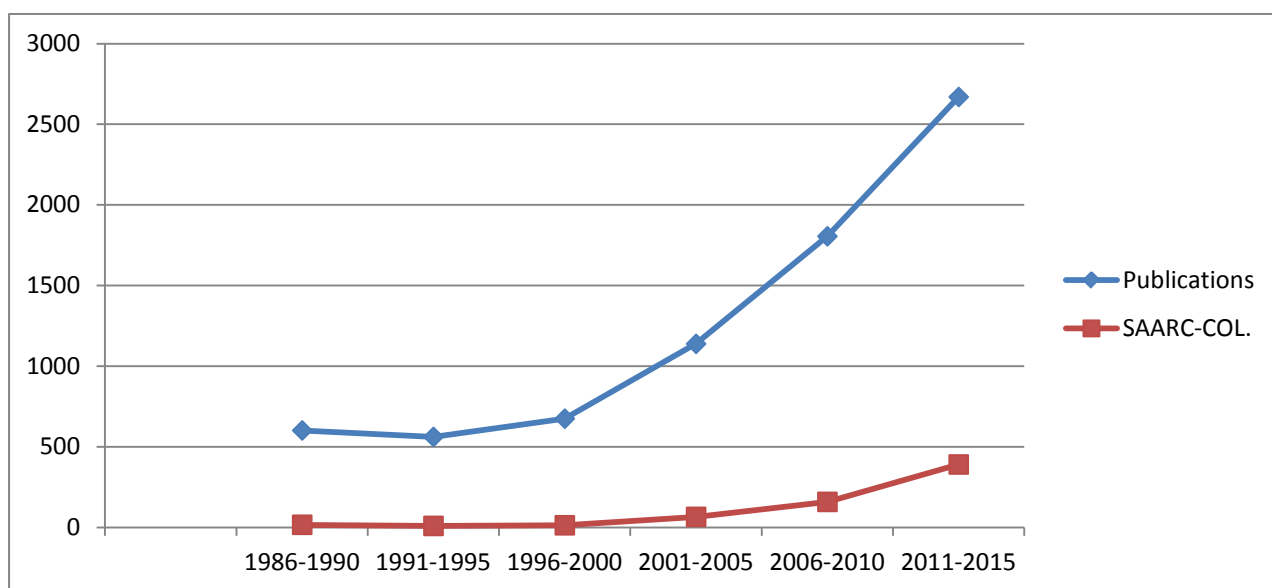


Figure 8 : SRI LANKA

ANNEXURE 3

Table 2: Collaborative Research articles among India and other SAARC countries (2006-2015)

OTHER SAAARC NATIONS	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
AFGHANISTAN	1	1	3	3	1	3	3	4	7	5
BANGLADESH	28	26	48	34	48	44	45	65	82	79
BHUTAN	5	1	1	N.F.	2	3	5	3	8	7
MALDIVES	N.F.	1	2	3	1	2	2	N.F.	5	3
NEPAL	18	35	39	42	59	63	63	63	74	86
PAKISTAN	23	39	46	44	97	144	178	228	263	252
SRI LANKA	11	15	27	31	37	30	38	50	110	107

Marketing of Library and Information Products and Services with Social Media

Chetan Sudhakar Sonawane
chetan.s2005@gmail.com
KMC College, Khopoli -410203, Maharashtra

ABSTRACT

Social media has become integral part of our daily lives. With rapid technological advancement and development of Web 2.0 there has been proliferation of several social media sites. In developed countries marketing of library and information services and products has become routine activity in most universities. In developing countries the trend is slowly setting in. The need for marketing of the information products and services of the libraries has become essential due to several reasons but the most prominent among this is the gap between what the library offers and the user's perception about the offerings. Marketing involves several factors this includes planning, implementation, identifying customers need – in terms of library its patrons or clientele are its customers. There are a lot many good numbers of social media sites which can be used to market the libraries however its selection should be made carefully considering the heavy presence of its clientele on such social sites- a survey in this regard can help identify such social media site. Apart from social media there are wealth of options which are available due to the technological advancement and this includes analytical tools as well as library websites. But the reason for choosing Social media sites over the traditional methods of marketing are its presence and the low cost involved into it. This paper will explore some of the tools which can be used to market the library and information products and services.

Keywords: Web 2.0, Social Media, Marketing, Products and Services

1. INTRODUCTION

Marketing of Library and Information products and services have become essential due to several reasons. The most prominent among these are the escalating cost, budgetary restriction, increasing numbers of users, information explosion, justification on part of librarian of subscribed e-resources, increasing research output of parent institution, acquainting the users with different information products offered by different database vendor's etc³. Marketing is often misunderstood as advertising; it is true to some extent in the context of consumer products where the companies adopt marketing strategies to increase the sale and earn more profit from it, but in the context of libraries as it is a service organization the aim of marketing is to draw more and more users to the library and put the subscribed resources to maximum use which in turn will result in the knowledge enrichment of users¹.

Technological advancement has created new variety of information, new sources of information and new ways of providing information bypassing traditional institution like libraries⁴. The impact of technology and Web 2.0 in the scholarly communications environment is a key debating point at present. The use of technology for marketing is also a much discussed topic in the professional marketing community - a search result on search engine usually displays pages ranging from few to many which list web pages, blog and articles which present a variety of views on what's important and what's unimportant⁵. The rapid advancement in technology has proved to be a boon as well as burden to libraries. Although we have many new tools available which has made our work more efficient and effective, in spite of that we have another option apart from libraries of academic institutions which provides us information resources. Libraries have realized this fact in many ways and have started imparting new forms of services in response to widespread competition from Google, Amazon, and the rest of the World Wide Web. As an outcome of this libraries have

begun imparting marketing as a necessary tool for survival in this new competitive age⁶.

Often the products and services offered by the libraries remains unawares to the users, the reason behind this is the lack of marketing approach. Marketing is a way to bridge the gap. The question often arises is what to market? The answer to this is the libraries can go on marketing anything it offers this includes services it offers, events planned in the library, collections, staff work area, and many more⁶.

2. NEED OF LIBRARY MARKETING

With the advancement of technology libraries have witnessed information explosion which has enabled creation of vast variety of information, new sources of information, new forms and new methods of providing information which has put a considerable burden on libraries to market its products and services. There is an increasing pressure on libraries to mobilize resources and become self-reliant. Library users are transforming into customers with high expectations, diverse needs and want and choices. The role of libraries has changed from mere storehouse of collections, staff and technology into a service Centre. The form of services are gradually changing from basic to value added, from staff assisted to self-help, from in-house to outreach, from free to priced, from reactive to pro-active, and from mass customization to individualized service.

As in such an environment library professionals are finding new ways of serving users or customers more effectively and efficiently. The importance of marketing principles have been acknowledged as beneficial and useful to library environment. Marketing provides a roadmap for offering effective and efficient service to their users or customers. The developed nations have seen many development and Library Marketing has emerged as an important discipline of study, which has attracted the attentions of developing countries like India as well⁴. The interest in marketing has increased several folds; some of the reasons why marketing has become imperative are budget reduction, increased user base, the rapid growth of material, rising cost, networking demands, competition by database vendors, and complexity in information requirements.

Marketing helps in identifying the client base, and to determine and fill its need, want and demand by designing and delivering appropriate products and services. The main focus of the concept is the client, and the goal is client satisfaction⁷.

The need due to which Library Marketing is needed is summarized as follows:

- Promoting the use of information resources
- Create perception of need and thereby create demand
- Ensure the optimum use of information
- Improve the image and status of libraries and library professionals
- Handle the problem of increasing cost of reading material, journals and databases
- Cope with information explosion
- Introduce cutting edge information technology system in library services
- Manage shrinking budget
- Save libraries from devaluation
- Save libraries from declining reader support
- Uphold the dictum that information is power⁸

3. MARKETING WITH SOCIAL MEDIA

The term ‘Social Media’ denotes any kind of online platform on which the users can interact and can exchange content. That content can be anything which includes digital objects (films, music and other files) or just opinions, news and views. These platforms can be of use to libraries. It is not something evil to worry about but an opportunity to seize to market the product and services of libraries. With Social media libraries can market directly to their users and potential users, and engage them in the kind of proper *dialogue* which marketing should be all about.

Using social media as a marketing tool is a viable option⁹. While choosing the tool it is necessary to assess the particular library in terms of user population, considering how tools will work together or complement one another, and simple trial and error. Knowing the audience is of utmost importance. Some technologies demand particular equipment to which a particular library user may not have access. For example, school librarians whose students are not allowed to use their cell phones during the school day may not see good results with QR codes because these require a smart phone to scan in order to use. Many marketing tools allow to do login with an existing Facebook or Twitter account a typical example of this is Pinterest. A particular library can choose to create a new account from scratch and can go on and there are still buttons throughout the system that allows one to share the pins to the above mentioned platform and other tools.

There is a distant possibility that the library will unlikely use every new tool or social media platform that is developed, it is good practice to go ahead and register an account with any service that seems to be getting significant notice. Despite the fact that libraries are unlikely to use every new tool or social media platform that is developed, it is good practice to go ahead and register an account with any service that seems to be getting significant notice. User names can be taken quickly on a new service and it is important to keep your institution account name as consistent as possible across all platforms. Many libraries have similar names or use the same acronyms in their publicity⁶. Although it is not advisable to shift from one social media platform to another but in case of declining popularity this needs to be done. Google’s Orkut service is a classical example of this, after the popularity of Facebook increased many users shifted to it and this resulted in low usage of Orkut service by users which in turn resulted in its shutdown.

The most popular and widely used social media sites include Facebook, Twitter, Wiki, Pinterest, Google+, Blogs, and LinkedIn etc. Each social media sites have some features to share the content and the users have to adapt accordingly. Other less known and less used social media tools includes Foursquare, Pinterest, and Tumblr etc. Digital as a medium for marketing can be witnessed on a large scale in coming years. Social media is a subset of Digital Marketing. Libraries in developing countries can use social media as a better marketing tool³.

4. ETHICS OF MARKETING WITH SOCIAL MEDIA

The general principle which needs to be kept in mind before actually starting implementing marketing with social media are outlined below:

Know why you are there

Each of the library’s social media profiles should have a purpose and a focus of its own.

Don't over-commit

Defunct social media profile do more harm than good – so make sure you can provide enough resources to run each profile well, or don't run it at all.

Get the tone right

Web 2.0 is concerned with dialogue; the tone used on social media sites should be conversational. Many libraries start off rather stiffly on social networks - that's okay, as long as over time it become less formal and relax a little. What should be aimed for is informal but not overly familiar, friendly but not overly personal, colloquial but grammatically, syntactically and orthographically correct. It's hard balance to strike! But if planned properly in friendly, informal, authoritative and you spell everything correctly, half of the objective is achieved.

Listen!

Marketing is an ongoing conversation between the marketer and the target audience, so social media platform are a fantastic way to listen to what is being said by that audience. Via social media the difficulty of gathering feedback can be considerably reduced from hundreds of followers. Many marketer discuss about the 'one in four rule' on social media platform, and on Twitter in particular – only one in four updates or tweets should be directly promoting the brand, and the other three should be replies; reconstituting other people's content; or something else not directly related to whatever is aimed at marketing.

Get the message across

Library use of Web 2.0 platforms should be aimed at accomplishing the following: add value to increase engagement so that it becomes possible to deliver key messages to a wider audience. In other words, Twitter feed (or any other) social media tool should attract the more users and they should start following the Twitter handle or any other social media tool, so that more people will get the really important marketing message the library want to deliver. The added-value parts (the replies, the links to external content and so on) impart social media presences personality, and the personality is what draws in more followers. In case the library wish to deliver some important messages like new opening hours, new collections, new services or whatever important need to be conveyed it gets more listeners. On the other hand if the library communicates only those important messages, people perceive it as boring and it fetches few and potential users.

Make social media part of something bigger

The social media marketing shouldn't work in isolation – it works best when combined with more traditional promotions. More on this below:

Act quickly if it all goes wrong

Sometime it may happen that person handling the social media account of library may mixed up between their personal and institutional account eventually leading in confusion among users. Inappropriate content (most usually simple opinion or anecdotes) can be inadvertently shared via social media and when this happens, respond quickly, honestly, and apologize with the appropriate level of seriousness. A little slip does not require a huge and somber apology – that only draws attention to what has happened and makes people overestimate its gravity. A quick 'Oops, sorry – wrong account there!' may well be fine. On the other side of the coin, a serious slip (such as Tweeting something obscene or otherwise offensive) needs swift and decisive action. An hour is an absolute eternity in social media terms – the mishap

may have been retweeted by others a hundred times by the time you delete the original offending item.

Hit the ground running

The basis of many initial following on social media is reciprocity. User X follows or 'friends' User Y, and User Y gets a message or e-mail telling them so. Out of curiosity they check out User X's profile, and decide to follow them back if they're interesting. For this reason, following people is a great way to get those initial followers yourself, and good quality content is essential right from the start, even before the social media account is launched in public. The launching should be marketed in a big way, the new account should not be just be marketed via the website, but within the walls of the library also. Social media account should be marketed through business card also. Whenever users visit the library for the first time or during orientation programme it can be distributed. Other way of letting the users know about the social media account is by adding a link to email signature of library staff, and of course getting library champions to spread the word to their contacts.

Utilize social proof

Before starting promoting the Facebook or Twitter account, its worth connecting with as many other accounts as possible so that there's something to show people – so it's necessary to start following the institutional account with personal account of library staff. This gives the 'social proof' – the phenomenon by which people copy the actions of others because they assume those others must know what they are doing. In other word, there's no easier way to convince people to follow your library on social media platforms than for them to see others already doing so; thereafter your success self-perpetuates. This isn't to say having huge numbers of followers is an end being the ability to engage in dialogue with relevant and potential users.

5. TOOLS OF SOCIAL MEDIA

Social media provides more opportunity to reach to the community, target specific audience, and give them a chance to interact with the library. Social media marketing of libraries is the way of advertising library, its brand product and services via web 2.0 technologies. By using social media libraries can engage with their clientele and enable them to participate in the production of library products. Social media includes networking websites like Facebook, MySpace, micro blogging websites like Twitter and other media tool like blogs, podcast, photos and videos. By posting library material via social media on library page, it can be used by the variety of locations on the web¹⁰. There are so many social media available for libraries to participate in, but its sometime difficult to get a handle on how these channels can be best be used for marketing library services. Some of the tools which can be used to market the information products and services are elaborated below:

Facebook

Facebook has become an extremely popular outpost for libraries of all types. It is a very popular social networking platform surpassing 1 billion users in 2012 and it currently sit 1.55 billion monthly active users which makes it extremely likely that a good portion of most library users are already using the service. For this reason Facebook is an extremely starting point for libraries looking to make a foray into marketing with technology. Facebook content can also be made "public", making it viewable by anyone, although not all features will be available to users who are not logged in to the service⁶.

Facebook is one of the high technologies that have been integrated into library marketing efforts. As an interactive web site, Facebook has been very popular among college students. The importance of Facebook to libraries has been discussed in library literature. Most of such studies highlight the potential of Facebook in promoting library visibility and assume its possibility of connecting library services to library users¹¹. There has been an evolution in how Facebook has handled the presence of organization, such as libraries and business, over time. When the current pages system was introduced in 2007, libraries had more option for how to present them and how can customize the look and feel of their pages, as well as import content and use application programming interface (API) from other system.

Facebook can serve as both a passive and an active marketing tool. In an active sense, libraries can post status updates that their followers can see. They can also purchase ads and target these to specific categories of users. Whenever a user “likes” the library on Facebook, this usually shows on their friend timelines, thus alerting more users of the presence of the page and potentially drawing more “likes” in a passive manner. Facebook also allows their ubiquitous “like” buttons to be embedded in external websites, allowing user to “like” particular items outside the Facebook system, which are then reflected on their profiles. Libraries can embed these buttons throughout their larger web presence to increase their reach on Facebook and thus allow users to easily share particular books, services and more⁶

Twitter

Twitter is having fewer users as compared to Facebook around five times less. Twitter is a microblogging platform and firstly it takes very little work to set up a Twitter profile, less than any other platform. Secondly, research has shown that users engage with libraries more on Twitter than on other networks; they seem to interacting via this medium. And thirdly Twitter users are much more influential than those on other networks, so can help build the brand. A report from Exact Target (2011) found that regular Twitter users are generally more active and participatory on the web: they blog, they comment on other blogs, they review things online and so on. They are, in fact, three times more likely to amplify (draw attention to) a brand than a regular Facebook user. This makes them a great asset to have – word of mouth is, after all, a hugely powerful marketing tool. A report from Exact Target (2011) found that regular Twitter users are generally more active and participatory on the web: they blog, they comment on other blogs, they review things online and so on. They are in actual three times more likely to draw attention towards a brand than a regular Facebook user. This makes them a great asset to have – word of mouth is, after all, a hugely powerful marketing tool, as we have already discussed⁹.

Pinterest

Pinterest is a social networking platform focused on visual content that allows user to create virtual pinboard of images available on the web, similar in a fashion previous generation were used to clip images from magazines to create a scrapbook or physical bulletin board. User can create a variety of topical boards and “pin” images from other places around the web by posting a short bit of code into their browser bookmark bar, as well as by uploading their own images. These images serve as link to the original source of material. Users can also browse the pinboards of other members that they follow within the service, or popular pin from all users, and are able to repin items onto their own boards. Pinterest differs from other photo sharing sites, such as Flickr, which are largely intended for sharing individually created content.

Pinterest also provides “Pin It!” button that can be integrated into external website to allow users to pin directly from the site without having a bookmark. Libraries wishing

to create a strong presence in Pinterest could consider implementing this button within their catalogue or discovery system.

When it first began to grow in popularity, Pinterest was often derided as being “just for women”, filled with nothing more than pictures of craft projects, wedding dresses, and the actor Ryan Gosling. However, as the system grown, its value as the tool for sharing visual information has spread to all types of users, and the system has largely lost this stigma. In fact, reports show that Pinterest is extremely successful at driving traffic to retailer, and as a result, many retailers have begun to encourage use of service. Pinterest has already reached a wide following among educators who use it to curate ideas for their classroom. Libraries could use Pinterest to share cover art of new book acquisitions, children’s craft programs or ideas for redesign of library spaces. The Addison (IL) public Library’s Pinterest page demonstrates several types of boards that libraries can create. A nice functionality of the system is that multiple users can pin to share boards. For example, a large public library system with multiple branches could create shared board while still allowing the branches to maintain their own accounts.

Thronton (2012) found that most academic libraries Pinterest accounts were primarily focused toward their own clients and some familiarity with the library or institution was assumed. The types of materials shared on these pinboards ranged from the promotion of libraries, reading, and literacy in general to resource suggestion and highlighting specific library collections and spaces. She emphasizes the importance of preplanning by setting goals and a focus for the library account⁶.

Google+

When Google+ launched in 2011, it was widely speculated to be “the Facebook killer”, or the service that would eventually overthrow Facebook’s dominance as a social media platform. Unfortunately for Google, this has not quite been the case. However, Google+ has still become very popular with some users, and the seam-less integration with other Google services is extremely convenient. Google+ may have fewer users overall than Facebook or Twitter, but it has grown much faster than either of these services initially; thus it is still an important platform to watch and consider.

Google+ allows users to organize their contacts into “circles” in an effort to replicate the way that real life social network function. Libraries can organize followers into circles based on their relationship to the library; for example “Library Staff” and “Patrons” or “Story Time Attendees”. Murphy (2011) suggest that libraries could use Google+ Hangouts, a form of videoconferencing, to conduct reference interviews and one-on-one interaction with library users. The Falvey Memorial Library at Villanova University has a Google+ page that features Photo and Library News.

Similar to Facebook, Google+ was slow to allow official organization pages to become part of the system. The “Pages” functionality in Google+ did not become available until several months after the official launch of the service. These pages can be populated with pictures and status update as well as information about the library. In this way Google+ pages function similarly to Facebook pages but reach a slightly different audience⁶.

Wikis

Named after the Hawaiiin work for “quick”, Wiki software was developed to allow for quick and simple updating of web content. The success of Wikipedia has brought wiki software to popular attention, and the use of wikis has since begun widespread. Libraries use wikis for a variety of purposes, including instruction virtual reference, desk management, and supplementing digital content offering – types of content that often have multiple authors and require frequent updates. Wiki software reduces the

difficulty of keeping such content up to date and facilitate participatory project between libraries and their user, as well as among multiple libraries.

MediaWiki, the open source wiki software platform that was originally built to support Wikipedia, is one popular platform used by libraries. Jackson and colleague (2007) discuss the use of MediaWiki for subject guide pages which promote electronic resources at the Florida State University libraries. The authors choose to use MediaWiki after concluding that using their main library website for this purpose would have required substantive edits to the structure of the website as well as extensive staff training. MediaWiki is a software package that must be installed locally; libraries wishing to use MediaWiki can visit mediawiki.org to download and install the software package. For libraries who do not wish to install such a robust package, PB works (pbworks.com) is an excellent web based option that offers a free basic version, as well as for pay options that include more robust features⁶.

Video marketing

Marketing with video can be extremely powerful. A one-minute film can convey a lot of information about your library, in an arresting way – when done well. When done badly, video marketing certainly has the capacity to cause more harm than good.

Video sharing sites like Vimeo (www.vimeo.com) and YouTube (www.youtube.com) have helped take film-making from the preserve of the elite to the pastime of the masses. The sites will host any video you upload (providing it is not pornographic) and it is the fact that it is so easy to share these videos that makes it so appealing from a marketing perspective. You can either promote a simple URL that link to the video, or you can easily embed a video within another website. Embedding is the process of taking content from one website and making it appear on another. Images, videos, slides decks and many other formats can be displayed in this way, the advantage being that you don't have to upload the content to your own website in order for your visitor to see it – you are effectively providing a window through to the original website. The only potential downside is that you are not completely in control of the content, therefore: if the original website goes down or removes / changes the content, then it will no longer display (or it will display different) on yours⁹.

Blogs and blogging

Institutional blogs are a great way to communicate with patrons in a way which is less formal than via press release or the main website, but which is still the library imparting information in a way it can control.

The fact that users can subscribe to a blog is particularly attractive for the library – it's essentially a way of being invited into the user's routine on a regular basis, with new posts. Blogging is also every simple and easy – often much more so than editing the library website and creating new pages.

What to blog about?

Because they're so easy to set up and maintain, blogs can serve a variety of functions. They can specifically market aspects of the library service (Have you seen our new ...?) but they can also promote the library just by being a useful service in themselves. Book discussions and recommendations are perhaps the most obvious blog topic for a public library; relevant corporate news and new resources are perhaps the most obvious blog topic for a special library; how to use the academic resource on offer is perhaps the most obvious blog topic for a university or college library. All of these 'go-to-subjects' have value.

Once established, library blogs can go a little deeper – for example, by offering guidance on how to use Web 2.0 technologies (Taking your first steps in social

bookmarking), or tying in with local or national cultural events (It's Festival season – check out our recommendations for CDs and books on music in the 21st century...)'.⁹

Tumblr

Tumblr is a short-form blogging platform which officially counts as a 'microblog' but in practice sits roughly in the middle between Twitter and a regular blog. You can write long posts as you would on a regular blog, but more generally Tumblr is used to share short snippets, quotes, images, videos and audio. Tumblr blogs have 'followers' in much the same way Twitter accounts do, and one-click 'Re-blogging' which works much like retweeting on Twitter.

Because of its distinctive nature, Tumblr should be used by libraries in a distinctive way. Short, sharp, focused posts work best – never more than a paragraph or two long – particularly if they are on a specific theme. For example, a new material blog listing exciting acquisitions and new collections would work well on Tumblr, as would a blog showcasing digitized images from special collections⁹.

6. Conclusion

Social media is becoming more and more important every month. We have a great opportunity to follow our users, and interact with them in a more informal way – hopefully winning a few new users at the same time. People turn to social media for information more frequently now than they did even a year ago, because every search engine brings back about a million hits too many to the queries we type in. So we ask our networks instead; we trust humans more than we trust algorithms. Libraries must be there, providing good quality information as we have always done, but across new platform.

As a minimum, most libraries should be on Facebook and Twitter. Our users expect us to be there. We shouldn't start any social media profiles that we can't resource in the long term, but those we do should be conversational, informative and entertaining. Through social media, we can expand the audience to which we can then market the key services and resources the library provides.

REFERENCES

1. Patil, S.K., and Pradhan, Pranita. 2013. Library promotion practices and marketing of Library services: A role of Library professionals. *Procedia – Social and behavioural sciences*. 133 (2014). pp.249-254. Available at <http://www.sciencedirect.com/science/article/pii/S1877042814031012>
2. Seetharama, S. 2015. Marketing in Libraries and Information Centres. New Delhi: Ess Ess Publications.
3. Edewor, Nelson., Okite-Amugboro, Faith., Osuchukwu, Ngozi., and Egreaajena, Dennis. 2016. Marketing Library and Information Services in Selected University Libraries in Africa. *International Journal of Advanced Library and Information Science*. 4(1). pp. 291-300. Available at <http://scientific.cloud-journals.com/index.php/IJALIS/article/view/Sci-386>
4. Gupta, Dinesh. K., Marketing of Library and Information Services: Building a new discipline for Library and Information Science education in Asia. *Malaysian Journal of Library and Information Science*. 8(2). pp. 95-108. Available at http://umepublication.um.edu.my/filebank/published_article/1925/255.pdf
5. Kenneway, Melinda. 2007. Marketing the library: using technology to increase visibility, impact and reader engagement. *Serials*. 20(2). pp.92-97. Available at <http://serials.uksg.org/articles/abstract/10.1629/2092/>
6. Thomsett-Scott, Beth C. 2014. Marketing with Social Media. Chicago: ALA Techsource.

7. Das, A. 2015. Marketing of Information Services and Products in Sant Gadge Baba Amravati University (MIS): An exploratory study. *South Asia Journal of Multidisciplinary Studies*. 1(5). pp. 18-34. Available at <http://www.gjms.co.in/index.php/SAJMS/article/view/964/855>
8. Madhusudan, M. 2008. Marketing of Library and Information Services and Products in University Libraries: A Case study of Goa University Library. *Library Philosophy and Practice*. pp.1-6. Available at <http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1178&context=libphilprac>
9. Potter, N. 2012. The Library Marketing Toolkit. London: Facet Publishing.
10. Khan, S.A. and Bhatti, R. 2012. Application of social media in marketing of library and information services: A case study from Pakistan. *Webology*. 9(1). Available at <http://www.webology.org/2012/v9n1/a93.html>
11. Xia,Z.D. 2009. Marketing library services through Facebook groups. *Library Management*. 30(6). pp.469 - 478. Available at <http://www.emeraldinsight.com/doi/abs/10.1108/01435120910982159>

Skills of LIS Professionals in ICT Environment: A Case Study of LIS Professionals of Colleges in Goa

Nandkishor Bandekar

nandu_bits@rediffmail.com

M.E.S. Higher Secondary School, Zuarinagar - Goa

ABSTRACT

The information communication technology is important to develop and promote technical improvements. In India there are comparatively few studies related to ICT applications and professional development of library professionals. The pace of developments in ICT in the field of library and information science is rather slow when compared to other sectors. It is clear that technological change affects library personnel and there is a need to develop guidelines and policies to train the professionals in providing frontline services in academic libraries. Also the establishment of ICT infrastructure facilities can improve the efficiency of information support, the information retrieval and quality of education as a whole. Many colleges have adopted the computer technology for their in-house activities and services. In the wake of this the researcher intends to study, evaluate and find out the real scenario of “**Skills of LIS Professionals in the ICT Environment of College Libraries**” The findings of this research can be used in the design of training programs and refresher courses and also in the evaluation of librarians’ training need.

Keywords: - LIS Professionals, Library Automation, ICT Skills, Digital Library, ICT Infrastructure, Web 2.0 Technology

1. INTRODUCTION:

Libraries especially of educational institutions in India have witnessed a sea change in the information seeking behavior of student end users. The students of the 20th century and those who are undergoing the courses in this 21st century of information era have a lot of differences in searching, retrieving and acquiring knowledge. The reason behind this is the innovation and invention that are taking place in the field of information and communication technology. The application of ICT in production and of generation of information and the use has changed the information seeking behavior of the users. This transformation is happening as the users information seeking behavior has direct impact on library staff who are engaged in acquiring, processing , organizing, preserving and disseminating knowledge in various information types.

Hence the libraries of the 21st centuries have a greater responsibility of providing right information to the right users at the right time and in a convenient manner. In this digital era, the library professionals have different challenges 1) in one direction, there is a continuous flow of gigantic amount of new information, created and published in various media. 2) In the second direction there are numbers of users waiting for the latest information. 3) In the third direction the librarian has to keep his subordinate

staff well trained with the modern ICT gadgets that they serve their users to the best of their ability and satisfaction, to make this happen and to bring control over such situation the library professionals need to be thoroughly trained in ICT skills.

2. OBJECTIVES OF THE STUDY:

- To know the level of ICT skills acquired by LIS professionals and their applications in enhancing library services
- To identify the training orientation needs of the LIS professionals in ICT based resources, services, and tools.
- To find out the constraints encountered by LIS professionals in acquiring ICT skills.

3. RESEARCH METHODOLOGY:

The study is based on a survey method, a structured questionnaire was circulated among the professionals and Semi-structured interviews with librarians, and observational visits were held in libraries.

4. SCOPE AND LIMITATION

The scope of the present study is confined to investigate the information and communication technology skills of library professionals working in non-professional colleges in Goa.

5. DATA ANALYSIS & FINDINGS:

This section presents the analysis of data gathered for the present study by means of a structured questionnaire which was distributed among the LIS professionals of 15 non-professional colleges selected for the study. The questionnaire was designed primarily keeping in mind the main objectives of the study.

Table 1:- Distribution of Respondents by Gender

Gender	Respondents	Percentage (%)
Male	8	53.33
Female	7	46.67

Table 1 shows the gender distribution of the respondents is almost equal, 8 male (53.33%) and 7 (46.67%) female. All respondents have Master's degree in Library and Information Science.

Table 2:- Distribution of Respondents by Age

Age in Years	Respondents	Percentage (%)
20-30	0	0.00
30 – 40	3	20.00
40 – 50	10	66.67
50 – 60	2	13.33

The above table clearly depicts that there are hardly any LIS professionals coming from young generation and maximum number of professionals are in between 40-50 years of age.

Table 3:- Computer Skill:

Type of Computer skills	YES		NO	
	Respondents	%	Respondents	%
Knowledge of Operating system	15	100.00	0	0.00
Word processing	15	100.00	0	0.00
Presentation software	13	86.67	2	13.33
Spread sheet	13	86.67	2	13.33
Virus/Malware scanning	11	73.33	4	26.67
Browser basics	12	80.00	3	20.00

Table 3 shows awareness of ICT skills with regards to basic computer knowledge, all respondents are aware of the Knowledge of Operating system and Word processing, thereafter 86.67% are aware of Presentation software and Spread sheet, followed by Browser basics with 80%, then comes the knowledge of Virus/Malware scanning as 73.33%. LIS professionals are well equipped with basic skills which are fundamentally required.

Table 4:- Library Automation:

Details of Library Automation	Yes		No	
	Respondents	%	Respondents	%
Using Library Software	12	80.00	3	20.00
Circulation	10	66.67	5	33.33
Acquisition	6	40.00	9	60.00
Cataloguing	11	73.33	4	26.67
Serials Control	5	33.33	10	66.67
OPAC	11	73.33	4	26.67
Barcode generation	11	73.33	4	26.67
Digitization of documents	3	20.00	12	80.00
Financial Management	4	26.67	11	73.33
Administration	5	33.33	10	66.67
Stock verification	7	46.67	8	53.33
Security check gate	3	20.00	12	80.00
Library Statistics	9	60.00	6	40.00

Now a day's automation is obligatory to meet goals of the institute; it ensures smooth and effective functioning of the library system. Table 4 shows the computerization status, 80% libraries use Library management Software. There is a reasonable integration of Cataloguing (73.33%), OPAC and barcode generation (73.33%), circulation (66.67%), followed by use of system for maintaining library statistics (60%), thereafter stock verification (46.67%). Acquisition (40%), serial control (33.33%), financial management (26.67%), digitization of documents & security gate (20%) are few areas in which the integration or usage of ICT is observed below average..

Table 5:-Application of ICT in Enhancing Library Services

ICT Based Library Services	Yes		No	
	Respondents	%	Respondents	%
CD-ROM Searching	7	46.67	8	53.33
Online Searching	10	66.67	5	33.33
Online Networking	6	40.00	9	60.00
Online Information Service	6	40.00	9	60.00
News Clipping Scanning Service	2	13.33	13	86.67
Online Reservation Service	3	20.00	12	80.00
Database Searching Service	6	40.00	9	60.00
Audio Visual service	5	33.33	10	66.67
Internet access	12	80.00	3	20.00
Institutional Repository	4	26.67	11	73.33
Provision for e-resources	11	73.33	4	26.67
OPAC	11	73.33	4	26.67
E-Query service	3	20.00	12	80.00
Library website	7	46.67	8	53.33
Subject Portal	6	40.00	9	60.00
Email alert services	5	33.33	10	66.67

Application of ICTs is practically enhancing library services and efficiency. Table 5 shows use of Internet for browsing and retrieving the information is highest (80%). OPAC and provision for e-resources is at the next level of application with 73.33% each followed by online searching (66.67%), CD-ROM Searching and Library website (46.67%), Online Networking, Online Information Service, Database Searching Service and Subject Portal (40% each), thereafter Audio Visual service and Email alert services with 33.33% each, Institutional Repository 26.67%, Online

Reservation Service & E-Query service 20% and News Clipping Scanning Service with only 13.33%.

Table 6:- Knowledge about Digital Library

Type of Technology	Fully Known		Known		Uncertain		Not known	
	Respondents	%	Respondents	%	Respondents	%	Respondents	%
Digitization & Image Technology	1	6.67	8	53.33	0	0.00	6	40.00
Optical Character Recognition	1	6.67	7	46.67	2	13.33	5	33.33
Cataloguing & Metadata	3	20.00	7	46.67	1	6.67	4	26.67
User Interface design	1	6.67	5	33.33	1	6.67	8	53.33

Digitization and imaging technique is essential for librarians. Valuable print sources need to be digitized for preservation for future. These digitized documents are also used for reprographic purpose which can be sent to users residing in remote areas. Table 6 shows that the maximum respondents have knowledge about Cataloguing & Metadata, thereafter Digitization & Image Technology, with Optical Character Recognition respondents are moderately proficient and have low proficiency for User Interface design. Overall, knowledge related to the digital library technologies is quite low among professionals.

Table 7:- ICT Infrastructure

ITEM	YES		NO	
	Respondents	%	Respondents	%
Server machines	11	73.33	4	26.67
PCs	15	100.00	0	0.00
Printer -Dot Matrix Printer	3	20.00	12	80.00
-Ink Jet Printer	3	20.00	12	80.00
-Laser Printer	8	53.33	7	46.67
-Network Printer	3	20.00	12	80.00
Barcode Printer	10	66.67	5	33.33
Barcode scanner	10	66.67	5	33.33
CD server	2	13.33	13	86.67
LCD projector	2	13.33	13	86.67
UPS	13	86.67	2	13.33

Table 7 shows details of hardware and computer peripherals in use, it indicates all libraries are equipped with PCs and almost all have UPS (for backup). 73.33% also have server machines to support their library automation software, 66.67% possess barcode printer and scanner, and 53.33% have laser printers, 20% have dot matrix, ink jet and network printer, and only 13.33% have CD server and LCD projector.

Table 8:- Networking Facilities

Internet & LAN facility	YES		No	
	Respondents	%	Respondents	%
Terminals with Internet Connectivity in Library	13	86.67	2	13.33
Terminals with LAN Connectivity in Library	14	93.33	1	6.67
Campus LAN in the Institute	9	60.00	6	40.00

Networking facilities is important and crucial in today's time; Table 8 shows 93.33% libraries are equipped with LAN connectivity, 86.67% having terminals with internet connectivity and 60% have campus LAN in the Institute. The status of networking facilities is found to be quite satisfactory in libraries.

Table 9:-Application of Web2.0 Technology in Library Services

Web2.0 Technology Tools	YES		NO	
	Respondents	%	Respondents	%
RSS	4	26.67	11	73.33
Wikis	2	13.33	13	86.67
Social networking	3	20.00	12	80.00
Blogs	1	6.67	14	93.33
Tagging	1	6.67	14	93.33
Mashup	1	6.67	14	93.33

Web2.0 Technology is a second generation of World Wide Web. It allows users to interact and collaborate with each other in a social media dialogue as creators of user-generated content in a virtual community. Table 9 shows the application of Web2.0 technology in library services, RSS is used 26.67%, social networking 20%, wikis 13.33%, and Blogs, tagging & mashup has a very poor application with 6.67% each. Most of the libraries are not acquainted with such technologies, thereby lacking in this domain of technology.

Table 10:- Means & Methods of Acquiring ICT Skills

Method	Respondents	%
Formal Education	3	20.00
Distance Education	1	6.67
Through Colleagues	6	40.00
Self-Study	9	60.00
Training at workplace	10	66.67
Training by service providers	5	33.33
Attending workshops /IT training programs	12	80.00

There are various means and methods of acquiring ICT skills. In the designed questionnaire for the study, respondents were asked to tick the most suitable option for acquiring ICT skills. The Table 10 indicates that maximum respondents (80%) preferred attending workshops /IT training programs, followed by training at workplaces (66.67%) and self-study (60%). Few preferred other ways gaining ICT knowledge through colleagues, training by service providers, formal education and one respondent opted for distance education.

Table 11:- Problems Faced in Acquiring ICT Skills

Problem Description	Yes		No	
	Respondents	%	Respondents	%
Financial problems	5	33.33	10	66.67
Overload of working hours	9	60.00	6	40.00
Library professionals not interested in learning IT knowledge	3	20.00	12	80.00
Higher authority is not interested to send their library professional to upgrade their IT skills	3	20.00	12	80.00
Lack of professional recognition	5	33.33	10	66.67
Limited opportunities	6	40.00	9	60.00
Lack of sufficient staff in the Library	11	73.33	4	26.67

LIS Professionals are constrained with different types of problems in their work environment which hurdles them from acquiring ICT skills. In this question many options were given to the respondents and were asked to tick mark the option they would prefer to acquire ICT Skills. Table 11 depicts that the maximum respondents (73.33%) are lacking in sufficient staff in the Library, 60% professionals have overload of working hours, then 40% with limited opportunities, then financial problems and lack of professional recognition, very few (20%) admitted that they are not interested in IT knowledge and remaining 20% mentioned that higher authority is not interested to send their library

professionals to upgrade their IT skills.

6. CONCLUSION:

The present status and conclusions that are drawn are as follows:

1. Gender distribution is almost equal; most of the respondents are in their forties whereas professionals from young generations are quite low in number. Young professionals are more equipped with ICT skills and compatible with latest technology.
2. In ICT based library services online reservation service, online networking, Institutional Repository, E-Query service and Email alert services is found to be at the lowest level of application. Whereas such services are most helpful in present era, time saving and enables remote access to the users.
3. In acquiring ICT skills it is being found that most of the professionals would prefer attending workshops/IT training programs and training at workplace provided there are sufficient staff to look after the library functioning. In this regard head of the institute may fulfil staff requirement and support librarians for attending and participating in such workshops/conferences held across the country.
4. Internet connectivity is almost flourished whereas campus LAN is essential for the prompt exchange of thoughts/ideas within the organization.
5. Web 2.0 is a set of technologies and services that allows people to contribute and support the provision of interaction among them through social networking, creating blogs, Wikis, RSS etc. The sample libraries are not properly equipped with these technologies and it reflects incompetence of the LIS professionals in the area.

Many revolutionary changes in past decade demand new roles for LIS professionals and subordinate staff. However as IT is advancing and fast changing it is not easy to predict all the skills required for LIS professionals even in next 5 years.

SUGGESTIONS AND RECOMMENDATIONS

1. Library schools and library professional associations shall take responsibility and design course/program content in such a way that knowledge of ICT skills is inbuilt into it, make provision for hands on training also initiative is required

for exposing library science students to intensive work environment or develop internship program.

2. LIS professionals have to identify who is the target group or user of the library. They have to find out or do research on what the user demand might be in order to answer questions like
 - a) *What kind of services, network facilities, ICT infrastructure and internet bandwidth do users really need? And can also check their level of satisfaction by conducting survey.*
3. Ultimately to work efficiently and effectively a new generation of LIS professionals should have the qualifications in providing information as well as dynamically exercising personal skills, generic skills and discipline-specific knowledge.

Although most of the LIS schools have integrated their curriculum based on the information and communication technology, ICT is ever changing process and LIS professionals need to update themselves. So, UGC/NAAC/AICTE and other higher and recognition bodies should take initiatives to make LIS professionals attend ICT based courses similar to refresher courses. Since academic libraries are attached to institutions which are engaged in learning, teaching and research, the role of LIS professionals in the present-day has become exceedingly vital.

REFERENCES:-

- a) J. Danrita, V.P. Ramesh Babu, and T. Marichamy, *Future concepts of library and information services: changes, challenges and role of library professionals*. New Delhi: EssEss Publications, 2009 -ISBN:- 978-81-7000-558-2
- b) <https://www.unigoa.ac.in/>

Academic Integrity and Plagiarism Prevention at Tata Institute of Social Sciences, Mumbai: A Case Study

Shekappa Bandi¹; Devyani Pothare²; Mallikarjun Angadi³ and Suresh Jange⁴

¹shekar.bandit@tiss.edu

²devyani@tiss.edu

³mallikarjun@tiss.edu

Tata Institute of Social Sciences, Deonar Mumbai-400088, Maharashtra

⁴sureshjange@gmail.com

Gulbarga University, Gulbarga – 585 106, Karnataka

Abstract

Plagiarism is not always a black and white issue. The boundary between plagiarism and research is often unclear. Learning to recognize the various forms of plagiarism, especially the more ambiguous ones, is an important step towards effective prevention. The study overview the concept and types of plagiarism and its benefits, Plagiarism Policies in India, and also discussed turnitin and its workflow process of the TISS comparison of the Turnitin and iThenticate plagiarism tools and other relevant areas.

Keyword: Plagiarism; Turnitin, iThenticate and Turnitin Work Flow

1. INTRODUCTION

With the advent of technology, internet and open source software used for building research repository in the academic institutions have facilitated academic research but at the same time the issues like easy access and copy pasting of others research work have started worrying the research departments. The increasing use and misuse of ICT in academic and research fields has thereby alerted the academicians about the need to protect academic honesty, copyrights and other legal aspects of a person's intellectual work. This have forced the national educational body like UGC to formulate regulations which relates to examinations and bring into practice the use of tools to control copy paste issue commonly known as plagiarism.

2. ACADEMIC INTEGRITY IN THE HIGHER EDUCATION

Cheema, Mahmood, Mahmood, and Shah (2011) found that while some plagiarism in higher education research is intentional, some is unintentional and a matter of ignorance of plagiarism facts. The authors found that while most researchers do have a general idea of what constitutes plagiarism, many were not aware of the differing types of plagiarism a substantial number of researchers also did not realize the penalties involved in committing plagiarism. In the study's conclusion and author suggested that researchers be educated in correct citation usage and intellectual property laws.

Academic integrity, including plagiarism avoidance, should be taught to young students as soon as they begin to write papers. A respect for intellectual property and one's reputation should be instilled in learners as early as possible. As Honig and Bedi (2012) suggested, a system of monitoring and censure should also be implemented world-wide for all scholarly research. The many instances of plagiarism throughout the world are disconcerting. In a technologically advanced world with a global marketplace, scholarly researchers should be held to the highest standards. This







is especially so with the advent of the technological tools and information offered by companies such as Elsevier.

3. WHAT IS PLAGIARISM?

The modern concept of plagiarism as immoral and originality as an ideal emerged in Europe only in the 18th century, particularly with the Romantic Movement. In the 1st century, the use of the Latin word *plagiarius* (literally kidnapper) to denote stealing someone else's work was pioneered by Roman poet Martial, who complained that another poet had "kidnapped his verses. "Plagiary", a derivative of "plagiarius" was introduced into English in 1601 by dramatist Ben Jonson to describe someone guilty of literary theft.

According to U.S. law, the answer is yes. The expression of original ideas is considered intellectual property and is protected by copyright laws, just like original inventions. Almost all forms of expression fall under copyright protection as long as they are recorded in some way (such as a book or a computer file).

Summarization of the plagiarism;

-  Turning in someone else's work as your own
-  Copying words or ideas from someone else without giving credit
-  Failing to put a quotation in quotation marks
-  Giving incorrect information about the source of a quotation
-  changing words but copying the sentence structure of a source without giving credit
-  Copying so many words or ideas from a source that it makes up the majority of your work, whether you give credit or not.

Most cases of plagiarism can be avoided, however, by citing sources. Simply acknowledging that certain material has been borrowed and providing your audience with the information necessary to find that source is usually enough to prevent plagiarism. See our section on citation for more information on how to cite sources properly.

4. DIFFERENCE PLAGIARISM AND COPYRIGHT

Plagiarism is not the same as copyright infringement. While both terms may apply to a particular act, they are different concepts, and false claims of authorship may constitute plagiarism regardless of whether the material is protected by copyright.

Copyright infringement is a violation of the rights of a copyright holder, when material whose use is restricted by copyright is used without consent.

Plagiarism, in contrast, is concerned with the unearned increment to the plagiarizing author's reputation that is achieved through false claims of authorship. Thus, plagiarism is considered a moral offense against the plagiarist's (for example, a reader, publisher, employer or teacher). In such cases, acts of plagiarism may sometimes also form part of a claim for breach of the plagiarist's contract, or, if done knowingly, for a civil wrong.

5. TYPES OF PLAGIARISM


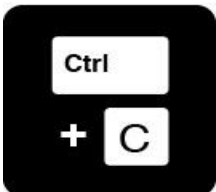





Plagiarism is not always a black and white issue. The boundary between plagiarism and research is often unclear. Learning to recognize the various forms of plagiarism, especially the more ambiguous ones, is an important step towards effective prevention.




The Plagiarism Spectrum was developed as a way to define and distinguish the common ways in which plagiarism can take form. The Spectrum makes these forms

memorable by tagging the types with “Digital 2.0” monikers, a gesture that both acknowledges the role that the internet plays in instances of content copying and makes the types more meaningful for a generation of younger writers.

As part of the Plagiarism Spectrum project, a May 2012 survey of nearly 900 secondary and higher education instructors was also conducted to assess the frequency with which these types appear as well as the degree to which each type is problematic for instructors.

Each of the 10 most common types of plagiarism are defined below. The types are ranked in order of severity of intent.

1	CLONE: Submitting another’s work, word-for-word, as one’s own	
2	CTRL-C: Contains significant portions of text from a single source without alterations	
3	FIND – REPLACE: Changing key words and phrases but retaining the essential content of the source	
4	REMIX: Paraphrases from multiple sources, made to fit together	
5	RECYCLE: Borrows generously from the writer’s previous work without citation	
6	HYBRID: Combines perfectly cited sources with copied passages without citation	
7	MASHUP: Mixes copied material from multiple sources	

8	404 ERROR: Includes citations to non-existent or inaccurate information about sources	
9	AGGREGATOR: Includes proper citation to sources but the paper contains almost no original work	
10	RE-TWEET: Includes proper citation, but relies too closely on the text's original wording and/or structure	

6. BENEFITS OF PLAGIARISM TOOLS

- ✚ It is an important step towards controlling the activity of taking others original thought or idea already published in print or electronic form,
- ✚ Will help to induce aspiration in young researchers to produce work of the highest quality, thereby also increase the credibility and authority to your work, and demonstrate your commitment to the principle of intellectual honesty in scholarship, resulting in quality writing.
- ✚ It will encourage students to learn how to read academic literature and how to write in a style appropriate to their discipline. It is necessary not only to learn new terminology, but the practical study skills and other techniques which will help you to learn effectively.


7. TURNITIN@TISS

Tata Institute of Social Sciences has been practicing turnitin plagiarism tool from 2009, around 15697 different forms i.e. thesis and dissertations, faculty articles, assignments and term papers and book chapters has been tested with turnitin. Out of 15697 submissions 71% of the submissions are got text matching between 0-24%, following by 17% of the submissions are got text matched between 25-49%, 7% of the submissions are got text matched in between 50-74% and there are 4% of the submissions are falls under between 76-100% text matching. Finally the study highlights that how this kind of tools are helps to improving research activities and creating awareness to the researchers as well as who are going to Wright and publish their research output.

Turnitin will have a scheduled system maintenance on Saturday, Sept. 19, 2015 from 7:00 AM to 11:00 AM Pacific Time ([click for local time](#)). Due to unavailability between those times.

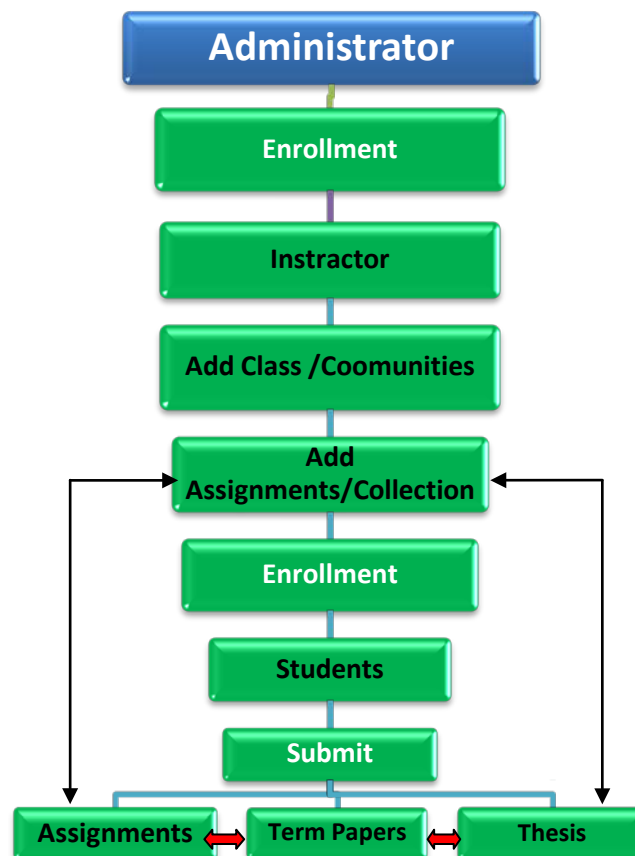
About this page

This is the account statistics page. Account statistics are collected at the beginning of every month and are calculated in monthly increments using Coordinated Universal Time (UTC). The statistics are calculated monthly by default. To view statistics for a different date range, please specify the start and end months and years below.

Now Viewing Statistics for: Tata Institute of Social Sciences													
View descriptions for how the various statistic columns are tracked													
Display statistics for period between Jan 2009 and Apr 2015 for --- All instructors --- Update Statistics													
Name	Join/Enrollment password	ID	Instructors	Students	Submissions	Originality Reports	75-100%	50-74%	25-49%	0-24%	No matches	PeerMark	Graded papers
Tata Institute of Social Sciences (cumulative)	tatainst123	55645	68	101	15697	15561	688	1049	2702	10285	837	-	9

8. WORK FLOW OF TURNITIN

Turnitin is one of the most popular plagiaries tool which is have academic support functionalities and where administrator can track the who are doing what and he can enroll the instructor/Supervisor then Instructor can create Class/Communities, and Assignments/Collections and also he can enroll the students respective collection and extend the rights to submit their thesis & dissertations, assignments, term papers etc. instructor can track the students activities and he can easily analysis the report which is generated by turnitin and also if it's required it can download in HTML format.



9. PLAGIARISM DETECTION TOOLS AND THEIR COMPARATIVE STUDY ON BASIS OF THEIR POPULARITY

Features	turnitin	iThenticate®
Provider	iParadigms, LLC	iParadigms, LLC
work Flow	Admin--> Instructor -->Student	Admin-->User
Language	English + 19 International Language	English + 2 International Language
Submit a document in single/multiple/Zip/cut pest	√	√
Search Facility	X	√
Folder/Report Sharing	X	√
Immediate Report Generation	√	√
Auto report alert every Hrs/day/week	X	√
Allow users/students to see Originality Reports	√	√
Report view; Text and Document view	√	√
Subscription	√	√
Report sorting	√	√
Report Download	√	√
Exclude Abstract Provision	X	√
Exclude Methods and Materials	X	√

Exclude Phrases	X	√
Report Filters	X	√
Reports custom settings	√	√
multiple user adding	√	√
Help Documents	√	√
Change Score Color Percentage	Default	Custom
Submit papers to Repository	Custom	X
Document Properties can Edit any time	X	√
Quick Submission	√	X
support multiple file format to upload	√	√
Similarity Searches in (Documents submitted in this folder will search checked repositories)	Student paper repository/Current and archived internet/Periodicals, journals, & publications	Crosscheck/Internet/Publications
File Types Supports	Microsoft Word, Excel, PowerPoint, WordPerfect, PostScript, PDF, HTML, RTF, OpenOffice (ODT), Hangul (HWP), Google Docs, and plain text	Microsoft Word® (DOC and DOCX), Word XML, Plain Text (TXT), Adobe PostScript®, Portable Document Format (PDF), HTML, Corel WordPerfect® (WPD), Rich Text Format (RTF)
Maximum File Size /Paper Length	20 MB/400 pages	40MB/400 pages
URL	http://www.turnitin.com/	http://www.ithenticate.com/
User Image uploading	X	√

10. PLAGIARISM POLICIES IN INDIA

From November 30, 2009 the University Grants Commission (UGC) in India made compulsory implementation of new regulations for the awarding of MPhil/PhD degrees in the country. Among the requirements were that all schools must begin “using well-developed software” to detect plagiarism and other forms of “academic theft” and also provide an electronic copy to the UGC for inclusion in the organization’s Information and Library Network Centre (INFLIBNET), which is open to the public.

Additional requirement that all theses not on language subjects also have at least one copy submitted in English and that research supervisors must also attest to the originality of the work, including that no plagiarism has taken place.

11. CONCLUSION

Today's digital culture has blurred the lines of originality and authorship. It is imperative that within this culture, writers, academics, and students have a clear sense of what constitutes plagiarism. Dictionary definitions and even campus academic honesty policies are often vague and do not necessarily address the types of plagiarism that occur. The Plagiarism Spectrum works well as an educational tool to help students and writers of all levels to better understand what plagiarism is and how it takes form. In addition, academic institutions can use this spectrum to account for the differences between serious issues of academic dishonesty and that of the inadvertent misuse of sources. This understanding can better guide policy development in the appropriate responses to plagiarism in the classroom.

Plagiarism is not a crime per se but in academia and industry, it is a serious ethical offense and cases of plagiarism can constitute copyright infringement. The best way of avoiding plagiarism is to learn and employ the principles of good academic practice from the beginning of your university career. Academic bodies like UGC, academicians as well the librarians in India have also become wary of the reputation issues that come from actively pursuing plagiarists. Under the regulations for examinations, intentional or reckless plagiarism is a disciplinary offence and in order to bring the qualitative change some primary steps towards this can be made as mentioned below.

REFERENCES

1. Ercegovic Z. & Richardson. J. V. (2004). Academic Dishonesty, plagiarism included, in the digital age A literature review, *College ft- Research Libraries*, 65(4), 301-18.
2. Cheema, Z., Mahmood, S., Mahmood, A., & Shah, M. (2011, January). Conceptual awareness of research scholars about plagiarism at higher education level: Intellectual property right and patent. *International Journal of Academic Research*, 3(1), 666-671.
3. Edlutid, J. R. (2000), What is "plagiarism" and why do people do it? Retrieved August 8, 2015 from http://www.calstalela.cdu/ccjitcrs/writc_cn/plagiarism.htm
4. Marcel Chotkowski LaFollette. (1996). *Stealing Into Print: Fraud, Plagiarism, and Misconduct in Scientific Publishing*, University of California Press, England
5. Neville, Colin. (2010). *The Complete Guide To Referencing And Avoiding Plagiarism*, McGraw-Hill Education, New York.
6. Vera Stepchyshyn & Robert S. Nelson. (2007). *Library Plagiarism Policies*, College Library Information Packet Committee, New York.
7. John Maxymuk, (2006), "The persistent plague of plagiarism", *The Bottom Line*, Vol. 19 Issue- 1 pp. 44 – 47
8. http://www.noblenet.org/merrimack/academic_integrity/detect.htm#jplag?
9. <http://www.netugc.com/plagiarism>
10. <http://www.ascilite.org.au/ajet/ajet24/atkinson.pdf>
11. <http://indianexpress.com/article/opinion/columns/faking-it-3/>
12. [http://www.ifla.org/events/the-4th-international-conference-on-information-science-and-information-literacy ?](http://www.ifla.org/events/the-4th-international-conference-on-information-science-and-information-literacy)
13. http://en.wikipedia.org/wiki/Plagiarism_detection
14. <http://www.emeraldinsight.com/doi/pdfplus/10.1108/08880450610643070>
15. <http://www.ithenticate.com/plagiarism-detection-blog/bid/87315/Plagiarism-in-Higher-Education-Research#.VfIMVdKqqko>

High Quality Professional Communication: The Path to Excellence

Perin Marolia

pvmarolia@gmail.com

Information Consultant and Academic Editor

ABSTRACT

Communication is a very important phase of all professional activities. High quality communication is the platform for excellence in professional functioning. This paper gives an overview of different forms of communication, grouped into Written, Audio-visual, Verbal and Non-verbal. It outlines the characteristics and features of various forms and the problems associated with them. The paper proposes that, as an innovation for excellence, communication skills should be included in the curricula of LIS education, and in continuing education programmes for LIS Professionals. A model paper on communication skills for LIS students is given.

Keywords: Communication – importance of; Communication – quality in; Communication skills; LIS Education; Paper on Communication Skills

1. INTRODUCTION:

Communication is defined in different ways in different sources. The Oxford Dictionaries Online gives the following compact definition: “The imparting or exchanging of information by speaking, writing, or using some other medium.” (<http://www.oxforddictionaries.com/definition/english/communication>).

Communication is an integral part of life both at the personal and professional levels. In this paper we will look at professional communication, which is a very important phase of all professional activities. High quality communication is the platform for excellence in professional functioning.

There is a vast amount of literature on communication theory, including various models of communication. In brief the components of the communication process are: source, message, medium, and receiver. Communication can be written or verbal. Non-verbal communication also has a role to play. Consciously or unconsciously, we are always carrying out non-verbal communication through our body language. In addition we regularly use audio-visual (AV) communication. Today, a wide range of communication channels are available to us, due to the advances in technology, particularly the Internet.

Professional communication can be formal, semi-formal or informal. It may be written, AV, verbal, or non-verbal; or the combination of two or more of these. The written, AV and verbal forms can be physical or digital. In many situations, the unit of communication may combine various forms and media, e.g. while presenting a paper at a conference we use written content combined with AV content, along with verbal communication (and some non-verbal communication) and integrate the physical and digital media. Another example is the library website, which combines written and AV content on a digital platform, to provide a detailed and easy-to-use form of communication.

2. IMPORTANCE OF COMMUNICATION IN THE PROFESSIONAL ENVIRONMENT:

Communication has always been an integral part of human life and activity. Right from the cave paintings and the inscriptions on pyramids, and other communications which date back to thousands of years, we see evidence of recording and communicating information. As civilization progressed the communication needs also evolved, from the social to the functional. With the growth of professions, we see the use of a variety of forms of professional communication, ranging from the formal minutes of meetings to the informal interactions over tea, which are nonetheless of significant importance.

The reasons for effective communication today include the following:

1. Effective communication is necessary for the efficient execution of tasks. Clear instructions from managers to juniors bring about the required results with proper utilization of time and effort. Moreover, coaching and mentoring in the work situation calls for good communication.
2. Good communication is the 'cement' for team building. It creates a pleasant working atmosphere where people work well.
3. All organizations need to have efficient communications with their client groups. In libraries, communication with users is very important, both for conveying information about the library's resources and services, and more so, for encouraging users to make optimal use of the library. This includes the user education and information literacy programmes conducted by libraries.
4. Professionals need to communicate regularly with higher management of the institution. Proposals and requests must be written convincingly; while reports and minutes should have enough background and detail to be useful even if they are referred to after several years.

Raman and Singh (2006) list the following benefits of effective communication:

- Increased productivity
- Stronger decision making
- Quicker problem solving
- Healthier business relationships
- Improved customer relations
- Increased awareness among employees
- Less misunderstanding
- Better quality of documents
- Enhanced professional image

While the above are applicable to all professional environments we can see that they stand true for the LIS profession. We are well aware that communication has always been an important phase of our professional life. But in recent times, the developments in the LIS field, as well as the pressures on LIS professionals have brought about situations where efficient and effective communication is of special importance. Let us review this matter.

1. Operations in libraries and information centers are more complex than before. New technologies are becoming available and can be harnessed to our benefit. While earlier there was great uniformity in library operations in different libraries, today we are in an age of customization. The technologies available allow us to carry out a wider range of activities, provided we know how to operate them. It is necessary for staff to be given clear and detailed instructions on the use of various new technologies and facilities. This calls for efficient communication to the operating staff.
2. One to one communication with users is enhanced. The reference interview is more detailed. Due to the large quantities of information and the need to provide focused information according to the users' needs, the LIS professionals need to clearly understand the users' needs in order to provide the right information.
3. With the ever pervading presence of the Internet, and the users' tendency to be dependent on it for information, libraries have to market their services to the users and potential users, and show how the library's resources and services can provide value addition over the Internet.
4. With the shift in emphasis to digital resources, users have to be instructed in their use. Moreover, and very importantly, users have to be helped to select the best and most appropriate sources for scholarly and professional information. In other words, libraries have to give greater emphasis to user education and information literacy programmes. This implies that LIS Professionals must cultivate the communication skills required for this purpose.
5. In the present age, we see a move towards embedded librarianship, where the LIS professional is well integrated into the team he/she serves. In order to be an effective member of the team the LIS professional must be able to conduct two-way communication between himself/herself and the rest of the team.
6. For career progress LIS professionals are required to carry out and report research. They need to write research reports and articles for journals, and present papers at conferences. For this, a special formal style of written communication is required.
7. We are in an age of evidence based librarianship where management decisions are guided by evidence of successful practice. This evidence is in the form of published (and sometimes unpublished) professional literature in the field. In order to have evidence to use, the profession must create evidence by reporting action research, case studies, etc. Even if the results are negative, it is useful to report the same, so that others in the profession can use them as evidence to avoid duplicating the same problems. Literature that serves as evidence must be methodologically sound, and communicated with clarity. Here again the communication skills of LIS professionals are exercised.
8. In this Internet dominated era, the survival of libraries is under threat. In order to survive, libraries have to innovate, and reconstruct the service delivery paradigm. So LIS professionals need to convince management to approve and support new services. They also need to persuade users to avail of the new services. This calls for skills of persuasive communication.

9. Good communication enhances a person's image. The image of the library and its personnel can be enhanced if they communicate well with all their audiences, in writing, verbal and by non-verbal communication, in different situations.
10. Networking among members of the profession is very valuable, particularly for informal problem solving. This can be done on a person-to-person basis, through Google groups, etc.

3. TYPES OF COMMUNICATION IN THE LIS ENVIRONMENT

LIS professionals have to carry out a spectrum of different forms of communication, ranging from the most formal to the most informal. These include the following:

3.1 *Written communication* (including electronically produced documents):

- Research Reports
- Research tools e.g. questionnaires
- Journal articles, Conference Papers
- Administrative Reports, Annual reports, Project reports
- Proposals for new services and/or projects
- Agendas and Minutes of meetings
- Formal letters to suppliers and to higher management
- Email, SMS etc.
- Communications with library users – Notices, promotional material, brochures, etc.
- Instructional content for user education and information literacy programmes
- Website Content
- Communications relating to organizing conferences and other special programmes
- Annotations, abstracts, summaries
- Information Consolidation Products
- Resumes
- Networking with other members of the profession

3.2 *Audio-Visual Communication:*

- Photographs
- Films/Video recordings
- Posters & charts
- Powerpoint presentations (which combine text and AV)

3.3 *Verbal communication:*

- Discussions and negotiations with higher management
- Instructions to staff
- Knowledge sharing among staff
- Interaction with users at service points
- Reference interviews
- User education and information literacy programmes
- Negotiation with vendors and suppliers

- Problem solving, with staff and users
- Social communication, among staff, and with users
- Speeches and presentations
- The “grapevine”

3.4 Non-verbal communication:

- Facial expressions
- Gestures
- General appearance, dress, grooming

4. QUALITY IN COMMUNICATION:

Each communication has a purpose. The purpose will be served adequately only if the communication is prepared and presented according to certain parameters of quality.

What are the parameters of quality in communication?

Rai (2010) lists 4 Cs of communication:

- Correctness
- Clarity
- Conciseness
- Courtesy

To these, I would like to add: Completeness

Let us examine these parameters in some detail.

Completeness:

The communication must contain all the facts and figures that are required to serve its function. Absence of facts will mean that if any decision or action is to be taken in response to the communication, it will be delayed or a poor decision may be made.

Correctness:

All the points in the content should be correct and must be verified before sending/presenting the communication. Special attention should be given to numbers, dates, names, references to previous communications on the matter, etc.

Clarity:

Communication should be carried out in such a way that it is clear to the receiver. The terminology used must be of the type that will be understood by the receiver. Technical terminology should be avoided when communicating with lay persons. Further there should be enough detail so that the receiver understands what is being communicated. Any assumptions made must be stated. The points must be presented in a systematic manner so that they are easy for the receiver to register in his mind. Jumping from point to point and back, and mixing up ideas results in difficulty in understanding.

Conciseness:

A communication should not be unnecessarily long, else it will not sustain the receiver’s attention. Irrelevant facts should not be included. The sentences should use words economically, and not use long-wound expressions of the type found in literary works and poetry. Conciseness has to be balanced with completeness and clarity.

Courtesy:

Communications should always be tactful, even if a strong message is to be conveyed. Communications in an angry or offensive tone will create more problems rather than solving them. In particular, when replying to an email, even if the sender is angry or

offended, he must pause, calm down and then communicate. Complaints should be presented courteously. Moreover, replies to complaints must be worded with special courtesy.

Therefore, we see that the following are essential for quality in communication:

- Focus/ relevance
- Good organization and flow of ideas
- Elimination of errors
- Proper use of language.

I would like to add that while this paper gives examples in English, the principles of communication are applicable to all languages.

5. STYLE AND FORMAT IN COMMUNICATION:

This is applicable mostly to written communications. Each form has specific requirements of content, and conventions regarding the presentation. Two illustrative examples are given below:

A research report contains:

an abstract and keywords,
background,
problem statement,
objectives,
hypothesis,
methodology,
findings,
conclusions,
bibliography.

The minutes of a meeting contain:

Where and when the meeting was held
Names of persons who attended, and who was in the Chair
Leave of absence
Confirming and signing of minutes of previous meeting
Matters arising from the minutes
Business conducted
Decision/resolutions (Resolved that...)
The meeting ended with a vote of thanks to the chair

Further, for semi-formal, informal, verbal and non-verbal communication, there are certain norms, conventions and guidelines to be followed.

e.g. when answering an office phone, we do not say “Hello” but we say, “ABC Library, Good morning.”

While writing email, we do not type in all capitals, as this is equivalent to ‘shouting’

6. PROBLEMS WITH COMMUNICATION:

Of the numerous problems to be guarded against in communication, a few important ones are listed below.

6.1 Problems with written communication:

1. Use of long sentences. By the time the reader finishes reading the sentence he has lost what was said in the beginning

2. Using technical terminology while communicating with a lay audience like non-scholarly users of a library. Written communication should use the type and level of language that the reader will understand clearly and easily.
3. Using words without knowing the exact meaning and the context in which the word has to be used. People have the tendency to consult a thesaurus to find alternative words, but the thesaurus does not give the exact meaning and context. So one must use new words carefully, after verifying the exact meaning and style of usage in a sentence.
4. Using a 'stream of consciousness' style of writing, moving from one idea to another in an unstructured manner. It is a good idea that before beginning a piece of formal writing one should write down the points and arrange them in a proper order, to make an outline. Then the final piece of writing will be well structured and therefore easy to read and understand.
5. Wrong use of punctuation. The wrong placing of a comma can change the meaning of a sentence. This is well explained in a book entitled "Eats, Shoots and Leaves" by Lynne Truss (2003). The most commonly misused punctuation mark is the apostrophe. The apostrophe denotes possession, not plural. E.g.
 - The books (not book's) are arranged by DDC numbers.
 - The book's DDC number is written on the title page.
 - The books' spine labels help us to shelve the books properly.
 Exception:
 - "Its" denotes possession. E.g. Every book must have its call number written on it
 - It's is a short form of "it is" e.g. It's necessary to give a correct class number to each book

6.2 Problems with verbal communication:

1. Talking too fast: When one talks very fast, it is difficult for the listener to register everything that is said
2. Taking long pauses, particularly in a speech. The listeners get bored.
3. Unnecessarily repeating what is said. Some repetition is useful to reinforce the message, but multiple repetitions are unnecessary and irritating.
4. Mispronouncing common words, e.g. women, paradigm
5. Putting on an accent
6. Not listening. Listening is a very important phase of verbal communication. Verbal communication is a two way process and one must listen to the opposite person in order to respond appropriately.
7. Interrupting at the wrong places. It is bad manners and damages the communication

6.3 Problems with non-verbal communication:

1. Lack of eye contact. Eye contact is necessary to convey to the other person that you are paying attention to him, when either of you is talking. Lack of eye contact makes the other person feel left out.

2. Sitting in a slouched position. It conveys a lack of attention and interest.
3. Wearing inappropriate clothes. Gaudy colours as well as garments that are inappropriate to the situation create a negative image.

7. CULTIVATION OF GOOD COMMUNICATION SKILLS AMONG LIS PROFESSIONALS

It is time for the profession to recognize that communication skills are as important in LIS as the other skills such as technical skills of LIS, skills relating to information and communication technologies and managerial skills. Just as these other fundamental skills are formally taught as part of LIS curricula, communication skills should also be taught. LIS degree programmes should include a paper on communication skills, which includes adequate practical work. Appendix I contains a model paper on Communication Skills for Librarians, which can be adopted by University Departments of LIS as part of the MLIS curriculum.

8. Conclusion:

As the LIS profession gears up to meet the challenges of future librarianship through innovation for excellence, the need for high quality communications must be realized. The members of the profession must be sensitized to the issues related to communication and must be motivated to develop good communication. Communication skills must be recognized as an important part of LIS skills and must be included in LIS curricula.

REFERENCES:

- Rai, Urmila & Rai, S.M. 2010. Business Communication. Mumbai: Himalaya Publishing House.
- Raman, Meenakshi & Singh, Prakash. 2006. Business Communication. New Delhi: Oxford University Press.
- Truss, Lynne. 2003. Eats, shoots and leaves. U.K.: Profile Books.

Appendix 1:
Model paper on Communication Skills for Librarians
As part of the MLIS curriculum

Objectives of the paper:

1. To understand the need and importance of various types of communication for librarians
2. To identify the different types of communications and be aware of the functions and characteristics of each
3. To identify the problems associated with different types of communications, and the ways to reduce them in order to produce high quality communications
4. To prepare examples of different types of communications

Course Content:

Unit 1: The need and importance of communication, with special reference to the LIS profession.

Unit 2: Written Communication: Different types; the functions and characteristics of each; rules, conventions and guidelines for preparing each type; problems associated with each, and their reduction.

Unit 3: Audio visual communications: Different types; the functions and characteristics of each; guidelines for preparing each type; problems associated with each and their reduction

Unit 4: Verbal communication: Different types; the functions and characteristics of each; ways of carrying out high quality verbal communication

Unit 5: Non-verbal communication: Different ways in which non-verbal communication is manifested; understanding non-verbal communication; understanding the ways of improving one's communication by value addition of non-verbal communication

Each unit should include practical work of preparing different types of communications

Marketing of Library Resources and Services: New Challenges and Opportunities

Mugdha A Raul¹, Swati S Belapurkar², Satish S Munnolli³

¹*sbelapurkar@actrec.gov.in*

²*mgokhale@actrec.gov.in*

³*smunnolli@actrec.gov.in*

*Advanced Centre for Treatment, Research & Education in Cancer (ACTREC),
Tata Memorial Centre, Navi Mumbai- 410210*

ABSTRACT

Over the years libraries have enjoyed positive and good relation with patrons. The new internet environment and technological advances have made libraries to rethink and adapt these innovations for the effective and efficient functioning of the system and services. Enhancing usage of resources and services is essential and possible with the help of effective marketing strategies. Librarian's should take this cyber age as an opportunity rather than as a challenge. This paper aims to highlight some of the conventional marketing techniques, which libraries can repack and promote for the effective flow of information resources to meet the objectives of the institute.

Keywords: Library Marketing, E-marketing, Library Services

1. INTRODUCTION

Change is imperative in any environment to exist, survive, prosper and move forward. Libraries are not exception to this phenomena. Exploring, identifying and integrating changing technologies in library environments, identifying new sources, escalating cost of resources, understanding new publishing models, and ever demanding user requirements are elements all the time hover the minds of library professionals. Integration of any of these elements with technology, it needs a meticulous understanding of new system with analysis, its implications, how best they are useful and effective for the user community. Every aspect needs an attention in detail and an inquisitive mind since from its conceptualization to implementation stage. Once it is implemented next is promoting and marketing the resources as products and services. In case of libraries, benefits are intangible in such case it is difficult to convey and convince the management. To exist and afloat in the institutions, libraries need to be proactive. Promoting, marketing and providing effective services to the users community according to the changing environment is very important.

The library acts as an information gateway, transforms the acquired information in organized manner with searchable options which connects past and the future. It is a brain Centre of any institute, as it gives glimpse and reflects new ideas and the activities carried out in any institute. In this information age, the role of libraries and librarian's is changing dramatically. The concept of libraries without walls is catching up and becoming popular amongst patrons. In this information centric users community, libraries are expected to provide online access to information in 24x7 mode as they are used more in online environment. Users are visiting libraries to use computers and internet facilities, to access e-contents from comfortable ambiance, library space for reading group discussions. Use of physical collection is minimized compared to last century as information is available and accessed through internet from anywhere. Librarian has the key role to inform the

users about physical resources of the library and also the importance of every source from time to time. This is achieved only by informing services offered by the library by a way of marketing. Promoting library resources and services should be given prime importance. It should be considered as an opportunity for enhancing library services and optimum utilization of its sources.

Libraries are facing lot of changes and challenges with technological developments viz., new and different formats of information files / compatibility with the applications / new ways of providing information with various search options on different platforms. The greatest challenge is to turn all these resources and services in the user friendly formats.

2. CONCEPT OF MARKETING

Often marketing is correlated with profit and with the argument that we are non-profit making entities, we tend to avoid it. In the 1970s, the father of marketing, Philip Kotler began focusing on marketing in non-profit entities. He defines marketing as "the analysis, planning, implementation, and control of carefully formulated programs designed to bring about voluntary exchanges of values with target markets for the purpose of achieving organizational objectives. It relies heavily on designing the organization's offering in terms of the target market's needs and desires, and on using effective pricing, communication, and distribution to inform, motivate, and service the markets."(<http://eduscapes.com/marketing/>)

3. NEED OF MARKETING FOR LIBRARY SERVICES

Marketing is an ongoing process of creating a connection between the library resources and its potential users. Research is a key element of marketing. Librarians must match what the library offers with what users want. Developing effective relationships, both within and outside the library, can also be seen as a vital ingredient in the marketing and promotion process (http://www.sconul.ac.uk/sites/default/files/documents/1_18.pdf).

Marketing is about relationships, about responding to the needs of others. For libraries, this means identifying patrons' needs, communicating how they can help patrons fulfill those needs, and deliver services accordingly. E-marketing is the process of utilizing information technology, conceptualizing the ideas in library environment to distribute and promote services that fulfill individual and organizational needs. It refers to the application of marketing principles and techniques via electronic media and more specifically through internet. This allows librarians to help their users to access information via electronic media, using various methods such as e-mail, Facebook, chat, website, e-conference, blogs, etc Most librarians feel that faculty and students do not understand the breadth of their collections and also think that the collections so carefully funded, acquired, organized are not explored to their optimal level. It is necessary for libraries to create a web presence and promote their collections and services through these various means.

4. CHANGING BEHAVIOUR OF PATRONS

Advent of Information Technology and internet has enabled users to access information from anywhere. In the present generation, information is virtual and is available through internet, clouds, repositories, online databases and so on. Young users have experienced the power of technology and nowadays the viewpoint of most academic researchers/ patrons is to venture into the internet beyond library walls to

access and share the knowledge. Sharing also supports disseminating results. When working in a research group, number of people sharing information is more. When for a user, access is an issue, PDFs are shared by colleagues. Citation links / metadata are shared through various means. Most preferred mode is email. Second is cloud services (dropbox) and internal networks is the other mode. It is observed, researchers share scientific activities / works of others than their own work.

5. CHANGING ROLE OF LIBRARIANS

It is a wish of any researcher or a group of users to have the required information on their desktop. How then do you – as a librarian – connect with this critical user group? And how do libraries ensure that their research community is making the most of the resources available to them? ‘If you build it, they will come’ is just part of a broader outlook. It’s important to venture beyond the library to become a true partner in the academic life. Information is not restricted to books and journals now, it’s online and the librarians are the experts at finding it. Instead of denouncing that their powers have been unfairly dismissed by the online age, research Librarians can help user surf faster and smarter by showing some hidden databases and tricks. They are the teachers of the digital literacy. So they can use the Digital Literacy Programs to promote library resources.

In such scenario, Librarian plays an important role as an ‘E-resource Manager’ in establishing the connectivity of desired information to end user or capable of providing the information in customized capsule. With the increasing pressure in the research community to make research available, librarians are becoming more involved in the process. Librarians are well suited to these new tasks with their experience in curation, description, customization, preservation and providing access to various information formats.

6. CONVENTIONAL METHODS FOR PROMOTION OF LIBRARY ACTIVITIES

Display of book covers procured by library, providing open access to book collection, display of list of new arrivals with special attention, newspaper clippings, posters of databases subscribed, attractive signage’s indicating library circulation counter, reference area, Internet cell to attract more and more users to library, were the quite common practices followed till recently. A Library Manual assisted users to know about the vision statement, library profile, acquisition policy for books, journals, different databases, technology/ infrastructure of library, membership privileges, rules for loss of books, information about library team, and physical description about library. Library orientation to new students joining the institute, arranging essay competition & quiz were all conventional promotional activities followed in many libraries. All these were very much visible and experienced by users by visiting library. But, today’s user is engrossed in his academic endeavor. The time is changing and users want a change from all these routines as they are occupied in their work and wish to experience new tech enabled information and services on their hand held devices.

7. PROMOTION OF LIBRARY SERVICES WITH WEB TECHNOLOGY AND SOCIAL MEDIA

The librarians have ability to gauge and understand the type and degree of information needs of different users community viz., Students look for basics and concepts on topics of their studies, Scholars and Scientists look for scientific information and current trends in their research areas, Managers and Directors look for information that supports decision making process to derive policies and streamline the systems. Encourage researchers to open “My Account” of various publisher’s sites, to get personalized services such as advance intimation / access to articles and access to free sample issues. Several ‘Social Media Sites’, online application tools assist in many ways to promote library resources and services.

7.1 Updated Library Homepage

A continuously updated library homepage is of great help for promotion of library activities. It acts as an information gateway to access various databases and journals subscribed by library, access to WebOPAC, to provide information about library collection. Providing links of databases other than subscribed sources assist the users to access free information on same platform. A mobile friendly website will help the users to access the information through various devices.

7.2 Library Newsletters and E-mail alerts

Publishing library newsletter with a frequency will help to promote new activities of the libraries, different events such as webinars taking place around the world; news which is of use to patrons, new awards for students can be circulated through newsletters.

E-mail alerts about articles which are of interest to users, various conferences happening around the world, informing about the new open databases, subscribed databases and online sources arranged on trial by library can be communicated through E-mail alerts. The same can also be flashed and linked on library home page.

7.3Tutorials on Different Databases

Tutorials by library on different databases subscribed by library will increase the use of databases as well as it will create awareness about their accessibility to users.

7.4 Remote Access Facility to Subscribed Sources.

Today’s user need information anytime and anywhere. Providing remote access to all library databases through applications viz., EzProxy serve the information need of user at any point of time.

7.5 RSS Feed

Real Simple Syndication (RSS) is the easiest way to keep user updated about activities of the library. RSS feed can be added on the library website, so that instead of browsing through the entire website user can get the latest information at one click. RSS feed can be created for news / events posted on library website, electronic newsletter created by library, new addition to library catalogue. A library can subscribe to RSS feeds of newspapers and same can be shared through library website.

7.6 Facebook

Facebook can be used as tool for promotion of library activities, a closed group of students and faculty can be formed for announcing upcoming events, new additions by library, blogs by librarian can be shared. Facebook can be used to analyze the services by library or to receive feedback from users as it has the option of like or dislike or to put a comment. A short video about the services offered by library, guide to new databases subscribed by library can be shared through facebook.

7.7 YouTube

Libraries can create their own account on YouTube for uploading videos of interesting events taken place in library as a promotional activity. Presentations and demonstrations on subscribed databases, tutorials on usage of sources, videos on book comments will increase curiosity of readers. A video streaming virtual tour of library will catch the attention of readers and indirectly it attracts more users towards library sources and services.

7.8 Twitter

Twitter is also an important social tool which can be used to promote library activities. It makes library more visible. It helps readers to get information about the dates of book exhibition or even sale of weeded out books. It can be used as feedback tool for new databases, books, journals procured by library. It provides direct interaction with users. It can also be used to inform the users about any changes in library timings or extended hours of library.

7.9 Pinterest

Pinterest is a internet menu that provides an opportunity to libraries for marketing and promotion of their services. A library can prepare its own board and pin photos of library, audiovisual clips, attractive library posters by creating library profile. Libraries can also download attractive posters for display in library which are available freely on Pinterest.

7.10 Tumblr

This customizable social media tool can be used to display information about new services by library, book exhibitions, pictures of posters presented by students at various conferences can be shared using Tumblr. It has a facility of knowing the comments of people who are following the account, therefore it can be used as a feedback tool also.

7.11 Blogs

Blogging is an effective mode of communication which can be used by libraries. A library can create a subject specific blog which can give more and more information on research activities carried out in any institute. New research, discoveries in the field of interest of user can be communicated through blogging.

7.12 Assist in Scientific endeavors

Libraries can also create ORCID profile for its researchers, to help them to create their unique identity in the world of scholarly communication. Conducting training

programs on reference manager tools such as EndNote, Reference Manager and Zotero will assist in highlighting the importance of sources and services.

8. CHALLENGES

Change always comes with challenges. With changing role, library professionals are also facing many challenges. Security and privacy of data, copyright issues, terms and conditions of access, availability of technical manpower for quick fixing of the issues are some of them. In the present generation most of the libraries are enabling the information access through various applications that is generated and stored on to some other servers. Also, e-journals being the preferred subscription models, there are several challenges like perpetual access, digital archiving, embargo period, dealing with bundle pricing, consortia agreements and models, access and copyright right issues are few major concerns faced by professionals. Seamless access to subscribed contents, maintenance of electronic sources, maintenance of licenses of subscribed contents, maintenance of hardware with back up are few other challenges. Managing the balance between budget cuts and escalating prices of products and resources are of great concerns, the library professionals are facing. Slow speed of internet, intermittent failure of connectivity with various local administration, delays the delivery of scientific information. In Indian scenario, research is mainly conducted in government or government aided institutes. In most of these government funded research bodies social media sites are blocked with security and administrative reasons. In such cases promotion of library services to users with available resources and social media is a major challenge.

9. FUTURE TRENDS

In future, users may need different services such as wireless printing from mobiles, a wifi service for mobiles. Also they may require any thesis of the institute in audio/video format to save the time of reading. Services such as Google voice can be used to alert users for any important events. Libraries can promote mobile friendly databases such as use of 'PubMed' for handheld devices. A webcam service can be provided to user to check the availability of free computers, so that user can decide the time to visit the library from different locations.

10. CONCLUSION

Marketing is normally low on the list of priorities (we're happy to spend X millions acquiring resources, but only X hundred on telling people why they might want to use them). But it has become necessity in today's digital environment. The market plan should assess where you are now (market research), where you are going (objectives) and how you are going to get there (strategies).

The young generation has experienced many social media applications. It is not necessary that all users might be conversant with all applications and all applications are being regularly used. Librarians needs to be meticulous and selective in identifying the most suited applications based on their experiences with users community before integrating with the system. Librarians should be proactive and take a lead in marketing and promoting library resources and services. The basic aim of marketing is to know and understand our users in order that the library is able to satisfy those needs in an effective way. Marketing plan is essential, which will enable us to focus and enhance usage of resources for furthering in achieving institutional goals.

REFERENCES

1. Dongardive, P. Marketing library and information services. *International Journal of Science and Research*. 2(11): 227-234, 2013.
2. Patil SK, Pradhan P, Library promotion practices.and marketing of library services.133: 249-254, 2014.
3. Tamrakar, A.K., Garg R.G.User perception towards E-resources and Services of IIT –Guwahati Library. *DESIDOC Journal of Library and Information Science Technology* 36(1): 40-46, 2016.
4. Sharma,Ajay Kumar, Bhardwaj Sapna. Marketing and promotion of library services.*ICAL Advocacy and Marketing*. 461-466, 2009.
5. Rowley J. *Information Marketing*.2006. 2nd ed. Ashgate Publishing.
6. Madhusudan, M. Marketing of library and information services and products in university libraries: a case study of Goa University library.*Library Philosophy and Practice* 1-6, 2008.
7. Weingand, D.E.. Preparing for the new Millennium: The case for using marketing strategies: *Library Trends*.43(3): 295-317, 1995.
8. eduscape, IUPUI online courses. 2012-2014.
9. Gupta, D.. Marketing of library and information services: Building a new discipline for library and information science education in Asia. *Malaysian Journal of library and information science*. 8(2): 95-108, 2003.
10. Coote, H. 1994. How to market your library services effectively. In S P Webb (Ed.) *The Aslib know how series* (PP. 1-47), Lodon. Aslib.

University Library Acquisition Model in ICT Environment: A Case Study of the BITS Pilani Library

Ishappa Bandi¹, Giridhar Kunkur², K. C. Ramakrishnegowda³ and A.N. Bandi⁴

¹ishappa.bandi@pilani.bits-pilani.ac.in,

²giridhar.kunkur@pilani.bits-pilani.ac.in

BITS Pilani, Vidya Vihar, Pilani-333031, Rajasthan, India

³Kuvempu University, Shankargatta-577 451

⁴dr.anbandi@gmail.com

National Institute of Fashion Technology, Mumbai

ABSTRACT

Acquisition of right resources always play an vital role in providing quality and effective library services to users. University library acquisition should be robust and unique system with strategised on many important factors like budget, recommendations, efficiency of vendors and timely processing. BITS Library has implemented a complete automated acquisition system using KOHA LMS which take care of library resources, budget allocation, monitoring and control for both books as well as journals along with databases. Involving all category of library stakeholders i.e. students, researchers, faculty and professional library staff, the acquisition is done meticulously in this Google generation. It is very important to develop a need based collection for the University library. Methods followed in collection development at BITS Pilani library are proved to be useful in ensuring that the library has adopted an 'user centric' acquisition system. BITS Pilani library is also taking proper measures to make use of all its acquired resources by the recommenders for their academic and research activities.

Key Words: University Library, KOHA Acquisition, Library Budgetting, Library Portal, Library users, CDP, BITS Pilani Library (BPL).

1. INTRODUCTION:

An academic library is a trustworthy collaborator for knowledge creation and dissemination. Library is a fast growing organism. Acquisition of books is central both to the collection development and the general development of any library in general and academic libraries in particular. Acquisition is the nucleus around which all other activities in the library revolve because ultimately, the quality and number of books a library acquires will determine the level of its patronage by its users. According to the Manual on University Management published by the National Universities Commission in 2001, the university librarian must be a good manager, a resourceful person capable of optimizing library funds for the overall development of the university library. Therefore, acquisition of books must be executed prudently and circumspectly. Acquiring information resources is a core activity of libraries. University libraries all over the world still acquire and maintain massive book collections while managing other formats (Ameen, 2008)

A proper computerized library will help its users with quick and prompt services. Library automation refers to mechanization of library housekeeping operations predominantly by computerization (Duraisekar. 2010). The most commonly known housekeeping operations are acquisition control, serials control, cataloguing, and

classification and circulation control. To meet the multifaceted users' needs, University library should adopt a scientific method in their Collection Development Policy (CDP). The dynamic nature of the CDP will help the University libraries to provide need based resources to their patrons to meet their information needs for academic as well as research activities.

1.1. Collection Development Methods in BITS Pilani Library (BPL)

No two libraries are similar in this world and it is also true that no two libraries follow similar methods in their collection development activities. Collection developments for various types of resources in University libraries are different, which can be seen predominantly for books, periodicals, databases, AV materials etc. Collection development happens in BITS Pilani Library (BPL) throughout the year continuously.

1.1.1. Acquisition of Journals and Databases

For periodicals and databases the user's feedback is sorted and also usage patterns are carefully analyzed before renewing them for the subsequent financial year. Periodicals addition or deletion suggestions were taken from HOD's through respective Library Committee Members (LCM). Yearly usage statistics in terms of number of downloads from various databases subscribed by the BITS library are also analyzed. This has also helped the librarian to take the necessary measures to improve the usage of all the databases which are renewed.

1.1.2. Acquisition of Books

Procurement of books takes more effort and whole process is robust in nature and happens throughout the financial year. For BITS library budget approval comes in the month of April every year in the form of OPEX (Operational Expenditures) and CAPEX (Capital Expenditure) which are further categorized into various Budget Heads. Books budget is part of OPEX along with this, journals and databases are also included. Budget sanction for the books happens based on our previous year spending and the calculations submitted for the provisions for the forthcoming FY procurement to the University administration.

After receiving the Books Budget, BITS library initiates the acquisition of books based on the recommendations received from the faculty sometimes researchers and students recommendations also be considered. The main objectives of the BITS library procurement is that, each book procured should have the quality content suitable to the programs which are delivered by the University and the books should be useful to maximum users for longer period. Hence the user's involvement while selecting the books for library is very important and which is one of the essential component to make the useful and need based collection.

Procurement of the right book at right time to the right users is the primary objective of the BITS library procurement process. There are various hurdles one can face while executing the procurement of the books and some of them are;

- i) Specific use and limited purpose with high cost books
- ii) Subject specific imbalance in collection development
- iii) Content wise, poor quality books

To overcome the above mentioned short comings, BITS library has developed strong acquisition policies. Where each department is allocated a specific budget at the beginning of the year based on their faculty and students strength. The balanced acquisition can be seen for FY 2015-16 in Figure 1.1.

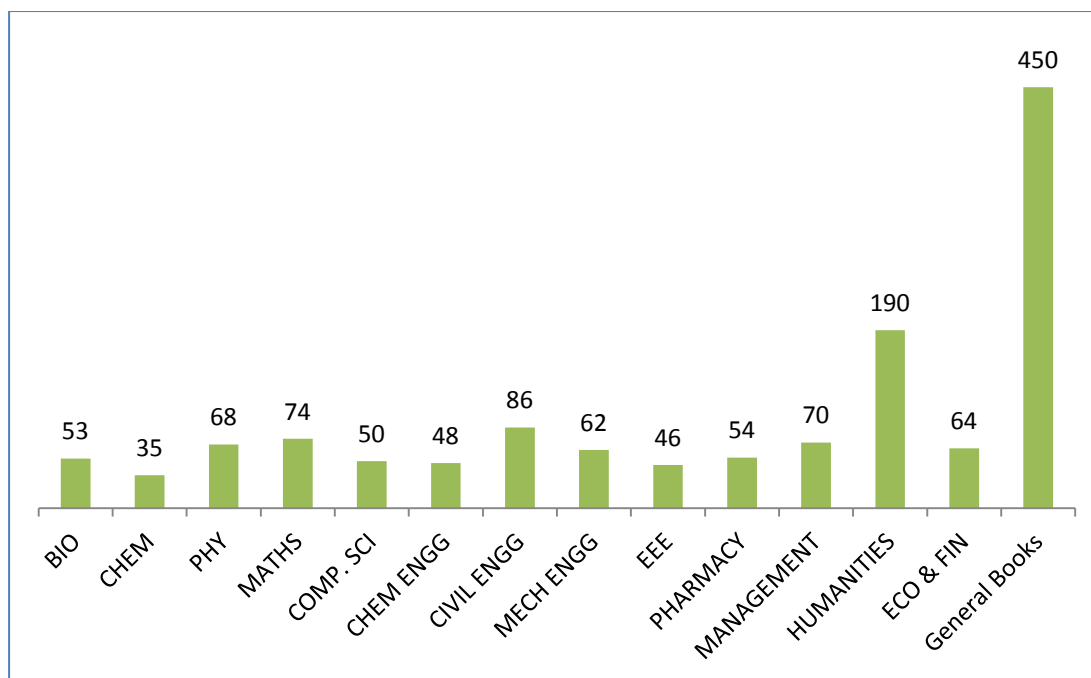


Figure 1.1: No. of Titles Department wise for FY 2015-16

Procurement of latest editions and prioritization from library committee member of the respective department if more than one books recommendation comes from an individual faculty.

1.2. Budget allocation in KOHA LMS Acquisition Module

Budget allocation by the library is the first step involved in acquisition activity. In BITS Pilani Library budget allocation happens on KOHA LMS and various funds are created to process the ordering and receiving purpose. The KOHA acquisition implementation can be seen in figure 1.2:

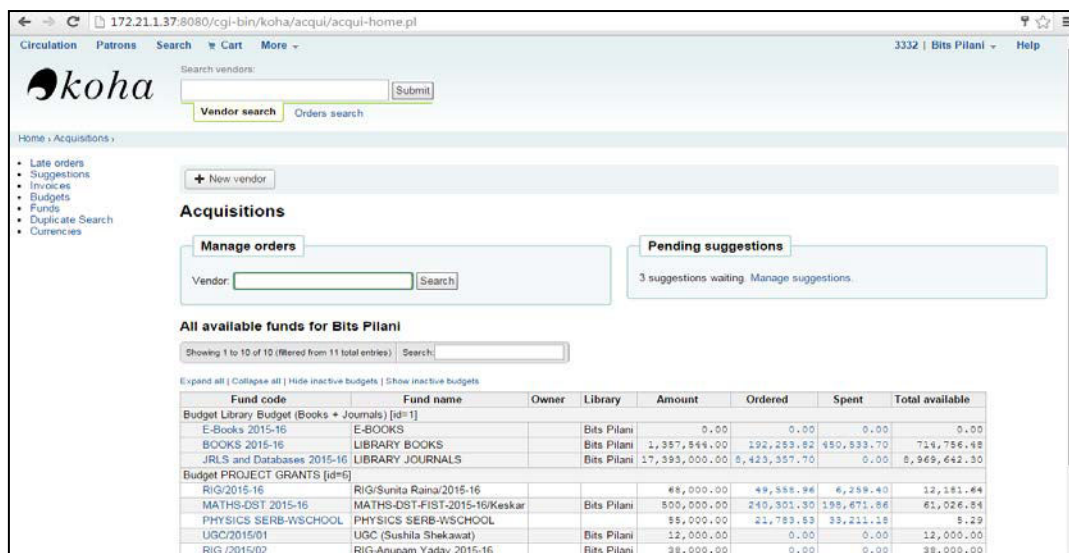


Figure: 1.2: KOHA Acquisition Module of BITS Pilani Library

Various funds are created using approved library budget in Koha before initiating the acquisition of the resources. The vendor baskets are created under these funds and purchase orders are released from Koha to the vendors through emails. All the vendors are given the strict deadline by which they are expected to supply the books. The recommenders also receive an auto intimation email once the books are ordered by the library.

1.3. User Centric Acquisition in BITS Library

Users are the one who are going to use the library collection, hence each book added to the collection must be recommended by the users. Therefore users involvement while selecting the books is as important as its procurement. There are various tapping points are available in BPL to seek the users recommendation for the books.. The following are some of the recommendation methods followed;

- i) Textbooks and Reference Books in Time table
- ii) Through infoBITS library portal
- iii) Through KOHA LMS suggestion option
- iv) Recommendations through Emails
- v) Through Books recommendation forms
- vi) Through Basant Book Festival (BBF)
- vii) Books on approval received un the library

i) Textbooks and Reference Books Time table

BITS Pilani conducts all its courses based on the time table schedule provided to all the students. Textbooks and reference books are recommended to each and every courses are also part of the time table. So for procurement of textbooks and reference books for library happens based on the Timetable and handouts circulated to the students from the Instruction Division in BITS Pilani.

ii) Through infoBITS library portal

Library has developed an interactive library portal known as **infoBITS** which has three separate Dash Boards for faculty, students and Admin i.e. library staff, users can login to their library portal dashboard and can recommend the books for library to procure. Library Admin team receive the users recommendations and take the necessary action and accordingly give their reply to the recommender whether the books has been ordered or rejected based on the collection development policy.

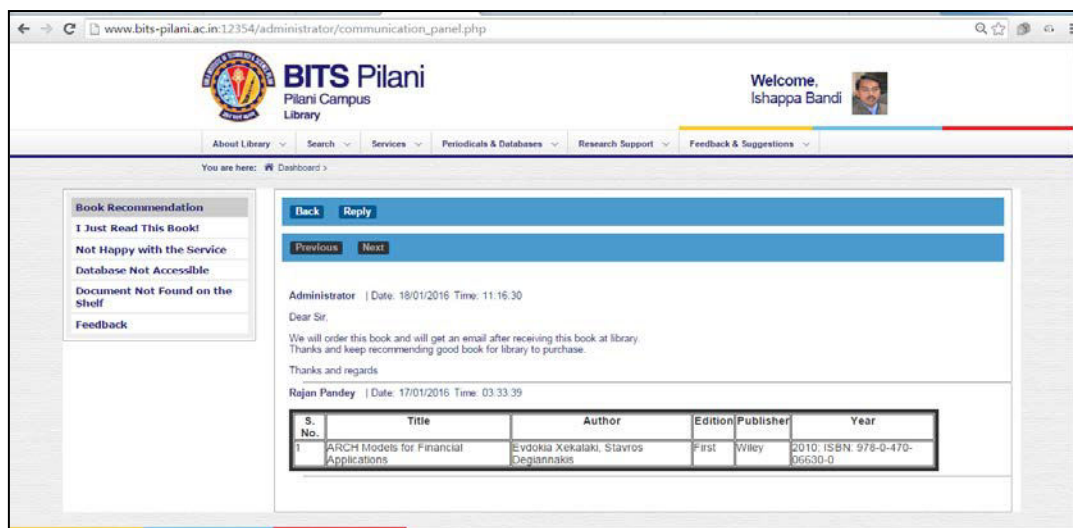


Figure: 1.3: Recommendation of Books through infoBITS Library Portal

iii) Through KOHA LMS suggestion option

This is one of the popular method used by the library users to recommend the books for library to procure. Where these suggestions are scrutinized based on the Collection Development Policies and accordingly acceptance or rejection is made for the books recommendations on Koha LMS.

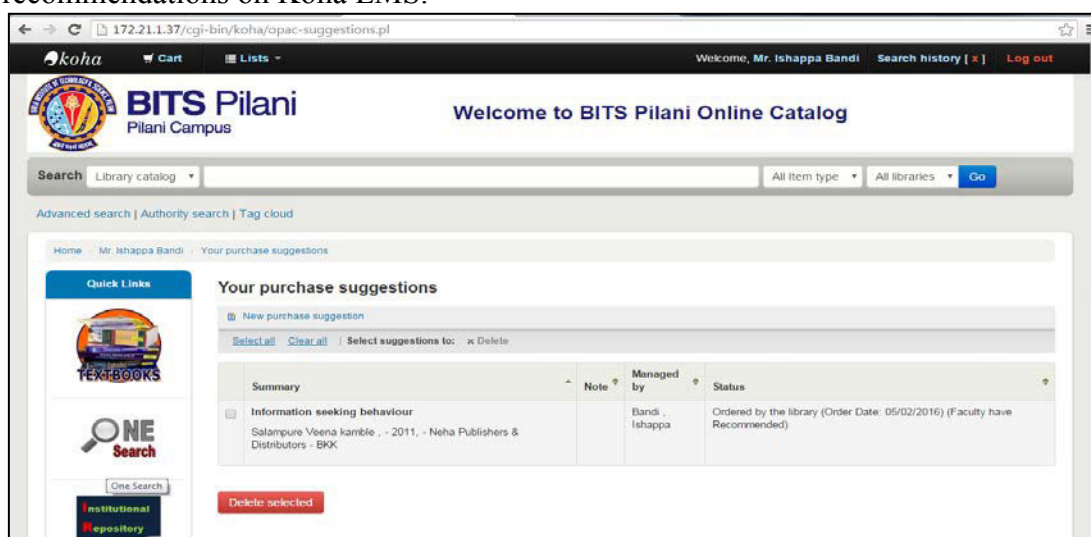


Figure: 1.3: Recommendation of Books through KOHA OPAC login

iv) Recommendations Through Emails

Many users are also using the email methods to recommend the books for library to procure. Users provide the minimum basic bibliographic details of the books and library procurement team regularly sends the reply to these emails.

v) Through Books recommendation forms

BPL has standard books recommendation forms available for users to recommend books by providing minimum bibliographic details. Feedback on action taken is provided to the recommender through email, as each and every user has their BITS Pilani email ids.

vi) Faculty recommendations during Basant Book Festival (BBF)

Basant Book Festival is an annual feature at BITS Pilani campus where more than five book sellers/publishers are invited to display their latest publications for more than one week. As Pilani is one of the remotely located village in Rajasthan state, users normally do not have access to the quality publications. Hence BBF plays an important role in providing opportunity to refer the latest books. During this event, the library actively promotes through, posters, fliers, banners, press releases to not

only people in BITS Pilani but among most of the educational institutions in Pilani. BITS library also encourages the faculty to recommend the books for library. Based on the library CDP the recommended books are procured for the users.

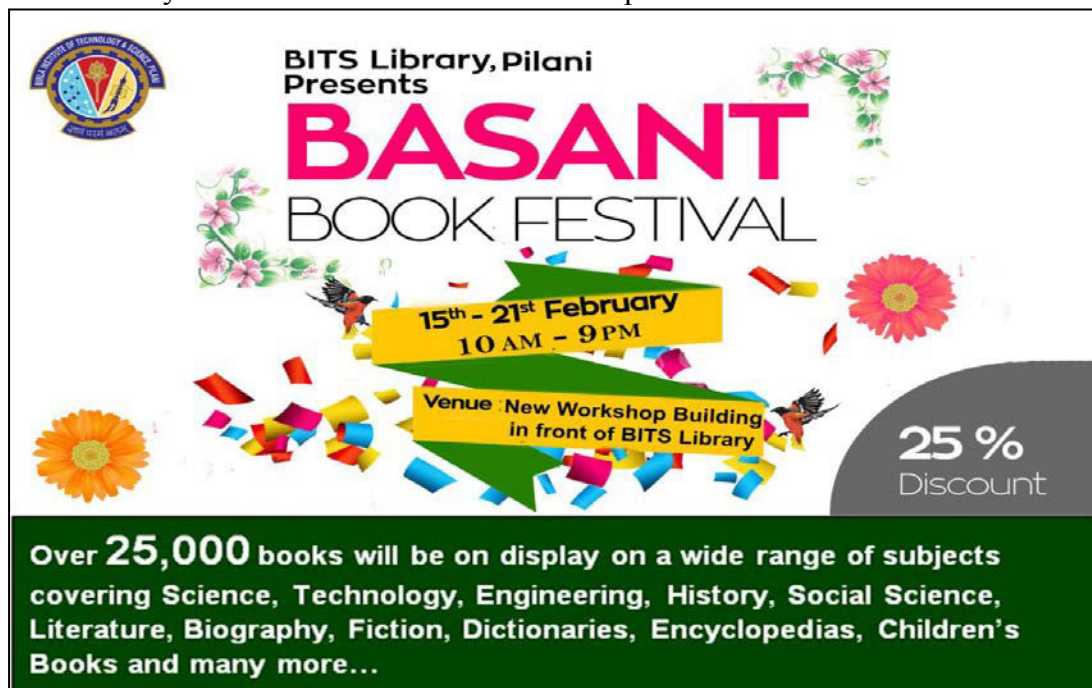


Figure: 1.4: Books recommendations through Basant Book Festival (BBF)

1.4. Acquisition Alerts to Recommender

Providing the alerts to the recommender is as important as procuring the recommended document for the library. BPL makes multiple alerts to the recommender till book is received and processed. These are auto alerts in the form of emails sent through KOHA LMS. This email alert enables the recommender to read his/her recommended books as a first user. Some of the email alerts are at various stages of their suggestions procurement;

- i) Title Acceptance alert
- ii) Title ordered alert
- iii) Recommended book received alert
- iv) Monthly/Weekly new arrivals list on OPAC
- v) Weekly new Books cover page display on LED screens

In addition to the above auto email alerts, library also makes some more effort to reach the recommender to know the books they have suggested for the library.

- i) List of Monthly new arrivals
- ii) infoBITS Bulletin Board Service
- iii) Books@ My Desk Service

i) List of Monthly new arrivals on root mail

Librarian sends the monthly new arrivals based on subject list to all the users as an email attachment on 1st of every month through the root mail. This helps the recommender to see his/her recommended book availability in the library.

ii) infoBITS Bulletin Board Service

This is part of the BITS library interactive portal where 13 monthly bulletins are published on different subjects representing each department in BITS Pilani campus. These Bulletins cover the latest books added both in print and electronic forms pertaining to each department. These Bulletins also cover the latest table of content (TOC) of the journals recommended by the respective departments.

The screenshot displays the BITS Pilani Library website. At the top, the library's logo and name are visible, along with a welcome message from Ishappa Bandi. A navigation bar includes links for About Library, Search, Services, Periodicals & Databases, Research Support, and Feedback & Suggestions. Below this, a breadcrumb trail shows the user's location: Dashboard > Info BITS Bulletin. A horizontal menu lists various academic disciplines: CHEMICAL, CIVIL, EEE, CS, MECH, PHARMA, BIO, CHEM, ECO, MATHS, PHY, HUM, and MAN. The main content area is titled 'Info BITS Bulletin' and is dated March 2016. It features a section for 'New Books' with four book covers displayed. Each book cover is accompanied by its title, author(s), and a button indicating whether it is available as a 'Print' or 'eBook' version. The books listed are: 'Ellipsometry of Functional Organic Surfaces and Films' (Print), 'Introduction to Mathematics for Physicists' (Print), 'Theoretical and Applied Aerodynamics' (eBook), and 'Nuclear Back-end and Transmutation Technology for Waste Disposal' (eBook). Below the book list, there is a section for 'Journals (Table of Contents)' with a few journal covers visible.

Figure: 1.5: Alerting recommender about new Books through infoBITS Bulletin

iii) Books @ My Desk

This is one of the unique service rendered by the BITS library to the faculty members. In this service, the recommenders will get a first chance to read their recommended books. As per this service after weeks display of the newly procured book is directly sent to the recommender for 15 days requesting them to return the books back to library after their use. This proactive service helps the users to make use of the books which are procured by the library.

BITS Pilani
 Pilani Campus
 Library

Welcome, Ishappa Bandi

About Library | Search | Services | Periodicals & Databases | Research Support | Feedback & Suggestions

You are here: Dashboard > Books @ MyDesk

To,
 The Librarian,
 BITS Library, Pilani
 Dear Sir,

Sub : Requesting for Books@MyDesk

I request you to please arrange to send the following books to my Desk in my office:

Name of the Faculty Member: Ishappa Bandi

PSRN No.: 3332 My Chamber No.: Department:

Preferred time of Delivery:

In my absence, the books can be delivered to in my Department.

Book Title	Author	Edition	Barcode
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Figure: 1.6: Books@ My Desk Service

2. CONCLUSION:

BITS Pilani library procurement activity is a sincere effort to reach and involve all category of users to make it more user centric and build a holistic collection. The services which are mentioned in this article are practical and everyday experiences of the BITS library procurement team. Some of these services involves effort at various stages to make the processes successful and result oriented. The results of these services definitely helps the library to improve the collection usage among the faculty, researchers and students in BITS Pilani campus. Many of these good practices followed in procurement can be replicable at other libraries also. Hence Innovation in procurement by utilizing the ICT application will bring a lot of value addition as it can be seen in BITS library.

REFERENCES:

- 1) Ajidahun, C.O (2008). Book acquisition practices in Nigerian university libraries: challenges and prospects. *Library Management*. Vol. 29 (4/5), pp. 414 – 421
- 2) Duraisekar N.B and Balasubramani R (2010). Implementation of Automated Library Management System in the School of Chemistry Bharathidasan University using Koha Open Source Software, *International Journal of Applied Engineering research*, Dindigul, Vol.1 (1). Pp. 149-167
- 3) Kanwal, Ameen 2008) Issues of Book Acquisition in University Libraries: A Case Study of Pakistan. *Library Philosophy and Practice (e-journal)*. Paper 198. (Accessed on 03/03/2016)

- 4) Kant Krishan and Ram Chander (2016) Library Automation issues and Remedies in present scenario, Manakin Press, New Delhi, pp98-101
- 5) Salam S.A (2014). Ordering and receiving Library documents using KOHA Acquisition Module in Shibpur D.B.I College. Journal of Indian Library Association. Vol 50 (2), pp 11-17
- 6) Saunders W.L (1968). University and Research Library Studies, Pergamon Press, New York, pp 39-83



Dr. Mallikarjun Angadi is working at Tata Institute of Social Sciences, Mumbai since 1998. Presently he is serving as Chairperson, Centre for Library & Information Management Studies (CLIMS) & Deputy Librarian, SDTM Library. He received both Masters and Ph.D degrees in library science from Gulbarga University, Gulbarga, He has several publications to his credit. He has visited Sweden, Denmark, Finland, Malaysia, Singapore, Oman, UAE, UK, USA, Thailand and Sri Lanka as part of academic activities. He is the recipient of SIS-Razaida Memorial Young Information Scientist Award (2008). He was awarded USA-IVLP Fellowship in 2007 and

Commonwealth Professional Fellowship (University of East London, London, UK, 2013).



Dr Satish S Munnolli is presently heading the library of Advanced Centre for Treatment, Research and Education in Cancer a research wing of Tata Memorial Centre since 2003. He has over 25 years of working experience in academic, research and corporate libraries. He did his graduation in Science and post graduation in LIS from Karnatak University, Dharwad and Doctorate from Shivaji University, Kolhapur. He is the recipient of Dr S R Ranganathan Gold Medal in 1990-91 and Cunningham Memorial International Fellowship of Medical Library Association, USA in 2011. He has several papers in national and international journals.



Ms. Truptee Shah is currently the Chief Librarian at Centre for Development of Advanced Computing (C-DAC), Mumbai. She has a professional experience of around 28 years. She has expertise in Koha, Drupal and Dspace systems. Beyond this, her areas of interest include Web Content Management and Training and Development. She has organized, participated and conducted several conferences and workshops and presented papers/talks in the conferences. She, a life member of BOSLA since 1996, has initiated BOSLA newsletter and BOSLA Website.



Dr. R. Prabakaran is presently working as Head, Scientific Information Resource Centre (SIRC), Tata Institute of Fundamental Research (TIFR), Mumbai. He has professional experience of more than two decades. He has published articles in national and international journals and presented papers in conferences. He has been member of organizing committees in conferences and invited to deliver talk in various institutions. He has been invited as member of Library Advisory Board Meeting of important publishers.



Dr. K. Praveen Kumar is currently working as Assistant Library & Information Officer at International Institute for Population Sciences (IIPS), Mumbai. He received Ph.D. in Library Science from Gulbarga University, Gulbarga and MLISc. from IGNOU. He also received MBA from Madurai Kamaraj University and PGDCMP from APPC. He has two decades of professional experience working with various organizations including DESIDOC. He has more than 20 research publications to his credit. Author for the book "Age structure of mortality in India and its bigger states: A data base for cross-sectional and time series research".



Dr. Satish Kanamadi is University Librarian at Tata Institute of Social Sciences, Mumbai. His areas of interest are Web resources, Information Access and Metadata. He is an alumnus of Karnatak University, Dharwad, and a distinguished professional whose research contributions include over 30 articles in journals, edited volumes, etc and has been the coordinator for training programmes. In September 2010, he was awarded the Commonwealth Professional Fellowship by the CSC UK and studied at London School of Economics for three months. He is also the faculty and teaches at PG Diploma and Masters Programmes in LIS at TISS.