

LIBRARY AUTOMATION IN INDIA: A SURVEY OF INFORMATION RETRIEVAL SYSTEM OF CENTRAL LIBRARIES OF IIT DELHI, IIT KANPUR AND KASHMIR UNIVERSITY

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Abstract

The primary purpose of this study is to assess the current status of information retrieval system of two leading institutes of national importance and one of the first ISO certified university library in India to help other libraries also to enhance their information retrieval system. The study was undertaken with the focus to determine the satisfaction of users with the existing retrieval system. The study also highlights the features of different software packages used by the select libraries i.e. Central Library, Indian Institute of Technology (IIT) Delhi; P. K. Kelkar Library, IIT Kanpur and Allama Iqbal Library, Kashmir University. Being technologically advanced, the author was of the notion that the information retrieval system of the select IIT libraries may be comparatively more developed. However, it is observed that the retrieval system of Allama Iqbal Library is rather more advanced. Nevertheless, even after using the leading international software and installing a complete automated retrieval system, some users in Kashmir University still rate the overall status of retrieval system behind the retrieval system of the select IIT libraries. On contrary, a significant percentage of users in the select IIT libraries are satisfied with the overall status of retrieval system. Nonetheless, it is notable to point out that there is further improvement required on part of librarians' to take appropriate steps to enhance their information retrieval system for its effective and efficient use.

Keywords– Library automation; Library software packages; Information Retrieval System; LibSys; Virtua; IIT Delhi; IIT Kanpur; Allama Iqbal Library

1. INTRODUCTION

Libraries have been seeking technological aids to facilitate and enhance their operations and services since very long. The introduction of typewriters in 1800s and innovations ranging from printing press to microcomputers have affected a wide spectrum of library operations (Reynolds, 1985). It is believed that library automation has taken off as early as 1930s, with the use of punched card equipment (invented by 'Herman Hollerith' of US Census Bureau) in library circulation and acquisitions. Quickly after this major breakthrough, other technology related applications were introduced to library procedures. However, the progress was very sluggish and the most practical data processing applications were restricted to library circulation (Riggs, 1992). However, the wide availability of general purpose computers in 1960s changed all and made possible a second era of library automation systems. Punched

cards were not completely abandoned, but their role slowly and gradually declined (Salmon, 1975). In the era of computerization, the landmark initiatives were taken by USA, UK and later in Continental Europe due to availability of best infrastructure in telecommunication and computing technology. It is said that the genesis of library automation is viewed in three different phases: the first, during 1954-70; the second, during 1970-90; and the present from 1990 onwards. The hardware and software available at those times have influenced each of these phases (Haravu, 2004).

In comparison to developed world, the application of computers for library work in India took off quite late. The first effort in this direction was possibly taken by Indian National Scientific and Documentation Center (INSDOC) in 1965, when it computerized the author and subject indexes of 'Indian Science Abstract'. Soon after two years, INSDOC (now NISCAIR) National Institute of Science Communication and Information Resources brought out 'Roster of Indian Scientific and Technical Translators' with the help of computers (Sharma, 1993). However, the progress towards computerization was very slow. Owing to the financial constraints, the significant movement towards automation in Indian libraries picked up the momentum with the falling hardware prices, wide availability of different software packages and ever-increasing curiosity towards automation among library professionals. Against this background, a number of Indian libraries associated with Research and Development agencies brought out many library software packages. Of them, LibSys; Granthalaya; Maitreyi; Sanjay; SOUL; Suchika; DELMS; DELDOS; TLMS; LIBMAN; OASIS; Delsis; Libman; Librarian; Libris; Library Manager; Library Management; Loan Soft; Salim; Slim 1.1; Trishna; Tulib; Ulysis; Wilisys, etc. are notable Indian softwares (Saxena & Srivastava, 1998). However, SOUL and LibSys due to their nonstop development for upgraded versions are widely used in Indian libraries. Furthermore, these software's also fulfill many international standards. It is worthy to point out here that many academic and special libraries in India are currently using some foreign software's such as Alice for Windows, Virtua, Techlib Plus, etc. to enhance the standard of their library operations and services. Significantly, the move towards using international software's especially Virtua software of VTLS (Virginia Technology Library Solutions) Company is growing at a fast speed among Indian libraries.

In any library automation venture, the information retrieval system is the most vital subsystem of the entire project. It has a direct bearing with the users of a library. In fact, the success of whole automated library system of a particular library rests on the effectiveness and efficiency of its retrieval system. The overall status of information retrieval system of surveyed libraries is discussed in detail in table-3.

2. RELATED LITERATURE

A number of studies have shown that even though many libraries have installed fully automated retrieval system, but their users are not still satisfied with their information retrieval system. In this direction, the study by (Saffady, 1989) revealed that a number of libraries purchased machine-readable bibliographic and non-bibliographic databases for

custom developed information retrieval software. However, most of these libraries lacked access to the hardware and software resources required to implement such systems. The study of (Choudhary & Sudatta, 1994) also revealed that automated text retrieval and library management system has not yet yielded a desired shape in Indian Libraries. Another study of (Gudivada, Raghavan, Grosky & Kasanagottu, 1997) also studied the effective search and retrieval for achieving the full potential of World Wide Web. The authors also suggested some of the recommendations and methods for enhancing retrieval effectiveness. Yet another study by (Sridhar, 2004) identified some of the reasonably new features like adjunct thesaurus help, limiting device with filtering effect, along with relevance feedback and ranking of retrieval references to lessen searching breakdowns. One more study carried out by (Mehtab & Amita, 2008) revealed the awareness and use of OPACs for information retrieval in Indian libraries. The study revealed that many users are yet unaware of advance searching and face number of issue of recall and precision, nevertheless in some searches; the users are unable to get their desired documents. They pointed out that necessary training should be rendered to users for using such automated retrieval systems in an efficient way. In their study (Tseng & Kuo, 2009) discussed the automated library equipped with RFID and Self-checkout system. Authors pointed out unfamiliarity of users as the major problem in operating automated Circulation system. This study revealed that Ximen Open Book Intelligent Library circulates and helps in Self-check out without any human intervention. However, this study is confined to Self-checkout and Circulation sections of few public libraries of Taipei Taiwan. It is hoped that this study will fill the gap in the literature available on information retrieval system particularly at Indian level.

3. SCOPE

At present, a large number of indigenous and foreign library software packages are available in India. Among the indigenous softwares as discussed in above paragraphs, LibSys and SOUL are widely used in Indian libraries. These softwares were largely developed by Research and Development (R&D) institutes. On the other hand, a number of large Indian libraries are using foreign softwares such as Alice for Windows; Virtua; Techlib Plus; etc.

Being a big country and having hundreds of universities and thousands of colleges, it was difficult for the investigator to cover all the software packages used by the Indian libraries. Nevertheless, the investigator had selected one popular indigenous software i.e. LibSys and one popular foreign software i.e. Virtua for the present study. Both LibSys and Virtua are integrated library management systems and comprise a number of modules as depicted in table-2. Furthermore, the coverage of present study is restricted to the central libraries of two institutes of national importance i.e. IIT Delhi and IIT Kanpur and one of the first ISO Certified University Library in India i.e. Allama Iqbal Library, Kashmir University.

4. METHODOLOGY ADOPTED

Since the study undertaken is descriptive in nature and has a direct bearing with the users of select institutes to determine the overall status of retrieval system, therefore, survey research

method was used for the present research effort. In survey research, there are three popularly used methods for collecting the data; the Questionnaire method, the Interview method and the Observational method. Based up on the fact, that questionnaires are acknowledged as the single most popular data collection tools in any research involving human subjects. Therefore, questionnaire was the chief tool used for collecting the necessary data. However, in order to avoid the limitations of questionnaire method, the investigator also adopted interview and observation method wherever the need was felt. The investigator personally visited all the select libraries and directly approached to the users of surveyed libraries to collect the necessary data. Notably, a pilot study was undertaken to left out the ambiguities and to check the validity and objectivity of the prepared questionnaires. Consequently, questionnaires were administered for data collection. The administration of questionnaires is shown below in table-1.

Table-1 Sample Distribution

Categories	Number of Respondents											
	IIT Delhi				IIT Kanpur				Kashmir University			
	*STU	*RS	*FM	Total	STU	RS	FM	Total	STU	RS	FM	Total
Administered Questionnaires	390	95	42	527	203	76	36	315	475	40	40	555
QuestionnairesReceived	355 (91.02)	89 (93.68)	29 (69.04)	473 (89.75)	192 (94.58)	73 (96.05)	26 (72.22)	291 (92.38)	435 (91.57)	40 (100)	28 (70)	503 (90.63)
QuestionnairesAnalyzed	330 (79.71)	84 (20.28)	27 (6.12)	441 (83.68)	184 (65.48)	72 (25.99)	25 (9.02)	281 (89.20)	416 (86.30)	40 (8.29)	26 (5.39)	482 (86.84)

* STU = Students (comprising Graduate and Post graduates),

*RS= Research Scholars, and

*FM= Faculty Members.

(Figures within the parenthesis represent %age)

4.1 Administration of Questionnaires

After getting the permission, the investigator personally disseminated the questionnaires among the users of the select institutes. Significantly, care has been taken to have a representative sample of total population of users, though the random sampling technique was adopted. The investigator administered a total of 527 questionnaires for a population of 5269 users, comprising 3900 graduate and post graduate students, 948 Research Scholars and 421 Faculty members in the month of February 2013 among the users of Central Library, IIT Delhi. Similarly, in the month of March 2013, 315 questionnaires were administered in P. K. Kelkar Library, IIT Kanpur for a population of 3143 users, comprising 2028 graduate and post graduate students, 758 Research Scholars and 357 Faculty members. In case of Kashmir University, though there are 6000 students registered with it; however, it is observed that 850 students are enrolled in different colleges which are affiliated with Kashmir University.

Therefore, the investigator selected only those users who are enrolled in the main campus. Consequently, a total of 555 questionnaires were administered in the month of April 2013 for a population of 5550 users comprising 4750 graduate and post graduate students, 400 Research Scholars and 400 faculty members. The whole course of data collection took three months to complete. The ultimate response rate (given in table-1) obtained from the users of select institutes is found to be 89.75%, 92.38% and 90.63% respectively.

The investigator used a self designed coding sheet and statistical counting was accordingly done for each response. The responses obtained through questionnaires have been cross checked by the responses obtained through interview and observation. Finally, the data have been organized; analyzed; compared; consolidated; tabulated and interpreted by using tables, percentages and statistical techniques. The software package MS-Excel has been used to tabulate, co-relate, and verify the validity of results. The charts depicting the different variables have also been drawn by using MS-Excel package. In the light of above data, useful findings, recommendations and conclusion have been derived.

5. OBJECTIVES

The principle objective of the this study was to assess the status of information retrieval system of the select libraries with special focus on following core objectives

- To underline the features of software packages used by the select libraries.
- Compare the information retrieval systems of the select libraries on the basis of easiness of use from the users' point of view.
- To examine the satisfaction of users with the existing information retrieval systems of the select libraries.

6. SOFTWARE PACKAGE USED FOR AUTOMATION

The Central Library, IIT Delhi and P. K. Kelkar Library, IIT Kanpur are using LibSys software. However, the Central Library, IIT Delhi started with LibSys4 version of LibSys in 1999; and in 2007, it shifted from LibSys4 to LSPremia version to enhance its functions and services (IIT Delhi, 2009). In order to overcome the shortcoming of RFID compatibility in LSPremia, the library recently switched over to LibSys7 version which is compatible with RFID technology and comprises some advanced features. In comparison, P. K. Kelkar Library, IIT Kanpur began with an in-house developed Kanpur Library Automation Software (iit-KLAS) in 1988. The software was used for nearly two decades. However, due to the shortcomings of upgraded versions, the software could not satisfy the emerging techno-oriented needs of the library. Therefore, the library in 2007 migrated over to presently using LSPremia version of LibSys (IIT Kanpur, 2006-07). On the other hand, Allama Iqbal Library took off with CDS/ISIS in 1997; however, in 2003, the library migrated to SOUL (Software for University Libraries) developed by Information and Library Network (INFLIBNET), Ahmadabad. Due to the shortcomings of UNICODE feature to deal with the large collection of multi-lingual resources of the library and lack of RFID compatibility in SOUL, the library

in 2008 switched over to Virtua software of VTLs Company to overcome these drawbacks (Kashmir University, 2009). The description of both these softwares' is given hereunder:

6.1 Description of Softwares

LibSys software is an integrated multi-user library management system designed to run on different hardware/software platforms in Client-Server architecture. The software is developed by Info Consultants (now LIBSYS, Ltd) with its Headquarters in Gurgaon (Haryana) India. It is easy to operate and requires less programming/computer skills. With the pre-requisite of nominal data entry, maximum possible integration of operations and powerful search and query facilities, LibSys produces high productivity. The software is built around its centralized bibliographic database based on Z39.50 format. LibSys undertakes almost all tasks related to acquisition; cataloguing; circulation; and serials. Besides this, it has a powerful and user-friendly OPAC. As stated earlier, LibSys is popularly used software across the nation having more than 1000 libraries as its clients. It is also used in some adjacent countries like Nepal, Sri Lanka and overseas country like Costa Rica, etc. The nonstop development of LibSys popularized it as a standard library management package for Indian libraries. With constant advancement, LibSys has produced a LibSys suite comprising various products such as LSEase; LibSys7; LSPremia; LibSysX and LSDigital for different types of libraries (LibSys, 2011).

On the other hand, Virtua software used by Allama Iqbal Library is a fully integrated library management package accepted globally to deal with the wide range of library functions. The software is developed by VTLs Inc; the leading library automation vendor at Blacksburg, USA. Virtua provides web OPAC and Chameleon iportal that facilitate the patrons to interact with the library by letting them to share on social network sites such as Facebook and twitter, etc. Virtua is having a significant distinction of being first library management package to fully support FRBR (Functional requirement for bibliographic records) and RDA (Resource Description and Access) standards. The software is based on six technologies such as Relational Database Management System (RDBMS); Rapid development tools; three tier Client-server architecture; database ware housing; UNICODE support and ATM network optimized applications. These technologies help in database management handling, software development and network delivery (VTLs, 2011). Virtua is worldwide acknowledged software with over 1800 libraries across 42 countries presently its clients. In India alone, about 40 libraries including National Library; Jawaharlal Nehru University; Central Institute of Indian Languages; University of Hyderabad; Allama Iqbal Library; IIT Madras; Indian Institute of Management (IIM), Indore; Indian institute of Science Education & Research (IISER), Kolkata; Indian Institute of Management (IIM), Ranchi; Indian Institute of Management (IIM), Bangalore; Indian Institute of Technology (IIT), Bhubaneswar; etc. are presently using Virtua software. It is observed that the number of libraries using Virtua is speedily increasing in India (Chachra, 2012). The features of LibSys and Virtua softwares are discussed in table-2 as below:

Table-2 Features of LibSys and Virtua

S.No	Features	LibSys	Virtua
1	Organization responsible for development of the software with year of establishment	Info Consultants (LibSys Corporation, now LIBSYS Ltd), Gurgaon, India. 1992	Virginia Technology Library Solutions (VTLS) Inc, USA. 2001
2	Nature of the Software	Proprietary and Fully Integrated library management system	Proprietary and Fully Integrated library management system
3	Design/Architecture	Client-server	Client-server
4	Operating system (Client Platform)	Windows 95/98/NT/2000, UNIX, Linux and NOVELL	95/98/2000/NT/XP/Vista, Linux
5	Operating system (Server options)	SCO Unix, Windows NT/Unixware/ Novell, UNIX, LINUX Sun Sparc (SOLARIS)	UNIX, LINUX, SOLARIS, SUSE LINUX, IBM(AIX), SUN(SOLARIS)
6	RDBMS	ORACLE, SQL, MySQL	ORACLE
7	Standards	ANSI Z39.50, USMARC, UKMARC, UNIMARC, MARC21, CCF	ANSI/ISO Z39.50, MARC21, ISO-23950, ISO-10161
8	ISO Certified	No	Yes (VTLS received ISO certification in 1997)
9	Profiler	Windows GUI	Windows GUI
10	Supports Multi lingual scripts	Yes through UNICODE	Yes through UNICODE
11	User facility	Multi user tasking	Multi user tasking
12	Protocol compatibility	TCP/IP communication protocol	TCP/IP communication protocol
13	Mode of searching	OPAC	OPAC
14	Modules supported	Acquisition, Cataloguing, Circulation, Serials Control, OPAC and Article indexing	Acquisition and Fund Accounting, Cataloguing, Circulation, Serials control, OPAC, Statistics and Reporting, Chameleon Gateway
15	Reports	Customization restricted	Customization certified
16	Installation Base	Over 1000 Libraries in India and some about 5-10 libraries in adjacent countries namely Sri Lanka, Nepal, etc.	Over 1800 Libraries across 42 Countries and about 25 libraries in India with number speedily increasing.

7. ANALYSIS, INTERPRETATION AND FINDINGS

To assess the status of information retrieval system, the investigator personally visited all the select libraries and collected the necessary data in this regard from the users. The responses received through questionnaires were consequently correlated with the responses received through interviews. The finalised data have been analysed, interpreted and discussed in table-3 as under:

Table-3 Overall Status of Retrieval System

Rating	IIT Delhi				IIT Kanpur				Kashmir University			
	*STU N=330	*RS N=84	*FM N=27	Total N=441	STU N=184	RS N=72	FM N=25	Total N=281	STU N=416	RS N=40	FM N=26	Total N=482
Excellent	48 (14.54)	16 (19.04)	4 (14.81)	68 (15.41)	25 (13.58)	13 (18.05)	3 (12)	41 (14.59)	111 (26.68)	14 (35)	7 (26.92)	132 (27.38)
Very good	147 (44.54)	35 (41.66)	10 (37.03)	192 (43.53)	85 (46.19)	26 (36.11)	9 (36)	120 (42.70)	168 (40.38)	17 (42.5)	13 (50)	174 (36.09)
Good	90 (27.27)	20 (23.80)	9 (33.33)	119 (26.98)	44 (23.91)	20 (27.77)	9 (36)	73 (25.97)	99 (23.79)	7 (17.5)	5 (19.23)	135 (28)
Average	34 (10.30)	12 (14.28)	4 (14.81)	50 (11.33)	23 (12.5)	11 (15.27)	4 (16)	38 (13.52)	30 (7.21)	2 (5)	1 (3.84)	33 (6.84)
Poor	11 (3.33)	1 (1.19)	0 (0)	12 (2.72)	7 (3.80)	2 (2.77)	0 (0)	9 (3.20)	8 (1.92)	0 (0)	0 (0)	8 (1.65)

*STU= Students (comprising Graduate and Post Graduate), *RS=Research Scholars and

*FM=Faculty Members

(Figures within parenthesis represent %age)

As stated earlier, the information retrieval system is the most important subsystem of the entire library automation system. It may be noted that the success of implementing automated library system lies in the effectiveness and efficiency of its information retrieval system. In this backdrop, the collected data in table-3 reveals that a small percentage of 14.54% students, 19.04% research scholars and 14.81% faculty members in IIT Delhi rated that the overall status of retrieval system of their library as excellent. There is not much difference observed in this direction in IIT Kanpur, where 13.58% students, 18.05% research scholars and 8% faculty members replied that the retrieval system of their library is excellent. In comparison, this category of users who reported the retrieval system of Allama Iqbal Library as excellent is 26.68% students, 35% research scholars and 26.92% faculty members.

The collected data further reveals that a large percentage of users in IIT Delhi with 44.54% students, 41.66% research scholars and 37.03% faculty members rate the retrieval system of their library as very good. This number of users is more or less same in IIT Kanpur, where 46.19% students, 36.11% research scholars and 36% faculty members are of the same opinion. No big difference is observed between the both IIT libraries and Allama Iqbal Library, as a large population with 40.38% students, 42.5% research scholars and 50% faculty members in Kashmir University are of the opinion that the overall retrieval system of their library is very good.

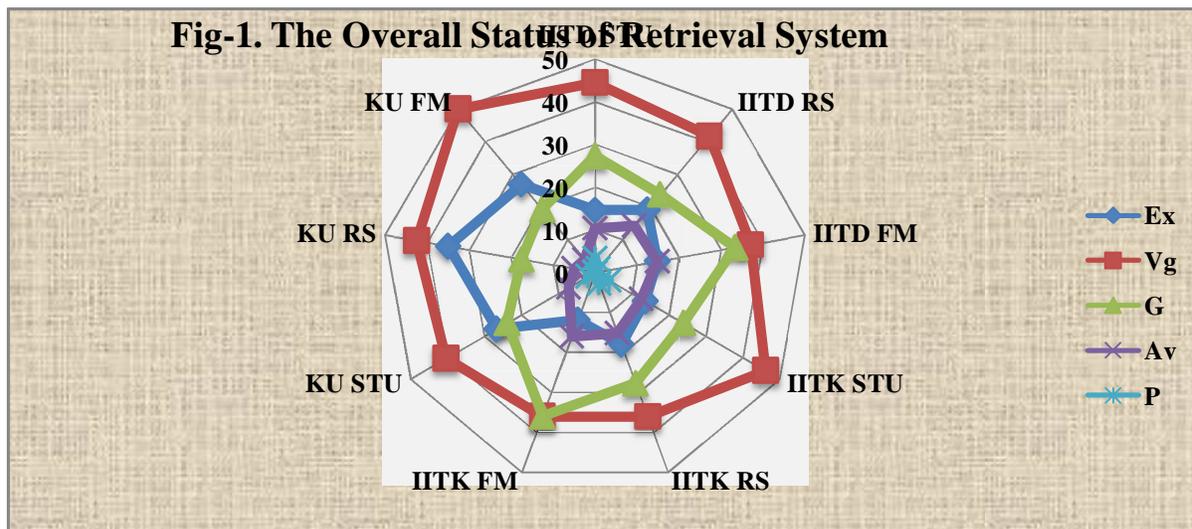
Furthermore, the data reflects that a considerable percentage of 27.27% students, 23.80% research scholars and 33.33% faculty members in IIT Delhi; while 23.91% students, 27.77% research scholars and 36% faculty members in IIT Kanpur rate the retrieval system of their library under good category. The situation in this regard is not much different in Kashmir University, where 23.79% students, 17.5% research scholars and 19.23% faculty members also rate the retrieval system of their library under good category.

It is, however, disappointing that 10.30% students, 14.28% research scholars and 14.81% faculty members in IIT Delhi find the retrieval system of their library as average. Likewise, 12.5% students, 15.27% research scholars and 16% faculty members in IIT Kanpur rate their library's retrieval system as average. On contrary, a small percentage of users in Kashmir University with 7.5% students, 5% research scholars and 3.84% faculty members are of the view that their library's retrieval system is average.

Further, a thin percentage of users with 3.33% students and 1.19% research scholars in IIT Delhi; while 3.80% students and 2.77% research scholars in IIT Kanpur find the retrieval system of their library as poor. However, none of the faculty members in both the IITs are of this opinion. On contrary, this number is even thinner in Kashmir University, where a meagre 1.92% students view the retrieval system of their library as poor.

The findings suggest that the retrieval system of Allama Iqbal Library has taken a strong lead over the select IIT libraries. Notably, a large percentage of users in Kashmir University rate the retrieval system of their library between excellent and very good. This owes to the fact that Allama Iqbal Library is providing the facility of self check-out and check-in system for issue and return of the library resources. It has also been observed that the users are more enthusiastic in issuing and returning the library resources themselves via self check-out/check-in machines. As mentioned earlier in chapter, this facility is yet to be seen in the libraries of both IITs.

In addition to above, the status of information retrieval system of the select libraries is also shown in graphical presentation below in Fig-1



‘IITD’= IIT Delhi, ‘IITK’= IIT Kanpur and ‘KU’= Kashmir University

‘STU’= Students (comprising Graduate and Post Graduate),

‘RS’= Research Scholars,

‘FM’= Faculty members

‘Ex’=Excellent, ‘VG’=Very Good, ‘G’=Good, ‘Av’=Average, ‘P’=Poor.

8. CONCLUSION

It is revealed that both LibSys and Virtua softwares’ have their potentialities and limitations. LibSys is most popular at Indian level and supports most of the international standards. In comparison, Virtua is globally acclaimed to have robust features that are compatible to all international standards. It is noteworthy to mention that LibSys is possible to be installed on different operating systems i.e. Windows NT, UNIX, Linux and NOVELL as server platform with any version of Windows as a Client. In this direction, Virtua can also run on several operating systems like UNIX, LINUX, SOLARIS, SUSE LINUX, IBM (AIX), SUN (SOLARIS) platform with Windows as a Client. LibSys has the advantage over Virtua that it does not require RDBMS as its back-end. However, the option of SQL server or ORACLE as back-end RDBMS is available. On the other hand, Virtua inevitably requires Oracle RDBMS at its back end. Furthermore, the study revealed that LSPremia version of LibSys presently used by select IIT libraries lacks RFID compatibility. While as Virtua is the first library software that fully supports RFID technology. Appreciably, Allama Iqbal Library has successfully and effectively installed RFID technology. In addition to above, Virtua is the first software in library automation industry that fully supports UNICODE, FRBR and RDA standards. While as apart from partial UNICODE, LibSys does not support these standards. It

is now up to the librarians' technological competence and judgement to select the software that accomplishes most of the library operations and services more efficiently and effectively.

It is encouraging to state that Allama Iqbal Library has taken a lead and has successfully installed RFID technology, self issue, self return and self check-in/check-out features. While these technologies are not yet in place in the libraries of select IITs. In the light of these facts, it can be said that the retrieval system of Allama Iqbal Library is comparatively more advance than the retrieval system of surveyed IIT libraries. Significantly, 63.47% users in Kashmir University rate the retrieval system of its library between excellent and very good. In case of IIT Delhi and IIT Kanpur, 58.94% and 57.29% users respectively are of the view that the retrieval system of their library is between excellent and very good. However, when the investigator wished to know the satisfaction level of users', majority of users in the Central Library, IIT Delhi and P. K. Kelkar Library, IIT Kanpur reported that they are satisfied with the overall retrieval system of their libraries. But strangely, the users of Kashmir University are little less satisfied with the overall retrieval system of Allama Iqbal Library. It may also be noted that a sizeable percentage of 14.05% users in IIT Delhi and 16.72% in IIT Kanpur rate the retrieval system of their libraries between average and poor. In contrast, only 8.49% users in Kashmir University rate the overall retrieval system of their library between average and poor. Although, this percentage of users, who view the retrieval system between average and poor is more in IIT Kanpur and IIT Delhi respectively. However, even after using the leading foreign software and installing a complete automated retrieval system, some percentage of users in Kashmir University still rate the overall retrieval system of Allama Iqbal Library as unsatisfactory. The results of this study clearly point out that there is further improvement needed on part of librarians' to take appropriate steps for making effective and efficient use of their information retrieval system. Besides, the study also reveals that the Allama Iqbal Library needs to take appropriate measures to guide its users for effective and efficient use of fully automated retrieval system.

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DIGITAL PRESERVATION IN LIBRARIES – WHY AND HOW?

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ABSTRACT

Preservation of traditional materials became more successful and systematic after libraries and archives integrated preservation into overall planning and resource allocation. Digital preservation is largely experimental and replete with the risks associated with untested Digital preservation strategies are shaped by the needs and constraints of repositories with little consideration for the requirements of current and future users of digital scholarly resources. Archives contain millions of documents like manuscripts, rare books, paintings, photographs, and historical records. All these constitute human heritage. Paper manuscripts, with the passage of time, are getting fragile and brittle because of various reasons. Lamination does not seem to be a permanent solution of preservation this cultural heritage for posterity. Digitization technology brings with it untold benefits for heritage preservation access. Once a document has been properly digitized, it become immortal and can remain accessible long after the original has ceased to exist. The option of digital access further aids in preservation of originals through reduced need for physical handling. This paper states about need for digital preservation with its objectives in Library environment.

Key Words: Preservation, Digitization, Archiving, Digital Preservation,

INTRODUCTION

Human past is splendid and full of wonders. The past is known by records, archives, books, and other library materials that constitute documentary sources. There are also other things like monuments, buildings, art objects, and other artifacts. All these constitute human heritage. They need conservation and preservation. Librarians, archivists, curators, chemists, and archaeologist the world over are concerned with the problems of conservation and preservation.

During the last few years, the library and information backdrop has changed considerably. Digital objects have become the dominant way that we create, delineate and exchange the information. Now, librarians and information scientists are anxious to provide access to information 24/7/365, as needed by the information society. Information and Communications Technology (ICT) is one of the major constituents of this divesting change, which is used in acquiring, processing, storing and disseminating information.

Preservation is a part of conservation. Preservation is concerned with problems like the repair, dusting, fumigation, de-acidification, air-conditioning, lamination, binding, and storage of manuscripts, books, films, disks, and optical materials.

PRESERVATION AND DIGITAL PRESERVATION

Preservation

The American institute for Conservation of Historic and Artistic Work (AIC) defines as, Preservation is the protection of cultural property through activities that minimize chemical and physical deterioration and damage and that prevent loss of informational content. The primary goal preservation is to prolong the existence of cultural property.

Preservation (in Library) is an “activities associated with maintaining library and archival materials for use either in their original physical form or in some other usable way”.

Digital Preservation

According to Cornell University Library, “Digital Preservation encompasses a broad range of activities designed to extend the usable life of machine readable computer files and protects them from media failure, physical loss and obsolescence”.

According to Russell (1998), Digital Preservation is a process by which digital data is perceived in digital form in offer to ensure the usability, durability and intellectual integrity of the information contained therein.

CONCEPT OF DIGITAL PRESERVATION

The most precise concept of Digital Preservation is the storage, maintenance and accessibility of a digital material over a long term, usually as a consequence of applying one or more digital preservation strategies. These strategies may include technology preservation, technology emulation or date migration.

OBJECTIVES OF DIGITAL PRESERVATION

The main ground of digital preservation is to achieve the following objectives:

- Providing continued access to digital material for both born digital and digitized material.
- Ensuring authenticity of preserved digital material.
- Preserve physical media to avoid damage/ deterioration by ensuring an environmental control.
- Changing the digital information in to newer and fresher format, if it is necessary.
- Achieving co-ordination of all efforts that are undertaken for preservation globally in order to achieve more synergy, to avoid redundancy and reduce cost. This provides an effective infrastructure for collaboration by connecting different networks, institutions and individuals that are working in this field.
- Focus the stakeholders on issues that desperately need attention in this area. The basic assumption being that action has to be taken at outset rather than at secondary stages.

REQUIREMENTS OF DIGITAL PRESERVATION

Digital Preservation combines policies, strategies and actions to ensure that digital objects remains authentic and accessible to users and systems over a long period of time, regardless of the challenges of component and management failures, natural disasters or attacks.

Even though, it is impossible to define all the requirements applicable for all digital preservation needs, since digital preservation requirements depend, for instance, on the type, size and amount of data. It also depends on the goals of each organization, regarding the reuse of data. However, there are several generic and common requirements that can be surveyed, based on what someone in the future would require from information stored today.

1. Digital Preservation requires that a copy (or preservation) of any preserved digital object survives over the system's lifetime, which is usually unknown, but may be as long as decades or even centuries. This can be defined as a reliability requirement. Therefore, a digital preservation system must be designed to store data indefinitely without suffering any data losses.
2. A future consumer should be able to decide if the accessed information is sufficiently trustworthy. Usually, this requires the authenticity assurance of digital objects (which is already a common requirement for tangible objects). Also, the provenance of digital objects should be required, especially its creator or entity responsible for it. Moreover, it is crucial to assure the integrity of digital objects, guaranteeing that their informational content was not modified.
3. Digital Preservation requires that future consumers are able to obtain the preserved information as its creators intended, dealing with obsolescence threats. This requirement encloses several challenges, since a digital object, to be explored, requires a technological context defined by specific software and, in some cases, even by specific hardware.
4. Dynamic collection and environments for digital preservation require technical scalability to face technology evolution allowing, for instance, the addition of new components through incremental updates.
 - Existing static collection (with a fixed size) like, for instance, a digitized historical archive, where no new items will be added, will have a fixed data size.
 - Although it will not be necessary to add new components to increase the storage capacity, it may be necessary to replace components by others with more recent

technology (in order to achieve lower maintenance costs or simply because the initial technology was disrupted).

Fortunately, some typical requirements of normal storage systems are not crucial in digital preservation. For instance, data updates are uncommon because, usually, objects in digital preservation systems are supposed to remain unchanged. Almost all write access to the repository is to either ingest new objects or re-write the existing objects in new migrated formats.

DIGITIZATION EQUIPMENTS

- Wide format scanner which can scan document width up to 42 inches
 - Digital Cameras
 - Scanners (8.5"x14") & Scanners (8.5x11.5")
 - Book scanners with V shaped cradle
 - Dark rooms with lighting equipment
 - Servers: IBM server with an installed storage of 20TB, Scalable up to 48TB
 - Backup equipment: LTOP Tap drives, hard drives, DVD writers.
 - Computers: Desktop and Laptops
- These are required based on the available documents which are going to be digitized.

METHODS OF DIGITAL PRESERVATION

Digital Preservation is concerned with ensuring that records which are created electronically using today's computer systems and application remain available, usable and authentic in future use, so digital preservation consist of preservation more than just the records bit stream for interpret the survival of the records otherwise without interpretation the bit stream is nothing more than a meaningless series of 0's and 1's.

1. Preservation of Digital Materials

Digital media, no doubt, have immense capacity to record information enabling the libraries to provide users seem-less access to information, but it is very fragile in comparison to print media. Archiving of digital information is more complicated than archiving printed information.

Digital preservation means taking steps to ensure the longevity of the electronic document in terms of the following.

- Data (this might be for text, image, video or audio stored in variety of format and standards)
- Index to the data
- Link to other data
- Metadata

- Software (relies upon hardware and Operating System)
- Storage medium

Hence, in the preservation of digital heritage material the following measures taken into account.

- Integrity of Digital material
- Physical presence
- Preservation format
- Digital material functionality
- Authenticity of the materials &
- Provenance.

2. Standards for Digital Preservation

Standardization is the secret behind quality, uniformity of measurement, norms, terminology which directly affect mass production that leads to economy of time, space, efforts, material, manpower and money and facilitates and acts as a tool of transfer of information which is required for digital information preservation.

3. Standards for Architecture

In a distributed digital environment the management of digital collection cannot be responsibility of just one central organization. In such environment it is important to agree on concepts, definitions and procedures. For this there are several standards on record management architecture.

- ISO/DIS 15489:** is a draft international standard on record management and this standard enable organization to standardize for mainly to design and implementation of record system.
- AS 4390:** In December 1995, Australia became the first country in the world to develop a standard on record management, i.e. AS 4390-1996. Following the approval and release of the standard, the international record management community began work on the development of an International Standard.
- DOD 5015.2.STD:** is being developed by department of defense of USA. The DOD 5015.2.STD implementing and procedural guidance on the management of document management.
- OAIS (Open Archival Information System):** It is developed by Consultative committee for space data system (CC SCS) of the NASA. The OAIS reference model described both the information flow and archival requisite and it is being reviewed as an ISO/DIS. This architecture is implemented by various types of Digital library and Archives.

4. Standards for Preservation content

Standards for preservation content should be depending upon ageing process of the semantic and physical recoverability of the document that is being preserved. A standard can only provide such longevity when the standard itself does not change and backward compatibility is provides. More often XML and PDF are put forward as two rivals to preserve a document for long term preservation.

- PDF (Portable Document Format):** PDF is the de facto document standard and is the proprietary of Adobe. It uses the image model of the post script language in order to depict text and image as exact copies of the original. The PDF have two types of format.

- Text based PDF outline font technology of postscript PDL(Page Description Language) for describe format of a page and
- Roster scanned image PDI without text outline font OCR (Optical Character Recognition)

b. XML (eXtensible Mark-up Language): XML is subset of the standard SGML (Standard General Markup Language) and is related to the Web language HTML Hypertext Markup Language (XML, 2001). With the help of the XML the structure of a document can be saved in a specific type document so called Document Type Description (DTD). For the specification of the form of document style sheet can be used. Cascading style sheet (CSS), extensible style sheet language (XSL) or XSL transformation (XSLT) can be used. Finally the content of the document can be stored is ASCII format with XML “tags”.

5. Standards for Preservation Access

Preservation of the bit stream of the document in some standard format is not enough to preserve a digital document over an indefinite period of the time, so it is necessary for the description of the digital, object or various parts into one object means file/ formats stored in different physical places in the information system and linked by cross reference. Such types of description are called metadata which included the contextual information to manage, retrieve and interpret the electronic information overtime.

- a. Dublin Core:** The Dublin core has especially been developed for cross disciplinary network discovery. It exists upon 15 elements (i.e. Title, Creator, Subject, Description, Publisher, Contributor, Date, Type, Format, Identifier, Source, Language, Relation, Coverage and Rights) for resources description and discovery.
- b. MARC:** MARC defines the representation and communication of bibliographic and relation definition in machine readable forms. Machine records contain a guide to its data or little “sign post” before each piece of bibliographic.
- c. Z39.50:** Z39.50 is an ANSI/NISO standard for information storage and retrieval under supervision of the Z39.50. Maintenance Agency (Library of Congress) of Z39.50 and its possible successor ISO Z39.50 is protocols which specifies data structure and enable searching or interchanging bibliographic information on different platform in a distributed environment.

6. Standards for Interoperability

Interoperability is ability of multiple systems with different hardware or software platform, data structure and interface to exchange data with minimum loss of content and functionality. Therefore interoperability is a critical problem in the networked environment with increase in diverse computer systems software application, file formats, information and users. But it is important for digital preservation in digital library and archives.

- a. ODMA (Open Document Management API):** The Open Document Management API enables integration of proprietary document application into ODMA compliant document

management system. Now many document management software packages are already ODMA compliant.

- b. **DMA (Document Management Alliance):** the DMA is a comprehensive standard for interoperability among electronic document management systems (EDMSs). The Document Management Alliance tries to solve the problem of island of information that crated different proprietary DMSs (Document Management Software), e.g. MS-Word.

ADVANTAGESOF DIGITIZATION

1. **Remote Access:** Connecting people globally by providing continued free online access.
2. **Multiple Accesses:** One of the most important advantage digitization is multiple Access documents. If a manuscript is in physical format, then it can be handled by only one person in the specific period, but through the digitization process, several users can access the specified document at a time.
3. **Preservation and Conservation:** Addressing heritage loss due to environment, ignorance, and destruction.
4. **Dissemination and Promotion:** Saving invaluable treasure to enrich the present and enlighten the future. Dissemination of knowledge and culture via the internet is a21st century phenomenon.

BARRIERS IN DIGITIZING

1. Initially no one understood what digitization was, and so everyone was hesitating in submitting his or her manuscript for digitization.
2. There is no doubt that in present times 27 million documents from the government, universities, and personal collection are to be digitized.
3. Initially they used to send requests to the public to send their manuscripts for digitization but now the scenario has changed; the request is being sent by the public.
4. It will take approximately ten years to fulfill the requests that are pending.
5. There is a great need to create awareness among the masses about the preservation of the archives so that this heritage can be handed over to the future generation.
6. Digitization requires a huge amount of money. Therefore, they have introduced a new scheme of “adopt one book” for digitization.

CONCLUSION

Digital preservation in all its aspects is going to require some form of organizational transformation. Long term preservation of documents is now hot issue in the present time. Accessioning to the digital documents in twenty or hundred years from now will be out of the question, if people not process the bit stream underlying digital documents. Digital documents are not fragile. The speed of technological obsolescence makes digital preservation an important issue for everyone.

Today, we have acknowledged the canonical needs of digital preservation, and the major libraries and archives of the world are concerned with the abiding digital preservation for traditional information materials and born digital information for the future generation. The

ever growing amount of material being available digitally, not only drives the need for feasible access and delivery, but also for preserving digital objects in the medium and long run. But the problem of digital preservation is not static and will continue to evolve with the technological developments.

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A SCIENTOMETRIC ANALYSIS OF GLOBAL RESEARCH TRENDS IN BIOMATERIALS

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Abstract

The paper analyses the results of total publication of the world in Biomaterials subject field as reflected in Thomson Reuters Web of Science database during the period of 1999 to 2013. The study has used various Scientometric indicators like R^2 Value, Annual Growth Rate, Activity Index (AI), Attractive Index (AAI), Publication Efficiency Index (PEI) and Relative Citation Impact (RCI). The present study compares the top ten countries' publications and their citations performance to the world average within their period cited earlier.

Keywords: Activity Index, Attractive Index, Biomaterials, Publication Efficiency Index, Relative Citation Impact, Scientometric Analyses, Scientometric Indicators.

1. INTRODUCTION

The biomaterials are basically materials which are utilized and acclimatized for a medical purpose. The biomaterials can have a benevolent function, being used in a proactive or used in heart valve and used for a more interactive purpose such as hydroxyl-apatite coated in different organs, implanted in the human body. The biomaterials can be used in dental surgery, dental application and also in drug relief in a routine life. The blog, 'Environment' (2014) defines biomaterials as "biomaterial is any material, natural or man-made, that comprises whole or part of a living structure or biomedical device which performs, augments, or replaces a natural function".

The biomaterials can be used in Bone plates, Artificial ligaments, Bone cement, and tendons, Joint restoration, Blood vessel prosthesis implantation, cochlear implant replacements, heart valves blockage treatment, skin repair devices (Ex. Micro-Plasma Device), contact lenses and dental implants for tooth fixation. Considering the importance of biomaterials and its application in various fields, the present study is carried out for using various Scientometric indicators for the period of 1999 to 2013.

2. OBJECTIVES

The objectives of the study are to perform a Scientometric analysis of all Bio Materials publications in the world. The specific objectives of the study are to find out;

- 1) the growth of publications and citations of Biomaterials research;
- 2) country wise distribution of publications and to calculate activity index;
- 3) most productive institutions;
- 4) highly preferred journals in the field of Biomaterials and
- 5) to calculate publication efficiency index for the study.

3. MATERIALS AND METHOD

The study involves scientific output of Biomaterials in terms of research publications. The data was using by 'Web of Science' for the period of fifteen years, i.e. 1999 to 2013. The keyword used for the search was "**WC= (Biomaterials) AND PY= (1999-2013)**" for measuring the research output on Biomaterials. 'Biomaterials' included research specific publications related to Engineering, Biophysics, Chemistry, Polymer Science, Dentistry oral Surgery Medicine, Biochemistry Molecular Biology, Biotechnology, Applied Microbiology, Energy Fuels, Robotics, etc.,. The total number of publications of "Biomaterials" showed 47,622 records.

The Scientometric indicators are mainly proposed to recognize, compare and assessment appropriate characteristics of input and output of scientific productivity and research in more objectives that is quantitative fashion (Sangam, et. all. 2008). To evaluate publications and citation efficiency the study used Scientometric indicators.

The R^2 value can be mathematically derived from the given below formula

$$R^2 = 1 - \frac{SSE}{SS_{yy}}$$

R^2 is the coefficient of determination that shows the relation between dependent variable and the other independent variables.

Activity Index (AI), the indicator compares a country's research recital with that of the world performance (Chen and Guan 2011; Hu and Rousseau 2009). The Activity Index is also

called as relative performance indicator, which considered publications size of the evaluated country in the field of Biomaterials.

Mathematically, the Activity Index is (AI_i^t) for the i^{th} country in the t^{th} year during the considered period and it can be describing as follows:

$$AI_i^t = \frac{\left(P_i^t / \Sigma P \right)}{\left(TP^t / \Sigma TP \right)}$$

P_i^t is the Biomaterials research publication by the i^{th} country in the t^{th} year; ΣP is the Biomaterials publications by the i^{th} country during the period; TP^t is the total Biomaterials publication output by the world in the t^{th} year; ΣTP is the total Biomaterials research publications by the world during the period. If $AI=1$, it indicates that the country's research attempt in a particular field match up specifically to the world's average. If $AI>1$, as the result shows that the country used to spend more force and funds to the specified field than the world average, or if $AI<1$, this reflects a specialization by this country in the field under study (Hu and Rousseau 2009; Chen and Guan 2011).

The Attractive Index (AAI) is used to characterize the relative impact of a country's research output in a subject field as reflected by the citations they received during the period (Chen and Guan 2011; Hu and Rousseau 2009). Mathematically, the Attractive Index for (AAI_i^t) is defined as follows:

$$AAI_i^t = \frac{\left(C_i^t / \Sigma C \right)}{\left(TC^t / \Sigma TC \right)}$$

C_i^t is the Biomaterials publications citations by the i^{th} country in the t^{th} year; ΣC is the Biomaterials research citation by the i^{th} country during the period; here TC^t is the total Biomaterials citations by the world in the t^{th} year; and ΣTC is the total Biomaterials citations by the world during 1999 to 2013. If $AAI=1$, the indicator used that the particular country's relative citation impact in the subject field match up specifically to the world average. If $AAI > 1$, indicates that the country's relative citation impact in that field is higher than the world average and if $AAI < 1$, it results that the country's relative citation impact in the field is lower than the world average (Hu and Rousseau 2009; Chen and Guan 2011).

The Publication Efficiency Index (PEI) is an indicator to find out if the impact of publication output by the top ten contributing countries in Biomaterials research corresponds with the

index (PEI_i^t) as follows;

$$PEI_i^t = \frac{\left(C_i^{t+2} / \Sigma C \right)}{\left(P_i^t / \Sigma P \right)}$$

C_i^{t+2} is the citations by the i^{th} country, y in the $(t + 2)^{\text{th}}$ year; ΣC is the citations by the i^{th} country during the taken citation period; P_i^t is the research publications by the i^{th} country in the t^{th} year; ΣP is the total research output by the i^{th} country during the period of 1999-2013. It is attained through isolating the percentage of citations “returns” by the percentage of publications “efforts”. If $PEI > 1$ (Publication Efficiency Index is greater than One), It indicates that the impact of total research publication in a given subject field by a particular country is more than the research attempt devoted to it during the period, the paper has considered.

Relative Citations Impact (RCI) is a measure of citations impact of the research output by a country compared to the world average. This is determined on the basis of average citations per paper for the relative to the average citation per paper for the world output (Gupta & Dhawan, 2006, p.33).

$$\text{Relative Citations Impact} = \frac{\text{Average Citation Per Paper for the Country output}}{\text{Average Citations Per Paper for the World Output}}$$

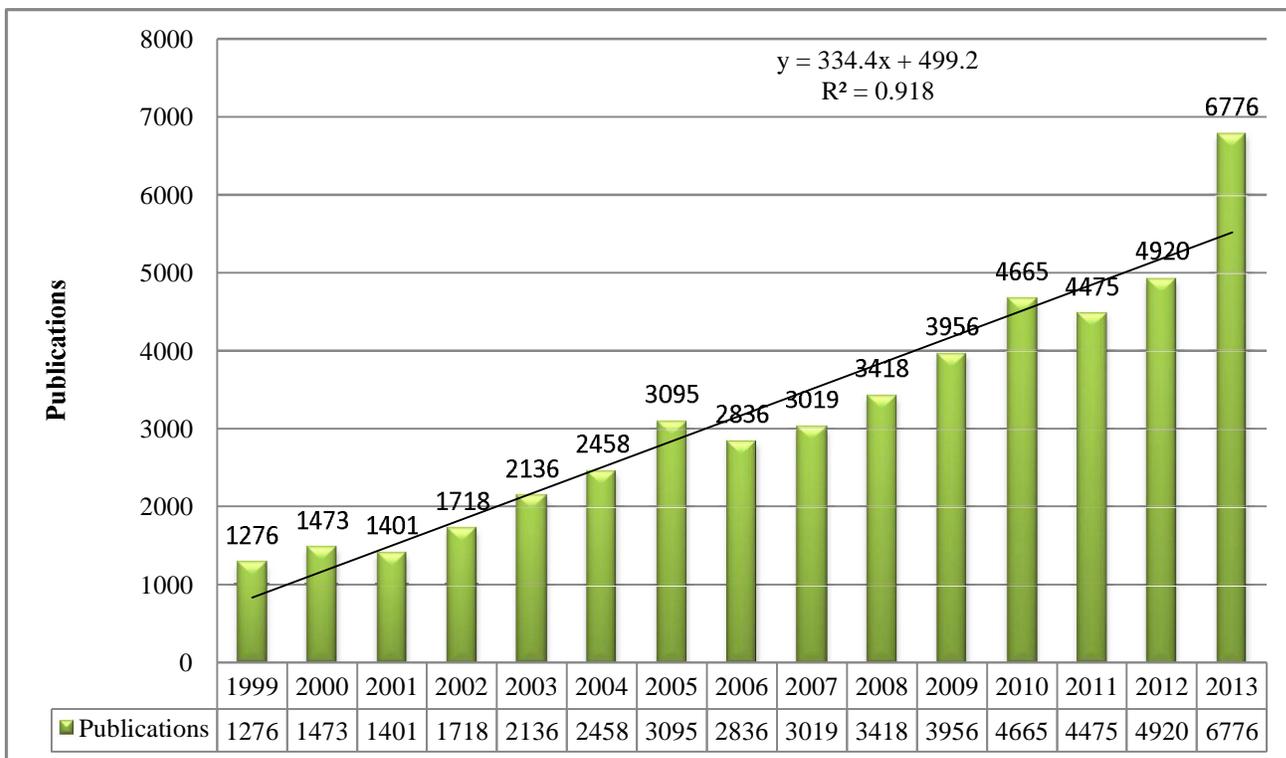
The RCI compares a country’s citation rate (the citation per year) for a particular field to the world wide citation rate for that field. A Relative Citation Impact greater than 1 shows that the country’s rate for the field is higher than the world’s and is viewed by some as a reliable indicators of the quality of the average paper. This latter measure takes into account the size of the particular country productiveness relative to that in other countries (National Research Council, 2000).

4. RESULTS AND ANALYSIS

The total number of publications extracted in the field of Biomaterials is 47,622 during 1999-2013 as reflected in Web of Science database and 9, 50,044; citations were received for 47,622 total publications.

During the period, the exponential growth pattern was reflected by the value of R^2 from WoS ($R^2 = 0.918$). The result confirms the fast growth of publications in Biomaterials research during 1999-2013.

Figure 1: Growth of Publications in Biomaterials research (1999-2013)



4.1 Publications and Citations trend of different Countries

Table 1 show the publications output of top seventeen countries which have contributed at least 1000 publications or above. Among the different countries, USA topped the list with 12,025 publications and its share is 25.251 % of the total publications, h-Index of 184 (which is highest among the countries) in Biomaterials. China ranked second in terms of number of publications (7,494) with the citations of 1,19,506 and 15.95 Average Citation per Paper (ACP) but it's ACP is too low compared to other countries. Singapore ranked first in terms of ACP with 36.53% but ranked last in the table in terms of total publications (1040). Japan with 5595 publications to its credit, ranked third in terms of publications (5,595) and citations (1,02,637), whereas, Germany with 3337 and UK with 3091 publications ranked third to fifth respectively. It is surprising to note that though the publications output of some countries (such as Netherlands, Switzerland and Singapore) are less but their ACP is high compared to that of top countries producing total number of publications.

Singapore has the highest RCI (Relative Citation Impact) with 1.822, Netherlands with 1.486, Switzerland with 1.467, USA with 1.436, Canada and UK with 1.130, Germany with 1.112 ranked first to sixth respectively. The RCI of other countries is presented in table 1.

Table 1: Performance of the Top Countries

Sl. No	Countries	Total Publications	Total Citations	Average Citations Per Publication	H-Index	Percentage	RCI
1	USA	12025	328255	27.30	184	25.251	1.436
2	China	7494	119506	15.95	113	15.739	0.839
3	Japan	5595	102637	18.34	111	11.749	0.965
4	Germany	3337	70502	21.13	99	7.007	1.112
5	UK	3091	66361	21.47	100	6.491	1.130
6	South Korea	2483	51609	20.78	95	5.214	1.094
7	Italy	2128	40265	18.92	80	4.469	0.996
8	Canada	1881	40404	21.48	82	3.950	1.130
9	France	1849	38024	20.56	79	3.883	1.082
11	India	1656	21398	12.92	57	3.477	0.680
11	Taiwan	1393	25451	18.27	67	2.925	0.961
12	Spain	1345	21531	16.01	65	2.822	0.842
13	Netherlands	1272	35924	28.24	90	2.671	1.486
14	Australia	1132	23164	20.46	67	2.377	1.077
15	Brazil	1067	14573	13.66	49	2.241	0.719
16	Switzerland	1053	29367	27.89	81	2.209	1.467
17	Singapore	1040	36013	34.63	87	2.184	1.822
	Total	47622	905044	19.00			

(*1000 \geq and above contribution of total publications)* Relative Citation Impact (RCI)

4.2 Growth Rate of Publications in the field of Biomaterials

The table 2 shows the growth rate of publications in the field of Biomaterials. It reveals that the total of 47,622 publications were published during the 1999 - 2013 which received 9, 05,044 citations. The highest numbers of publications i.e. 6, 724 were published in the year 2013. The highest number of citations were received i.e. 94,668 for the year 2005. It appears that the annual growth during the period is inconsistent. The Annual Growth Rate is fluctuant during the study period. The present study contradicts the results of Kademani et. al (2011) i.e. “ The quantity and quality of research always go hand in hand as average citations per year is decreasing. The older publications received more citations than the publications published recently”.

Table 2: Growth Rate of publications in the field of Biomaterials

Publications Year	Total Publications	Annual Growth Rate (%)	Total Citations	Average Citations Per Paper
1999	1276	-	55,139	43.21
2000	1473	15.44	57,970	39.36
2001	1401	-4.89	54,987	39.25
2002	1718	22.63	65,787	38.29
2003	2136	24.33	74,192	34.73
2004	2458	15.07	77,159	31.39
2005	3019	22.82	94,668	30.59
2006	2836	-6.06	79,218	27.93
2007	3019	6.45	73,519	24.35
2008	3418	13.22	68,869	20.16
2009	3955	15.71	68,568	17.34
2010	4665	17.95	64,117	13.74
2011	4474	-4.09	42,071	9.41
2012	4890	9.30	21,968	4.49
2013	6724	37.51	68,12	1.01
Total Citations			9,05,044	

4.3 Activity Index (AI) of different countries

Table 3 gives the Activity Index of different countries in Biomaterials research. Though India is placed tenth position in terms of total publications it has the highest mean AI i.e. 1.854, followed by China (1.800 AI), Germany (1.575 AI), USA with 1.524(AI), Canada (1.507 and France (1.465) ranked second to sixth respectively. This indicates that all these countries' Average AI is greater than 1 ($AI > 1$) indicating an active and specialized focus on Biomaterials research. This means top ten countries average corresponds to that of world's average.

Table 3: Activity Index (AI) of Top Ten Countries in Biomaterials

Years	USA	China	Japan	Germany	UK	South Korea	Italy	Canada	France	India
1999	0.227	0.023	0.220	0.139	0.282	0.076	0.228	0.243	0.365	0.076
2000	0.331	0.067	0.439	0.276	0.357	0.152	0.437	0.329	0.503	0.146
2001	0.309	0.072	0.407	0.324	0.459	0.185	0.365	0.309	0.392	0.154
2002	0.378	0.135	0.548	0.389	0.461	0.309	0.520	0.504	0.524	0.186
2003	0.508	0.304	0.936	0.451	0.584	0.524	0.577	0.474	0.475	0.269
2004	0.682	0.390	1.093	0.601	0.960	0.842	0.812	0.615	0.754	0.227
2005	0.964	0.852	1.282	1.084	0.991	1.159	1.063	1.260	0.924	0.362
2006	0.952	0.676	1.356	0.851	1.000	1.061	0.719	0.931	1.024	0.495
2007	1.170	0.928	1.228	1.142	1.157	0.879	1.097	1.143	0.963	0.811
2008	1.427	1.401	1.205	1.498	1.492	1.326	1.493	1.195	1.394	1.264
2009	1.930	2.231	1.630	1.750	1.731	1.787	1.886	1.683	1.495	2.383
2010	2.861	3.085	2.165	2.949	2.520	2.836	2.631	3.198	2.354	2.762
2011	3.256	3.857	2.254	3.013	2.552	3.268	2.887	3.111	2.675	3.787
2012	3.403	4.699	2.369	3.738	2.815	4.134	3.179	3.343	3.052	4.495
2013	4.466	8.287	3.008	5.413	4.226	5.742	4.192	4.266	5.087	10.390
Mean	1.524	1.800	1.343	1.575	1.439	1.619	1.472	1.507	1.465	1.854

*(see also table 1)*Countries listed with top 10 priority in publications.

4.4 Attractive Index (AAI) of different countries

Table 4 indicates the Attractive Index of top ten countries. India scored highest Attractive Index that is 3.434 in the year 2013 followed by China with 2.617 in the same year. Both India and China have recorded Attractive Index greater than 1 during 2007 to 2013. Whereas USA, Japan, UK, Canada and France recorded less than 1 Attractive Index during the period of 2008 to 2010, which are not corresponding to the world's average. The AAI of China and India seems to be performing better than other countries. Fluctuant trend of AAI was observed for Germany, South Korea and Italy.

Table 4: Attractive Index (AAI) Top Countries in Biomaterials

Years	USA	China	Japan	Germany	UK	South Korea	Italy	Canada	France	India	Total Citations
1999	1.217	0.138	1.303	0.546	1.225	0.681	1.194	1.380	1.669	0.332	51,063
2000	1.244	0.291	1.161	0.895	1.173	0.916	0.968	1.106	1.777	0.306	55,649
2001	1.011	0.398	1.367	0.909	1.308	0.547	1.121	1.135	1.080	0.402	48,791
2002	0.953	0.541	1.323	0.996	1.135	0.924	1.149	1.039	1.135	0.509	59,164
2003	0.974	0.725	1.524	0.936	0.818	1.044	0.853	0.723	1.050	0.685	67,586
2004	0.950	0.764	1.086	1.042	1.213	1.391	1.018	0.967	0.697	0.328	70,282
2005	1.023	0.869	1.042	1.349	0.895	1.011	1.109	1.318	0.836	0.489	90,743
2006	1.018	0.828	1.051	1.049	1.268	1.014	0.880	1.034	1.130	0.592	75,655
2007	1.060	1.028	0.884	1.168	1.018	0.893	0.837	1.093	0.928	1.148	71,607
2008	0.982	1.228	0.729	0.939	0.996	0.958	1.150	0.750	0.926	1.497	66,135
2009	0.926	1.654	0.706	0.908	0.917	1.039	0.887	0.740	0.653	1.967	68,247
2010	0.910	1.598	0.610	1.096	0.665	1.148	1.013	0.968	0.821	1.865	65,746
2011	0.950	2.026	0.540	0.989	0.622	1.178	0.917	0.923	0.799	2.084	47,756
2012	0.806	2.251	0.516	0.832	0.579	1.176	0.921	0.819	0.653	2.199	27,268
2013	0.661	2.617	0.425	0.811	0.7415	1.036	0.905	0.581	0.888	3.434	13,404
MEAN	0.979	1.130	0.951	0.964	0.972	0.997	0.995	0.972	1.003	1.189	
MEDIAN	0.974	0.869	1.042	0.939	0.996	1.014	0.968	0.968	0.926	0.685	
											8,78,970

4.5 Publication Efficiency Index (PEI) of different countries

Table 5 depicts the Publication Efficiency Index (PEI) of top ten countries. The results demonstrate the impact of research publications in Biomaterials in these countries. This means that for those nine countries, the research performance is more than the research effort devoted to it during 1999 - 2012. South Korea scored the highest PEI i.e 3.639 and 3.574 in 1999 and 2000 respectively in the Biomaterials research. The top countries' PEI score is

greater than one for the period 1999 to 2006 but it is lesser than one during 2009 to 2013. No country displays good performance during 2009 to 2013. All ten countries seem to display regular decreasing trends during the study period 1999-2013.

Table 5: Publication Efficiency Index (PEI) of Top Ten Countries

Years	Total Publications	Total Citations	USA	China	Japan	Germany	UK	South Korea	Italy	Canada	France	India
1999	1276	56592	2.191	2.403	2.419	1.604	1.773	3.639	2.139	2.319	1.867	1.776
2000	1473	59710	2.229	2.566	1.567	1.927	1.948	3.574	1.315	1.991	2.097	1.241
2001	1401	56634	1.941	3.271	1.993	1.662	1.691	1.752	1.823	2.177	1.634	1.548
2002	1718	67925	1.870	2.975	1.792	1.898	1.824	2.221	1.639	1.531	1.607	2.025
2003	2136	77033	1.826	2.271	1.549	1.976	1.332	1.897	1.406	1.453	2.103	2.422
2004	2458	80188	1.596	2.244	1.139	1.988	1.448	1.894	1.438	1.803	1.061	1.657
2005	3095	98980	1.659	1.594	1.271	1.945	1.412	1.364	1.631	1.635	1.415	2.109
2006	2836	83363	1.443	1.653	1.046	1.664	1.711	1.289	1.651	1.499	1.489	1.612
2007	3019	77958	1.216	1.488	0.967	1.373	1.182	1.364	1.025	1.285	1.296	1.901
2008	3418	74118	1.013	1.292	0.891	0.923	0.984	1.064	1.135	0.925	0.979	1.746
2009	3956	75123	0.825	1.274	0.745	0.891	0.911	0.999	0.809	0.756	0.750	1.418
2010	4665	72488	0.655	1.068	0.581	0.766	0.544	0.834	0.794	0.624	0.719	1.393
2011	4475	50017	0.484	0.872	0.398	0.545	0.405	0.598	0.527	0.492	0.495	0.913
2012	4920	29969	0.248	0.501	0.228	0.233	0.215	0.297	0.303	0.256	0.224	0.511
2013	6776	14497	0.082	0.175	0.078	0.083	0.097	0.100	0.120	0.076	0.097	0.183
Total	47622	974595	1	1	1	1	1	1	1	1	1	1.000

4.6 Prolific Authors in Biomaterials Research

A total of 86,084 authors contributed to 47,622 papers in WoS during the period 1999-2013. The ratio of number of articles is 86,084: 47,622 or 1: 0.68. Table 7 shows the most productive (42) authors with their respective authorship score (greater than or equals to 100) in the field of Biomaterials. All the forty two most productive authors contributed on an average of 11.96% of total publications during the period. Zhang, Y. From Beijing Union Medical College, Hosp, Dept Orthopedic, Beijing (China) has the highest publications (263 publications), followed by Nakamura, T. from Hokkaido University, Faculty of Pharmaceutics Science, Lab Mol Design Pharmaceutics, Kita Ku, Sapporo, Hokkaido (Japan) has 238 Publications. It is also revealed from the study that among the top forty two authors, 15 authors belong to China, which is predominantly high compared to other countries, followed by seven authors belong to Japan, Six authors from South Korea, five authors belong to the USA and two author belongs to Portugal and Spain, one author from Netherlands, Singapore, Italy, UK and Finland respectively.

Table 7: Prolific Authors in the field of Biomaterials

Sl. No	Author	Total Publications	Name of the Institution	Country	H-Index
1	Zhang, Y.	263	Beijing Union Medical College, Hosp, Dept Orthopedic, Beijing	China	38
2	Nakamura, T.	238	Hokkaido University, Faculty of Pharmaceutics Science, Lab Mol Design Pharmaceutics, Kita Ku, Sapporo, Hokkaido	Japan	50
3	Reis, R. L.	220	University Minho, European Inst Excellence Tissue Engineering & Regenerat, Dept Polymer Engineering, Research Group Biomaterials Biodegradables & Biomimet 3Bs, Caldas Das Taipas, Guimaraes	Portugal	35
4	Jansen, J. A.	212	Radboud University Nijmegen, Med Centre, Dept Biomaterials, NL-6525 EX Nijmegen	Netherlands	44
5	Wang, Y.	201	Academy of Mil Med Science, Dept Adv Interdisciplinary Studies, Inst Basic Med Science, Beijing	China	29
6	Wang, J.	193	Peking University School & Hosp Stomatol, Dept Prosthodont, Beijing	China	26
7	Liu, Y.	192	Nanyang Technology University, School Civil & Environmental Engineering, Division of Environmental & Water Resources Engineering, Singapore	Singapore	28
8	Kokubo, T.	181	Chubu University, Dept Biomed Sci, College of Life & Hlth Sci, Kasugai, Aichi	Japan	50
9	Kaplan, D. L.	155	Tufts University, Dept Biomed Engr, Medford, MA	USA	43
10	Mikos, A. G.	148	Tufts University, Dept Biomed Engr, Medford, MA USA	USA	54
11	Zhang, X. D.	146	Sichuan University, Natl Engn Res Ctr Biomat, Chengdu,	China	23
12	Li, Y.	136	Chongqing University, Minist Educ, Key Lab Biorheol Sci & Technol, Chongqing	China	21
13	Lee, J.H.	134	Dankook University, Inst Tissue Regenerat Engr ITREN, Cheonan	South Korea	27
14	Knowles, J. C.	131	Dankook University, Grad Sch, Dept Nanobiomed Sci, Cheonan,	South Korea	35
15	Tabata, Y.	130	Kyoto University, Inst Frontier Med Sci, Dept Biomat, Kyoto	Japan	31
16	Zhang, L.	128	Tianjin University, Sch Chem Engr & Technol, Tianjin,	China	22
17	Tagami, J.	127	Tokyo Med & Dent University, Dept Restorat Sci, Bunkyo Ku, Tokyo	Japan	20
18	Chang, J.	123	Chinese Academy of Science, Shanghai Inst Ceram, State Key Lab High Performance Ceram & Superfine, Shanghai,	China	26
19	Kim, S.H.	122	Korea Institute of Science & Technology, Biomed Res Inst, Ctr Theragnosis, Seoul	South Korea	29
20	Lee, Y. K.	121	Yonsei University, Dept & Res Inst Dent Biomat & Bioengn, Coll Dent, Seoul	South Korea	18
21	Ishihara, K.	119	Univ Tokyo, School of Engineering, Dept Mat Engr, Bunkyo Ku, Tokyo	Japan	31
22	Kim, H.W.	118	Dankook Univ, Inst Tissue Regenerat Engineering ITREN, Cheonan	South Korea	34
23	Bonfield, W.	115	Ato Cap Ltd, London WIT 4TP,	UK	36
24	Li, J.	114	Chinese Academy of Science, Lanzhou Inst Chem Phys, State Key Lab Solid Lubricat, Lanzhou	China	25
25	Miyazaki, T.	114	Kyushu Inst Technol, Grad Sch Life Sci & Syst Engr, Kitakyushu, Fukuoka,	Japan	20
26	Ambrosio, L.	113	CNR, Inst Composite & Biomed Mat, I-80125 Naples	Italy	27
27	Pashley, D. H.	113	Georgia Regents University, Coll Dent Med, Dept Oral Biol, Augusta, GA	USA	35
28	Tay, F. R.	112	Georgia Regents University, Coll Dent Med, Dept Oral Biol, Augusta, GA	USA	35
29	Li, H.	111	Zhejiang University, School of Med, Affiliated Hosp 2, Dept Orthoped Surg, Hangzhou, Zhejiang	China	22
30	Li, L.	111	Harbin Engineering University, Ctr Biomed Mat & Engr, Harbin	China	16
31	Langer, R.	109	MIT, Dept Chemical Engineering, Cambridge, MA	USA	47
32	Zhuo R. X.	109	Wuhan University, Dept Chem, Minist Educ, Key Lab Biomed Polymers, Wuhan	China	25
33	Okano, T.	107	Tokyo Women's Medical University, Inst Adv Biomed Engr & Sci, TWIns, Shinjuku Ku, Tokyo	Japan	35
34	Planell, J. A.	107	Inst Bioengn Catalonia IBEC, Barcelona	Spain	29

35	Wang, W.	105	Xiamen University, Fuzhou Gen Hosp, Dept Digest Dis, Fuzhou	China	23
36	Wang, Y. J.	105	Sichuan University, West China Med School, West China Hosp, State Key Lab Biotherapy, Chengdu	China	21
37	Cui, F. Z.	104	Tsinghua University, Dept Mat Sci & Engr, State Key Lab New Ceram & Fine Proc, Beijing	China	27
38	Mano J. F.	104	University of Minho, European Inst Excellence Tissue Engr & Regenerat, Dept Polymer Engr, Res Grp Biomat Biodegradables & Biomimet 3Bs, Caldas Das Taipas, Guimaraes	Portugal	27
39	Vallet-Regi, M.	104	University of Complutense Madrid, Fac Farm, Dept Quim Inorgan & Bioinorgan, Madrid	Spain	34
40	Zhang, J.	101	Shaanxi Normal University, Coll Food Engr & Nutr Sci, Xian,	China	18
41	Kim, J. H.	100	Konkuk University, Dept Anim Biotechnol, Seoul	South Korea	21
42	Vallittu, P. K.	100	University Turku, Inst Dent, Dept Biomat Sci, FIN- Turku	Finland	22

* ≥ 100 publications by the authors

4.7 Institutions' Productivity

Table 9 presents the list of 21 Institutions which have contributed at least ≥ 300 publications on Biomaterials during 1999 to 2013. The total publications count of top twenty one institutions is 9,298 (19.52%). Chinese Academy of Science, Zhejiang (China) has the highest publications (974) among the different institutions, followed by Kyoto University, Kyoto (Japan) has 654 publications, Seoul National University, Seoul (South Korea) with 614 publications, National University of Singapore, Singapore with 578 publications and Sichuan University, Sichuan (China) with 577 publications ranked second to fifth respectively. The study reveals that the institutions from China dominate among the other institutions (5 institutions) considered for the study, followed by four institutions from Japan, four institutions from USA, two institutions from Singapore, one institution from South Korea, Taiwan, Brazil and Portugal respectively appeared in the list of top twenty one institutions in the field of Biomaterials.

Table 9: Institutions Productivity

Sl. No	Name of the Institution	Country	Total Publications	Total Citations	H-index
1	Chinese Academy of Sciences, Beijing	China	974	17,150	60
2	Kyoto University, Kyoto	Japan	654	16,516	66
3	Seoul National University, Seoul	South Korea	614	14,348	57
4	National University of Singapore, Singapore	Singapore	578	25,013	79
5	Sichuan University, Sichuan	China	577	7,289	40
6	Tokyo Medical Dental University, Tokyo	Japan	521	8,744	48
7	Harvard University, Cambridge	USA	463	16,052	64
8	Zhejiang University, Zhejiang	China	463	8,841	46
9	Massachusetts Institute of Technology, Cambridge	USA	397	16,931	68
10	Nanyang Technological University, Nanyang Ave	Singapore	391	6,979	44
11	National Taiwan University, Taipei City	Taiwan	384	5,934	38
12	Shanghai Jiao Tong University, Shanghai	China	380	5,112	35

13	University of Toronto, Toronto	Canada	375	9,846	52
14	University of Washington, Washington	USA	336	10,700	56
15	University College London, London	UK	329	7,771	47
16	University of Michigan, Ann Arbor	USA	317	16,522	66
17	Hokkaido University, Hokkaido	Japan	313	6,931	43
18	Universidade De Sao Paulo, Sao Paulo	Brazil	312	4,820	36
19	Universidade Do Minho, Braga	Portugal	311	6,601	39
20	Osaka University, Osaka Prefecture	Japan	306	4,277	32
21	Wuhan University, Wuhan, Hubei	China	303	4,907	35
			9298		

* \geq 300 and above publications

4.8 Preferred Sources of Publications

The distribution of Biomaterials publications were spread over 51 sources of publications. The table10 shows top nineteen journals which have produced 1% or more than 1% of total publications during the period 1999 to 2013. The Journal, *Biomaterials* (UK) has 9923 publications and topped the list, followed by *Journal of Biomedical Materials Research Part A* (USA) with 4504 publications, *Colloids and Surfaces B Biointerfaces* (Netherlands) with 4486 publications, *Journal of Materials Science Materials In Medicine* (Netherlands) with 3554 publications and *ACTA biomaterialia* (UK) with 2821 publications topped the list and ranked second to fifth respectively. The study also reveals that among the top nineteen sources of publications, eight journals are published form UK, Five from Netharlands, Three from USA and one from Germany, Switzerland, Japan respectively in the list.

Table 10: Preferred Sources of Publications

Sl. No	Source Title	Country	Total Publications	Percentage
1	<i>Biomaterials</i>	UK	9923	20.867
2	<i>Journal of Biomedical Materials Research Part A</i>	USA	4504	9.472
3	<i>Colloids and Surfaces B Biointerfaces</i>	Netharlands	4486	9.434
4	<i>Journal of Materials Science Materials In Medicine</i>	Netharlands	3544	7.453
5	<i>ACTA Biomaterialia</i>	UK	2821	5.932
6	<i>Journal of Biomedical Materials Research Part B Applied Biomaterials</i>	USA	2479	5.213
7	<i>Dental Materials</i>	UK	2177	4.578
8	<i>Journal of Biomaterials Science Polymer Edition</i>	UK	1686	3.546
9	<i>Journal of Biomedical Materials Research</i>	USA	1641	3.451
10	<i>Materials Science Engineering C Materials For Biological Applications</i>	Netharlands	1625	3.417
11	<i>Macromolecular Bioscience</i>	Germany	1583	3.329
12	<i>Key Engineering Materials</i>	Switzerland	1509	3.173

13	<i>Dental Materials Journal</i>	Japan	1224	2.574
14	<i>Journal of the Mechanical Behavior of Biomedical Materials</i>	Netherlands	904	1.901
15	<i>Journal of Materials Chemistry B</i>	UK	717	1.508
16	<i>Biomedical Materials</i>	UK	664	1.396
17	<i>Bio Medical Materials and Engineering</i>	Netherlands	654	1.375
18	<i>Journal of Bioactive and Compatible Polymers</i>	UK	556	1.169
19	<i>Journal of Biomaterials Applications</i>	UK	529	1.112

(\geq 1% of Total Publications)

5. CONCLUSION

Among the different countries, USA topped the list with 12,025 publications and its share is 25.251 % of the total publications with the h-Index of 184 (which is highest among the countries) in the field of Biomaterials. Though the publications output of some countries are less but their ACP is high compared to that of top countries producing number of publications. The older publications received more citations than the publications published recently.

It is also revealed from the study that among the top forty two authors, fifteen authors belong to China, which is predominantly high compared to other countries. Chinese Academy of Science, Zhejiang (China) has the highest publications (974) among the different organizations, followed by Kyoto University, Kyoto (Japan) with 654 publications.

The study reveals that the Institutions from China dominate among the other institutions (5 institutions) considered for the study, followed by four institutions from Japan, three institutions from USA, two institutions from Singapore and UK respectively appeared in the list of top twenty one Institutions.

Biomaterials (UK) has 9923 publications and topped the list among the different sources, followed by *Journal of Biomedical Materials Research Part A* (USA) with 4504 publications, *Colloids and Surfaces Biointerfaces* (Netherlands) with 4486 publications ranked second to third respectively.

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ATTITUDE OF NEWGENLIB SOFTWARE USERS TOWARDS THE ADOPTION OF OPEN SOURCE INTEGRATED LIBRARY SYSTEM IN INDIA

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Abstract

Adoption of library automation software is imperative. In the changing phase of the information sector, Open Source Integrated Library System is gaining more significance across the world for various factors such as availability of source code, flexibility, cost benefit, better quality control, self-customization and community support. The present paper investigated the attitude of potential NewGenLib software users towards the adoption of OSILS in Indian scenario. The study aimed to find out the major factors that influenced the NewGenLib users in adopting OSILS among Indian library community. The study also traced the major problems related to switching over and wider adoption of OSILS for managing libraries in Indian scenario. The paper formulated the suggestions obtained from NewGenLib users to improve the adoption of OSILS in Indian libraries. The study found that, in spite of a drastic increase in the adoption rate of NewGenLib software in Indian libraries when it was declared as open source software, lack of technical support and shortage of skilled manpower to execute installation, maintenance and customization have been barricades to its extensive use.

Keywords: NewGenLib, OSILS (Open Source Integrated Library System), ILMS
(Integrated Library Management Software), India, Library Automation, Library community

INTRODUCTION

In the knowledge society, information explosion is wafting beyond the control in different forms at distinguished levels. The present libraries and information centres are not only responsible for collection and diffusion of information, but also they are to shoulder the management and retrieval of information.

Information sector with cutting edge technology has reached an extent where information professionals determine to replace the proprietary Integrated Library Management Software (ILMS) with Open Source Integrated Library System (OSILS). An OSILS is basically available for use which is downloadable along with the source code. The users are licensed to use, modify and re-characterise. The rigidity, expensiveness and lack of timely technical support in commercial ILMS have caused OSILS being more popular and flexible. OSILS serves the basic philosophy of library science which signifies the open access (Dora, 2008).

OSILS are becoming more prominent by creating revolutionary changes in the modern information sector. With an extending horizon OSILSs have created the impact on libraries and information centres (LIC) by offering customization according to their ever-changing needs. OSILS has opportunities on create, modify and distribute and redistribute basis. With the limited financial resources LICs are being accountable to cater the information needs of the users. Proprietary ILMS are going beyond the affordability of most of the Indian libraries. OSILS can definitely be a viable alternative to proprietary ILMS as they are economic, offer specialized services and easy to fix technical issues with internal IT experts (Pruett, 2013). Functionality and technical support are gaining more seriousness in managing information resources. When a library chooses to adopt OSILS, it is not only reducing the cost of automation but also to be self sufficient and independent (Muller, 2011).

OSILS

An OSILS is created and maintained by developers crossing institutional and national barriers and has collaboration with internet as a communication platform and sources of development applications. Such OSILS are typically free for use along with the source code and licensed to modify and redistribute. Intellectual property rights on OSILS belong to everyone who takes part in development, use and redistribution and not just the vendor or creator alone (Singh, 2012).

In this transition time, the library communities around the world are realizing the importance of OSILS which are equally competent and exceeding the limits set by proprietary ILMS. Commercial contracts are now available to install and provide support services for which it needed a technical expert earlier (Dorman, 2008). An OSILS product is not locked into a single vendor. Thus, a library that uses an OSILS from one vendor can always choose to seek technical help from another company or in-house experts (Sheeja, 2009). OSILS's quality of suppleness to be customized with the free source code has made it adoptable in many libraries. An OSILS can be restructured according to the need of any library that uses it.

OSILS MOVEMENT IN INDIAN LIBRARIES

Being a developed country, India has made remarkable contributions to the world of science and technology in international level. The importance of OSILS is slowly coming into realization among Indian library communities. Koha, an OSILS, has been adopted by many Indian libraries including Delhi Public Library, South Asian University Library (SAU Library), Mysore University Library (Koha), Mahatma Gandhi University, Kerala, Indian Institute of Space Science and Technology, Kerala; IISER Mohali, IISER Bhopal, IIT Mandi, IIM Ahmedabad. Kerala government has declared Koha to be a recognized OSILS which is considered for the automation of all government libraries in Kerala and this is a milestone in the history of OSILS in India.

NewGenLib has been in use in various libraries across the country. Bangalore University Library, Karnataka, Central Institute of Plastics Engineering & Technology, Chennai, Indira Gandhi Delhi Technical University for Women (IGDTUW) Library, NewDelhi, Osmania University, Hyderabad, IIT Jodhpur, Karnataka State Open University, Karnataka, University College of Arts Library, Tumkur University, Karnataka, Central Library of Sree Chaitanya Institute of Technological Sciences, Hyderabad, SDMIMD Library, Mysore, Maulana Azad National Urdu University, Hyderabad, TKR College of Engineering & Technology, Hyderabad and Archaeological Survey of India (ASI) Hyderabad are the few libraries where NewGenLib has successfully been implemented. The response to NewGenLib is comparatively fair enough in India. It is true that the developer has instituted several initiatives like the NewGenLib adoption program, offering free data conversion, maintaining a dedicated OSS team for providing quick responses to user queries, but all the developmental work is done only by the original developer (i.e. Verus Solutions Private Limited), and there are hardly any external developers for NewGenLib. Indian libraries are adopting NewGenLib, but we lack in contributing to the code base of the OSS, as most libraries hardly have any dedicated IT experts (Giri, 2012).

ABCD, an OSILS, is getting introduced in Indian libraries. It is basically an OSILS that provides automation functions for conventional libraries as well as documentation centres. ABCD is developed by (BIREME WHO, Brazil) in association with the Flemish Interuniversity Council, Belgium. It is a multilingual OSILS based on CDS/ISIS database technology. Presently ABCD is successfully being used by Modern College of Arts, Science and Commerce, Ganeshkhind, Pune and Centre for South Indian Studies Library (CSIS) Thiruvananthapuram (ABCD).

Evergreen is another OSILS which was developed by Georgia Public Library System in the year of 2006. Adopting the Z39.50 standard, Evergreen offers applications to cover most of the library activities. It is more in use in USA and Canada. In India, Indian Institute of Science Education and Research Library, Thiruvananthapuram has adopted Evergreen for its library functions (Evergreen).

REVIEW OF LITERATURE

The literature reflects the use of OSILS to have been increasing in the recent years. The tendency of adoption of OSILS is becoming prominent in all kinds of libraries. Kiriyananth (2012) examined through a survey on adoption of OSILS in Thai University libraries in Bangkok and Pathumthani to realize that 69% of the libraries had awareness of OSILS and 59% respondents chose to adopt OSILS. The result of the survey confirms that library communities in Thai universities are moving towards adopting OSILS. A study showed the instantaneous change through a shift from proprietary software's to OSILS and recorded the facts which made libraries switch over to OSILS. It examined the various OSILS in terms of their technical requirements and functionality (Salve, 2012). Financial crisis had been the main hindrance why small scale libraries had not adopted a commercial ILMS. Such libraries are setting up for OSILS which considerably can reduce the cost. OSILS provides technological freedom to the libraries and also help the library professionals to provide services at lost cost or free of cost (Kamble, 2012). The ability to be tailored with new applications by retaining the old hardware and almost nil cost on the purchase are the main feature of OSILS (Kandar, 2011). As Payne reported the existing presence of OSILS in the libraries, it is noticeable that libraries had a great deal of interest in adopting OSILS which are cost effective and also showed their willingness to be involved in the development and diffusion process of OSILS(Payne, 2010).

The implementation of OSILS could be decided considering the parent institution's IT infrastructure and motivation. A study of attitudes in UK higher education institution libraries showed the unwillingness of libraries being more conservative (Dalling, 213). Espiau-Bechetoille et al (2011) conducted a study of three universities that switched over to an OSILS. It was a process to increase inter-university cooperation where the OSILS was installed, tested and carrying out the modifications in the modules on a mutual consensus. Kumar and Reddy (2013) examined different OSILS and evaluate their features and functionalities to derive the best OSILS. The study also observed that in the recent years OSILS are gaining more importance due to their features and benefits. Biswas et al (2008) conducted a study to assess the features and functionalities of NewGenLib at the beginning point of time. This study also compares NewGenLib with other softwares like Koha, SLIM++, Libsys, Easylib and reveals that NewGenLib with little modification can be a very efficient OSILS with more advanced features of its time. Singh (2011) conducted a comparative study between Koha and NewGenLib to find NewGenLib had better functionality of modules than Koha. It has essential components for digital library functionalities in terms of technology, data structure and programming. NewGenLib offers more enhanced features which are significant for OSILS.

OBJECTIVES

The basic objective of the present study is to assess the attitude of NewGenLib users towards the adoption of OSILS in libraries. Following are the main objectives of the study.

- (a) To investigate the attitude of potential NewGenLib software users towards the adoption of OSILS in Indian libraries
- (b) To identify the major issues associated with the wider adoption of OSILS in Indian libraries
- (c) To find out the major factors which made NewGenLib software users to consider OSILS
- (d) To obtain suggestions from NewGenLib users to improve the adoption of OSILS in Indian libraries.

METHODOLOGY

Online survey was conducted in Google by using a structured questionnaire to collect data from the libraries using NewGenLib Software in India as their integrated library system. Questionnaires were used to comprehend the attitude of NewGenLib users towards adoption of OSILS in India. Importance was given to bring in all possible aspects of NewGenLib in preparation of the questionnaire. The questionnaires were sent to various libraries using NewGenLib through personal email and the investigator received response from Thirty Six libraries including university, college, school, special and research libraries. Analysis was carried out to identify the factors persuading the NewGenLib users to prefer OSILS.

LIMITATION

The study is limited to the users of NewGenLib in India. Irrespective of the kind of libraries such as academic/research/school libraries, the study intends to cover each library that uses NewGenLib for its functions. The questionnaire has been designed for professionals namely Librarians, Assistant Librarians and Library Assistants to gather their perseverance of OSILS. The study signifies the merits and demerits of OSILS considering only NewGenLib users experience and opinions.

ANALYSIS AND FINDINGS

NewGenLib

NewGenLib, the first Indian OSILS has been in use for about a decade in Indian libraries. It offers all possible services according to the needs of any given library ranging from a school library to a university library.

NewGenLib is developed by Verus Solutions Pvt. Ltd. (VSPL) on the domain expertise provided by Kesavan Institute of Information and Knowledge Management, Hyderabad, India. The latest version of the software is 3.0.4 R1 which was released in the year of 2012 (Wiki). NewGenLib has gone through enormous changes along the time since its initial version 1.0 was released in 2005. In January 2008 NewGenLib was declared to be an OSILS

under GNU/GPL and it is clear from the graph that there was a shoot up in the adoption rate of the software from that point in time (Fig.1).

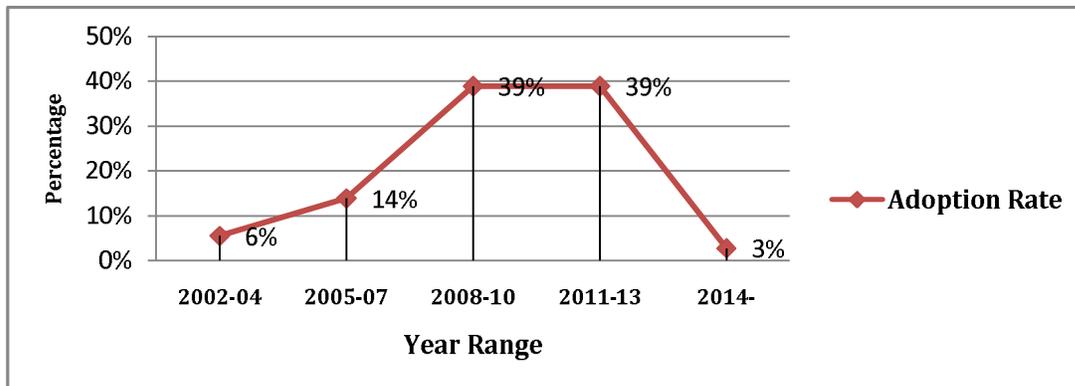


Figure 1. Usage of NewGenLib in India

VSPL has been offering technical services and training for the libraries opting NewGenLib. The company also offers commercial support when the library needs a dedicated channel (NewGenLib). Conducting workshops and seminars among the NewGenLib users have greatly been helping the professionals to upgrade their knowledge with the latest updates.

Response Rate and Library Collection

The questionnaire was sent to diversified libraries across the nation and 36 libraries responded to the questionnaire. It is observed from the survey that maximum library professionals (94%) supported the adoption of OSILS which is an evidence of awareness spreading over the Indian library community (Fig.2).

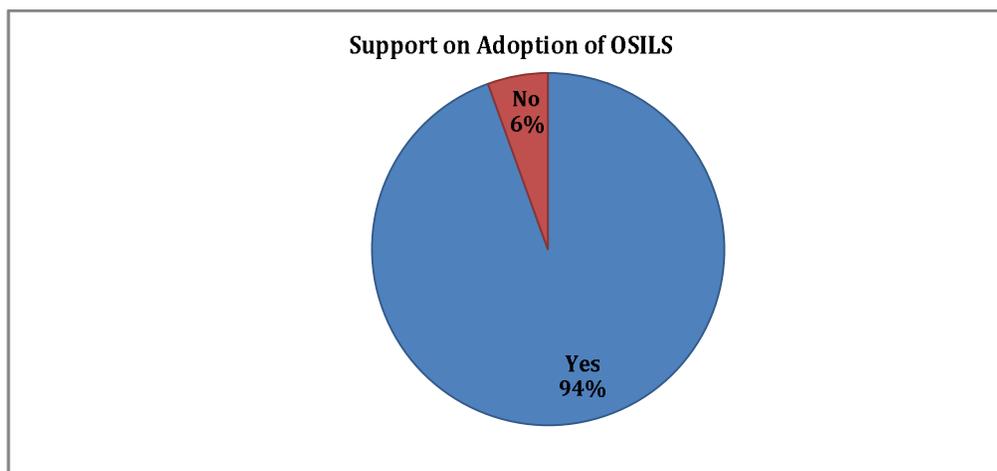


Figure 2. Support on Adoption of OSILS

Among the libraries responded, there were 55.56% college libraries and 30.56% university libraries. The rate of special or research libraries was 11.11% and school libraries being 2.78% to be at the lower end (Fig.3). The responded libraries were divided into three groups according to their size of collection and they were 1-49999 (72%), 50000-99999 (17%) and 100000-499999 (11%). This denotes that libraries ranging from low to high collections have adopted NewGenLib for the functions.

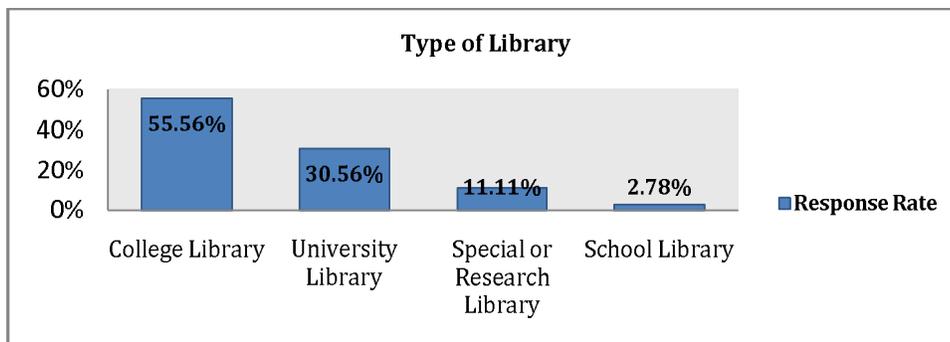


Figure 3. Response Rate from NewGenLib Users

Respondents

The respondents were divided into four different age groups such as 21-30 years, 31-40 years, 41-50 years and above 51 years and they have a response rate of 10%, 35%, 55 % and 3% respectively. The people age group of 31-40 showed better interest in responding comparing with the other three. In the segment, where library staffs were divided such as Professionals, Paraprofessionals/Semi Professionals and Non-Professionals, it is learned that 29 libraries of out of 36 libraries have 1-4 professionals and 20 libraries manage their functions with 1-4 Para/Semi professionals. It is observed that only two libraries having more than 12 non-professionals staff or supporting staff (Table 1).

Table 1. Staffing pattern

No of Staff /Category	Professionals	Para Professionals/ Semi Professionals	Non-Professionals/ Supporting Staff
1-4	29	20	29
5-8	4	5	3
9-12	0	0	2
13-16	1	1	1
17-20	1	8	0
21 and Above	0	0	1
Nil	1	2	0

Implementation of NewGenLib

Implementing an OSILS indirectly creates opportunities for library professionals and in-house technical personnel to explore and contribute to the development process. In the survey it is observed that, 58% of the libraries managing to self install NewGenLib in their libraries. Seeking help for installation from the OAs (19%), PC (6%), OT (8%), LCDM (3%), LC (3%) and OM (3%) is comparatively less. This undoubtedly shows the enhanced self sufficiency among the library community. In areas which require technical knowledge like Configuration (44%), Hosting (64%), Maintenance (61%), Adding new features (34%) and Customization (33%) libraries are managing by themselves to a noticeable extent. Libraries depend on PC for Migration of Data (22%), Configuration (18%), Hosting (16%), Maintenance (11%), Customization (17%) and Bug Fixing (32%). The rates of libraries come down in LCDM, LC and OM for approaching for professional help in the implementation of NewGenLib. 64% of libraries train their staffs for the software by themselves where as 14% libraries rely on OA for training. 7% of libraries are getting help from the community for training. For Bug fixing, 14% of the libraries finding ways to resolve issues themselves and OA, PC, OT, LCDM, LC and OM are helping out the libraries at the rate of 32%, 31%, 11%, 6%, 3% and 3% orderly (Table 2).

Table 2. Mode of Implementation and sources of Technical Support

Functions/Mode of Implementation	Self (%)	Outsourcing Agencies (%)	Through Professional friends/Community (%)	Through online Tutorials (%)	Through Live CD/DVD Course Materials (%)	Through library Consortium (%)	Other Methods (%)
		OA	PC	OT	LCDM	LC	OM
Installation	58	19%	6	8	3	3	3
Migration of data	25	28%	22	8	6	3	8
Configuration	44	23%	18	6	3	3	3
Training of staff	64	14%	7	6	6	0	3
Hosting	64	11%	16	6	3	0	0
Maintenance	61	14%	11	11	0	0	3
Adding new features	34	22%	19	14	11	0	0
Customization	33	25%	17	19	3	3	0
Bug fixing	14	32%	31	11	6	3	3

Issues Associated with the Wider Adoption of OSILS in Indian Libraries

Though OSILSs are cost effective solution to compete with its commercial counter parts many concerns which foreclose the library professionals to adopt it. Lack of confidence, knowledge and proficiency in the application of OSILS and lack of taking initiatives and attaining self-reliance are the common reasons among professionals for continue with their legacy proprietary systems.

Respondents were asked to indicate the major issues associated with the wider adoption of OSILS in Indian libraries. The major problems fingered by NewGenLib users are lack of technical support (13%) and lack technical knowledge required in installing and maintaining (12%). An equal number of professionals (10%) feel that shortage of skilled staff to install and maintain the software and inadequate promotional activities are the other two major issues associated with wider adoption of OSILS. Lack of vendor support, issue of reliability/longevity and data security issues are being blockades at the same level (8%). Lack of software support (7%), Lack of community support (6%) incompatible organizational policies (5%) and lack of high quality documentation (5%) are hindering the usage of OSILS. A few respondents (4%) observed that issues of functional features and availability of commercial softwares are contributing to the reduced rate of OSILS adoption in Indian libraries (Fig.4).

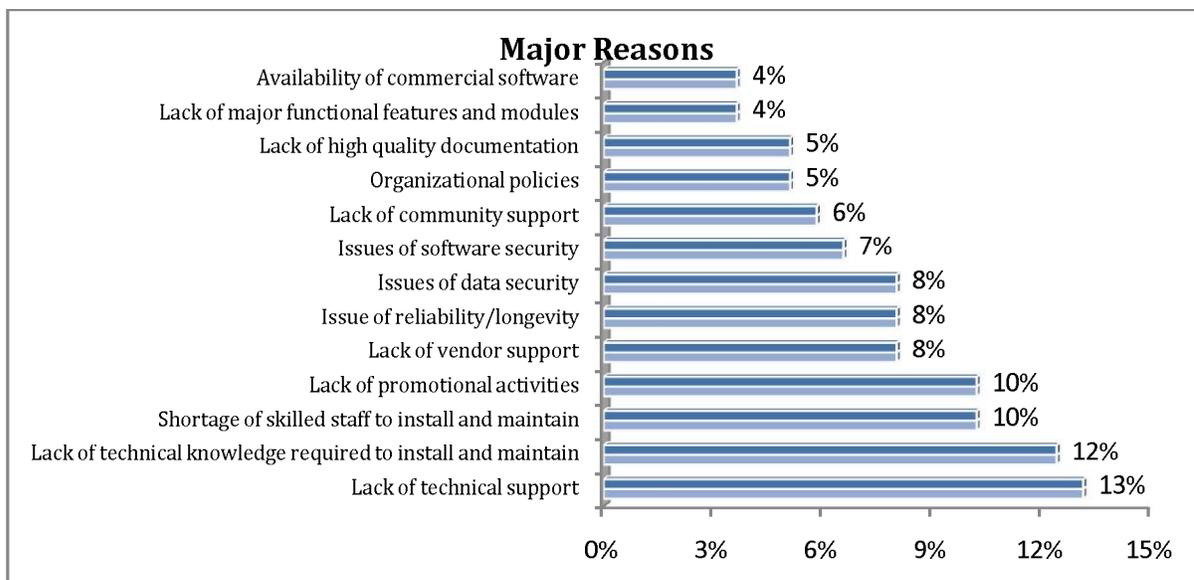


Figure 4: Issues in adoption of OSILS

Factors Influencing NewGenLib Users to Prefer OSILS

The ever-changing needs of libraries always compel to adopt the system that is flexible for constant modification. 13% of the libraries feel customization is one of the main reasons to

adopt NewGenLib. 12% libraries prefer NewGenLib to escape vendor lock-in, shorten the software costs and to avoid licensing fee. Easy installation and maintenance (11%) and wider adaption in the recent years (10%) as well availability of quality documentations (9%) have been other major reasons for having opted NewGenLib. Uncertainty of commercial service provision (5%) and concerns of receiving timely support from the proprietary provider (5%) have caused OSILS become more prominent (Table 3).

Table 3. Reasons for adopting NewGenLib

Sl No.	Reasons for adopting NewGenLib	Responses	Response Rate
1	Its ability to customize to fit the library's needs	23	13%
2	To cut short the costs	21	12%
3	Freedom from maintenance and licensing fee	21	12%
4	Freedom from vendor Lock-in	21	12%
5	Easy to install, maintain and modify	20	11%
6	Its wider adoption/support/online community	17	10%
7	Availability of quality documentations	16	9%
8	Availability of source code	13	7%
9	Uncertainty due to merges and outside ownership of proprietary software ILS	9	5%
10	Concerns about the suppliers of proprietary	9	5%
11	To become part of the consortium	6	3%

Justification of Respondents on why OSILS is being the Best

Respondents were asked to indicate their perspectives on the best things about OSILS. Summary of the comments says OSILS:

- is highly economical and give more opportunities to library professional in enhancing their technical skills
- provides a sense of control and reduces dependency on the vendor considerably
- is cost effective solution for any type of libraries as the initial cost for purchasing an OSILS is almost nil
- facilitates to gain adequate knowledge of various essential modules in library software
- gives opportunity to collaborate for customization
- makes library community innovative and more active

- provides good support, both technical and non-technical through online community
- comes with source code and is flexible for customization as per the library requirements
- minimizes the technical inequalities
- is a combination of the qualities of Interchangeability, Interoperability, Customization, Consistency and Integrity
- Allows retaining local variation at users' convenience.
- is more reliable as every step of installation and maintenance involves the library staff who actually carry out the work
- facilitates to obtain timely technical support through in-house experts or devoted companies that offer services
- makes it possible to carry on with the existing IT infrastructure thereby withstands the obsolescence of technology
- makes it easy for the evaluation as it is always available for trial
- helps to achieve better quality control effectively and efficiently
- brings reduction in maintenance cost to a great extent since an in-house IT expert can monitor the functions.
- sets free the libraries from the risk of ceased services
- uses open standards and freely available supporting applications which gives the users independence to modify with lower cost or even switch over easily

Justification of Respondents on why no to Choose OSILS

Respondents indicated their perspectives on the negative aspects of OSILS and the highlights are;

- Lack of technical support in installation, troubleshooting and data migration
- Lack of support from the vendor or the community if the software crashes
- Lack of technical knowledge required to maintain and update the software
- Lack of manpower to handle the system
- Difficulties in debugging and keeping backups
- Difficulties in keeping track of software developments and their upgradations
- Lack of knowledge in supporting LIS professionals
- Difficulties in maintaining both the software and the database
- Lack of publicity
- More responsibility
- If the OSILS is coded in a complex computer language, it definitely requires technical support, which may finally result in the expenditure for services alike in commercial software
- When the community size of the adopted OSILS is small, it is hard to get help when stuck with a problem

- It makes the implementation difficult with the limited organizational support with respect to high speed Internet connectivity, memory storage devices and hardware peripherals, etc.

Suggestions to Improve the Adoption of OSILS in Indian Libraries

- Educational institutions and universities should conduct workshops frequently to train and make LIS professionals aware of OSILS
- Simplified documentation and training are required for customization and data migration
- Library professionals must nurture the technical skills along with the computer knowledge to make the professionals self sufficient
- Software development team should take the feedback and suggestion from working Librarians while designing every module
- It is better to integrate repository, automation and learning management system in a single OSILS
- Software installation and backup process should be made easy
- Partnering with user libraries to continuously develop standard customizations is a need which also helps in cost reduction and avoids repetition of work
- Good technical documentation must be provided
- OSILS has to form a council/consortium to monitor quality control and share updates among the member libraries
- Technical/Cloud support is needed
- OSILS should be made more user friendly and simple

CONCLUSION

Open source software is continuing to gain momentum among the library community across the world. Adoption and use of OSILS have changed the landscape of library automation process. The paradigm shift of large-scale libraries from commercial ILMS to OSILS is signifying the booming progress of open source movement. Indian library professionals are interested to adopt OSILS for their libraries because of its tremendous advantages in managing information and introducing innovative services with minimal cost. OSILS comes into focus as an alternative tool for libraries to automate their libraries in a cost effective manner, where libraries experience dissatisfaction with their legacy proprietary system due to poor support from the vendors, expensive maintenance charges, customization inefficiency, and inflexibility.

Lack of technical knowledge and support, shortage of skilled staff and lack of promotional activities are some of the major issues encountered in OSILS adoption by NewGenLib users in India. Libraries having staff with the necessary skills and experience to implement and customize the software can be highly benefitted with its vast potential. Use of OSILS is to be

promoted as they pave the way for collaborative research and this can be achieved with the confluence of professionals.

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E-MARKETING OF LIBRARY SERVICES BEST PRACTICES IN LIBRARIES

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Abstract

The paper defines the concept and describes the strategy for application of best practices in Academic libraries in digital era. It discusses importance of introducing best practices in a modern library and information centre to enable it to improve its processes and activities, optimize resource utilization, and deliver high quality, value added services to its users. NAAC in India to develop best practices / guidelines for different types of libraries and /or for specific services. The process that are adopted in the academic libraries will be a continuous improvement and overall performance in the institution / organization.

Keywords: Best practices. Academic Libraries, Digital services, NAAC.

1. INTRODUCTION

The recent developments in the field of information, communication and technology have also changed the expectations of the users in many ways. Hence, there is a greater responsibility on the academic library personnel to identify and adopt best and effective practices to meet the demands if end-users. UGC-NAAC defines best practices as an application of procedures to yield superior results which means way of doing things in particular organization as guidelines for good practices. The use of ICT with creative / innovative ideas leads to evolve best practices in library and information environment which can be replicated in library and information centres.

2. ROLE OF THE ACADEMIC LIBRARIES

The role of the library and information centre in a college is aimed at realizing the educational goals of the college or the parent organization. The college libraries not only provides stimulus to reading by procuring materials for study and research, by introducing open access system, by providing long hours of open, by organizing the library resources in a systematic way, but also feeds the intellect of the student, encourage the researches of the faculty and thus serve the teaching and research needs of the faculty.

The college library and information resource centre acts as a vehicle for disseminating information and the related computer technologies through the best practices for utilization by its community of users and also for the exchange of information among its users.

2.1 CHALLENGES FACED BY ACADEMIC LIBRARIES

- Impact of ICT on Libraries.
- Explosive growth of information and documents
- Increased cost of the documents and information materials
- Increase in users information needs
- New role of the librarian and greater responsibilities.
- Latest techniques and concepts in handling of information.
- New electronic information environment.
- Creation of databases and its security.
- Marketing of library and information services.

The library and information centre of an institution play a central role in facilitating dissemination and creation of new knowledge.

3. DEFINITION OF BEST PRACTICES

- a) *Oxford Advanced Learners Dictionary* describes 'best practices as quality of high standard, excellence, highly improved, outstanding, par excellence service. It means way of doing something that is usual or expected way in a particular organization or situation, guidelines for good practices. In this process of developing best practices we take action rather than good ideas, and we improve our skills.'
- b) **Best Practices:** add commendable value to an institution. Considered as reliable benchmarks or standards of quality. Tools for the continuous improvement of products, processes and services. Leads to development of an understanding of the fundamentals that lead to success.

3.1 Strategy for Application of Best Practices The successful application of the best practices can be achieved by adopting the following five-stage strategy (7) : Identification of best practices

- Implementation of best practices
- Institutionalization of best practices
- Internalization of best practices
- Dissemination of best practices

3.2 National Accreditation and Assessment Council (NAAC) and Best Practices

University Grants Commission created a higher education body (whose job is to assess the quality of university and college institutions) in 1994 in Bangalore on the recommendation of National Policy of Education (NPE) in 1986. This is National Accreditation and Assessment Council (NAAC) which strives for quality and excellence in higher education and advocates for enhancing the role of library and Information Services in improving academic environment. Document prepared by NAAC for “Best Practices in Academic Libraries says : “Best practice may be innovative and be a philosophy, policy, strategy, program, process or practice that solves a problem or create new opportunities and positively impact on organizations. “NAAC developed a set of best practices followed in academic libraries and presented under the following four broad areas:

1. Management and Administration of Library.
2. Collection and Services.
3. Extent of User Services.
4. Use of Technology.

4. E-marketing of library services

4.1 User Empowerment, Library Marketing and promoting library services

- a. **Extended Hours of Service:** Extended library opening hours helps the users, especially students during examination time to utilize the services optimally and thereby fulfil the first law of library science i.e documents are for use.
- b. **E- Library Statistics:** This practice involves maintenance of usage statistics in all sections of the library. Maintenance of visitors’ login in the system and purpose of visit helps in knowing how many users are visiting and for what purpose.
- c. **Library Tour:** Take a Library Tour a ll the new entrants are taken to the library tour in small groups to physically show them the library resources, how to access these resources and various other services that they can avail during their studies. Live demonstration of e-resource is one of the important components of the tour.
- d. **Virtual library tour:** A simple tour will also expose you to the different forms and locations of library resources, such as help desks, shelves for current periodicals, reference shelves, and stacks for less recent resources.
- e. **Orientation Programmes:** Librarian should organize intensive programmes for orientation of new students in the beginning of the academic year. Institute librarian is a regular invitee to address the new entrants and explains them the important role a library

plays in higher education An audio-visual presentation is made to introduce them to the facilities, rules, resources (print and electronic), and services of the library.

- f. **Educating the User/ E-resources awareness programme:** The academic libraries have a great role and responsibility in creating awareness among its users which will help to make use of the library resources, facilities, services, more effectively and efficiently. Through 1 User orientation which may be individual or groups, Kulkarni (2009). Library Brochures, circulars, Pamphlets and handouts.
- g. **Intellectual property rights/ Copy right / Plagiarism:** Conduct information literacy programme to create awareness on IPR, copyright and plagiarism how to use sources, quote references, benefit of the author, plagiarism software's, plagiarism policies/guidelines/penalties for the users to reduce the plagiarism is very important in the digital era.

4.2 Internet/Local Area Network/ WiFi Facility in the Campus

The goal of this practice is to network the information resources of the library with the entire academic and research activities on the university / college campus and to evolve a user friendly environment by using the information and communication technology tools to provide quality and quick retrieval of the information sources along with resources available in other libraries at their desktops.

4.21. Web based– Digital Library Services

Library has computerized all its operations and activities are meant for users to access OPAC, databases, e-books, e-journals and other e-resources. Multimedia products, Daily News papers etc. This is the human interface between library and its users. A service that connects users with the library and helps them to make full use of the resources. It includes guidance in the use of information resources and services, help in locating required documents, instructions for accessing on line library resource

- a. **Automation of Library Services:** The goal of this practice is to automate all the housekeeping operations viz. acquisition of books and other material, creating maintenance of its catalogued database, circulation of its holdings etc, to give service more quickly, efficiently and effectively and thereby meet the fourth law of library science i.e save the time of the user. Online Public Access Catalogue (OPAC) facilitates the users to search for information by author, subject, title, ISBN, keywords etc and helps to reserve item on loan, view special collections, cancel reservations, request renewal of loan, to see list of new arrivals, request addition of new publication, define SDI profile.
- b. **Library Portal:** The Library Portal is a gateway to its resources and services. The purpose of an information gateway of this type is to help users discover high quality, relevant web-based information quickly and effectively. The portal besides providing information about the staff, collection and services, allows access to the OPAC, and provides direct link to e-resources on publishers' site. User interaction is encouraged

- through a number of e-mail links. Website performs the role of an effective help desk and promotional tool for libraries. As practiced in many college libraries abroad, audio tours of libraries, detailed maps and brochures serves as a great help for libraries. A user friendly environment should make the users more confident and efficient library users without requiring help from the library staff.
- c. **Institutional Archive/ Digitization of Manuscripts:** Library should set up an archive of publications brought out by the faculty and the institute, using open source software, The archive, accessible initially on the Intranet facilitates on-line submission of the publications by the authors permissible within the copyright regulations. The archive will become a full-text database of all publications produced by the Library. The goal of this practice is to preserve and conserve rare documents and archaic material for progeny. All the old and rare documents are digitized and stored for future access by the potential users.
 - d. **Links to e-Resources subscribed/ open access resources:** E-Resources are available 24x7, allow multiple concurrent users, are more current than their print counterparts, support distance education, reach to remote and under-served areas and have no constraint of time and location besides saving library space. These sources can be searched, browsed and interlinked with other publications and databases, downloaded and saved.
 - e. **Subject gateway portal:** Is the very important tool for users to access information. so provides links to subject gateways through the library portal.
 - f. **Web-OPAC:** The collection of the library can be accessed through on line catalogue – Web OPAC. It allows simple, and complex, multi-field search (using Boolean logic) options. The search results are displayed with minimal information. The selected item can be displayed in full format. The output also gives information whether a particular document is already loaned to any member and the scheduled date of its return. The interest members can make reservation /claim to borrow on return of such documents.
 - g. **E-Question paper services :**upload the old question papers in database or in digital repositories.
 - h. **e-News paper / Web based Press clippings:** Clippings related to organisation, education, any information relevant to the users can give the links archives to e-news papers website or provide hyper text link to scanned clippings daily, compile month wise / year wise news clippings subject wise and preserve in a digital format for future reference.
 - i. **Information Alert Services:** The library offers a number of current awareness services to inform and alert its users. A weekly/fortnightly list of recent additions of books, pamphlets, reports, standards, annual reports and faculty publications added to the collection is put on the library website. It displays important information of interest appearing in journals, newspapers, newsletters and other sources. The library also displays announcements of forthcoming conferences and international events, and list of articles of general interest scanned from the current issues of journals received.

- j. **Electronic document delivery services:** through fax machine for immediate delivery of photo copies of articles via telephone lines.
- k. **Virtual Reference Desk/Ask your Librarian:** All our users as well as others can ask any question related to the library using the link “Ask your Librarian” through the website. This link serves as a virtual reference desk. Website offering facilities like “Ask a Librarian”, provision of bibliographies, new additions, maps of collection and online catalogues solve lots of users’ queries from their homes.
- l. **Web-based Instructions, FAQs,The** library uses its website optimally to provide appropriate instructions so that users are able to use various resources and services effectively. A link to FAQs attempts to answer general queries that users normally ask.
- m. **e-Feed back /e-Suggestions :** Provision has made in the website to get the online feedback /suggestions from the user and take initiative to fulfil the need of the library user.
- n. **E-news letter:** Publish the library e-news letter and provide link to library website. Or send through e-mail.
- o. **Training Seminars and Workshops:** The library organizes training sessions and workshops for the users whenever a new product database or service is introduced. These programmes include presentations, demonstrations and exhibitions, and are organized at the institute level as well as at the department level depending upon the relevance and need.
- p. **Online /eTOC services:** Links provided in the library websites.
- q. **Discussion forum/Groups:** Join the discussion forum on the internet to meet people around the world with similar interest, ask questions, and discuss the problems faced by you.
- r. **Vendors’ Participation:** One of the important methods of user awareness is active involvement of the publishers and vendors. It is different from vendors selling their products. They regularly visit the institute to interact with library staff and the users to update them with new developments and/or features added to their product. Publishers or their representatives are also invited to give a detailed presentation about that resource followed by a live demonstration. Many publishers/vendors request the library to let them conduct training sessions to update users.
- s. **E-Book displays:** use e books display rack to display the books purchased for the Library can be arranged on the e- display rack.
- t. **Social media:** Social media is key to 21st century communication with library users, and enables the academic library to promote library resources and services. Use blogs, facebook, twitter, YouTube, slide share. LinkedIn, RSS feed used to share information, photos related to library events.
- u. **Career information services:** CIS can be provide through social networking sites. Implementing a social media policy will streamline responsibility for the management of various platforms and provide guidelines for posts and interactions online with library patrons and the public.

- v. **E-mail:** Use e-mail tool to communicate or to provide library services to the library user. The library makes good use of all these list services to communicate with the users particularly when a new e-resource is introduced or a service is launched. These services are also useful for informing or inviting users to a seminar or a demonstration organized by the library. It is an extremely important medium to market library resources and services.
- w. **Other important Best Practices RFID & CCTV Implementation:** (for Security Purpose) Career/Employment Information/ Services. (with USEFI)

4.3 Mobile based Library services

- **Mobile online public access catalogs (OPACs):** Libraries are providing access to their OPACs via mobile-optimized websites.
- **Mobile applications**—Some libraries have developed mobile applications for smart phones. OPAC and the ability to place items on hold, and also provide information on hours and locations of local libraries.
- **Mobile collections**—Third-party content providers are partnering with libraries to deliver audio books, e-books, audio language courses, streaming music, films, images, and other multimedia that can be used on mobile devices. The Overdrive service is supported on numerous mobile devices and has developed an application for BlackBerry smart phones (see <http://www.overdrive.com>).
- **Mobile library instruction**—Some libraries are offering library instructional materials and resources
- **Library Short Message Service (SMS) notifications**—Many libraries use SMS for a variety of purposes, including notification for items available for pickup, due date reminders, information on availability of library materials, provision of call numbers and locations, and
- **SMS Reference**—Some libraries are offering “text-a-librarian” services which is ideal for simple questions that can be answered with a brief response.

CONCLUSION: implementing the best practices is the responsibility of the librarian for the benefit of the user. Use of technology in designing and delivering the information products and services in a library has always yielded good results. Librarian should create an environment and conditions for keeping abreast of the new and latest knowledge and uses of modern technological achievements in the field so that the knowledge from the source to its beneficiaries or users can be disseminated in a most efficient and effective way through the adoption of the best practices.

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INFORMATION & KNOWLEDGE SHARING THROUGH INSTITUTIONAL REPOSITORY: AN OVERVIEW OF EPRINTS@IISC

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Abstract

This study describes, major objectives of Institutional Repositories and its relevance in the present context and in particular, the study is mainly focused on Indian Institute of Science Institutional Repository specifically in its Objectives, Hardware and Software used for repository, Type of Collection, Age of Collection, Division-wise contribution of collection and Position of eprints@IISc in terms of Collection.

Keywords: IISc@e-prints; Digital Library; Institutional Repository; Knowledge Management

1. Introduction

The development of web technology has brought enormous opportunity to bring the results of research primarily to all through digital communication – anyone, anywhere and anytime. In the recent years a large amount discussions and initiatives are taken in the area of open access. Open Access is a compendium of many scholarly literature are freely accessible now without any hindrance and endeavors to reduce barriers to scholarly communication. Open access literatures are available in open access journals, institutional repositories, subject repositories, digital archives and so on. Open access facilitates availability and distribution of scholarly communication freely, as a means to solve the problem of inaccessibility primarily due to financial constraint specifically in Developing Countries. (S. B. Ghosh and Anup Kumar)

Institutional repository (IR) has emerged as a means of storing digital contents produced by research organizations, universities etc. This new technology offers the Nobel laureates and researchers to deposit their work, which facilitates the target audience to access the research publications via digital form. (Ramesh Kuri-2014) The essence of IR is to make research and

development publications to be freely available on the internet. It is stated that most of the institutes adopt the open source IR software's for creating/developing their own repositories. The type of documents may deposited in Institutional Repository are theses, dissertations, conference papers, journal articles, reports, patents, etc. There is no doubt Institutional Repositories can serve as an engine for institutions of higher education, and more broadly for the scholarly enterprises that supports research activities. (N. Ashok Kumar)

Institutional Repositories are coming up with the so many objectives based on the institution, but majority of the Institutional Repositories are mainly concern with following objectives such as i) global visibility for an institution's scholarship ii) collect content in a single location iii) open access iv) institutional research output by self-archiving and v) store and preserve institutional digital assets, including unpublished or otherwise easily lost ("grey") literature (e.g., theses or technical reports) etc.

The building of an Institutional Repository for any organization is needed in the present scenario of digital world because of the certain changes such as Technology, Increase in the overall volume of research, Increasing need of archival and access to unpublished information bearing objects, Increasing demand to access knowledge objects from anywhere at any time, Increase uncertainty over who will handle the preservation archiving of digital scholarly research materials. (Kanchan Kamila-2009)

In India ePrints@IISc is a very fastest growing Repository compare to other institutional repositories. ePrints@IISc collects, preserves and disseminates in digital format the research output created by the IISc research community. It enables the Institute community to deposit their preprints, postprints and other scholarly publications using a web interface, and organizes these publications for easy retrieval and sharing.

2. Objectives:

The objectives of the study are as follows;

1. To know the growth and development of Institutional Repositories in India;
2. To overview the diverse documentary forms in ePrints@IISc;
3. To know the division-wise contribution of documents;
4. To identify the age of documents deposited;
5. To identify the action oriented divisions in depositing intellectual works; and
6. To ascertain the position of ePrints@IISc by comparing study.

3. Methodology:

The study adopts case study method through which a review of literature of articles on IR published till date is scanned to gain the information of IR in India. The Institutional Repository and ePrints@IISc Institutional Repository website (<http://www.eprints.iisc.ernet.in>) is used as primary source for the case study on certain

parameters, such as number of documents, hardware and software used, growth of collection, domain wise distribution of contents, usage and retrieval pattern etc. to meet the objectives.

4. Development of Institutional Repositories (IR)

A large number of IRs have been established worldwide, more than 3585 repositories have been registered with Registry of Open Access Repository (ROAR) as maintained by Open Archive Initiative's web site. (<http://roar.eprints.org/>) as well as by Open Directory of Open Access Registry Open Directory (OPenDOAR). In India Libraries and information centers have attached to various types of institutions are now taking part in open access movement, by establishing institutional repositories, digital repositories to provide worldwide access to their research documents. Institutional repositories from India as registered with ROAR. Existing IRs in India- there are 89 IRs registered with ROAR, OpenDOAR and also through Internet. (ROAR)

Research and development (R&D) institutions and higher learning institutions in India such as Indian Institute of Science (IISc), Indian Institutes of Technology (IITs), Indian Statistical Institute (ISI), institutions under the Council of Scientific and Industrial Research (CSIR) and Indian Council of Medical Research (ICMR) are engaged in depositing their intellectual work in the institutional repository. Leading Indian scientific research institutions, now Indian Institute of Science is one institute having more than 36794 documents in its repository.

5. ePrints@IISc

The Indian Institute of Science (IISc) was established in 1909 since then, it has grown into a premier institution of research and advanced instruction, with more than 2,000 active researchers working in almost all frontier areas of science and technology. Every year it produces many intellectual works it may be journal articles, reports, thesis and dissertations, patents, standards etc. In 2004, to collect and disseminate all the intellectual work the Indian Institute of Science took step in setting up of Institutional Repository and that has come with the name of "eprints@IISc".

Dr T.B. Rajashekar was the team leader in setting up the ePrints@IISc repository, His immense knowledge in the areas of Library and Information Science, and in the emerging field of digital library, was effectively put to use in some of the innovative and unique features of ePrints@IISc. ePrints@IISc repository collects preserves and disseminates in digital format the research output created by the IISc research community. It enables the Institute community to deposit their preprints, postprints and other scholarly publications using a web interface, and organizes these publications for easy retrieval. While eprints@IISc can be accessed by anybody, submission of documents to this repository is limited to the IISc research community only. (Francis)

ePrints@IISc repository is running on EPrints open archive software, a freely distributable archive system available from eprints.org. ePrints@IISc complies with the [Open Archives Initiative \(OAI\)](#) framework allowing publications to be easily indexed by web search engines and other indexing services. From the researchers' perspective, the Institute is trying to impress on them the advantages that they stand to gain by depositing their research papers in the open-access, interoperable institutional repository by stressing the following points: (<http://eprints.iisc.ernet.in/information.html> -2014)

- ❖ helps in establishing priority for research findings;
- ❖ being interoperable, metadata from the repository are available through cross archive service providers like OAIs;ter;
- ❖ indexed by Google Scholar, Microsoft's Windows Live Academic Search, Scirus;
- ❖ better visibility and wider access;
- ❖ better impact and citations;
- ❖ rapid communication of research;
- ❖ long-term preservation;
- ❖ integrated view of IISc research publications;
- ❖ value-added services like individual and department-wise publication listings; And . graphical view of usage statistics.

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- **ePrints@IISc Collection analysis:**

An institutional repository stores and makes accessible the educational, research and associated assets of an institution. Most of the currently established institutional repositories are providing open access to the research outputs of a university or research institution. The content potentially includes research data, learning material, image collections and many other different types of content. The Indian Institute of Science Institutional Repository is

very rich in its collection and hence the authors have considered the following criteria's to assess the total collection of its repository.

5.1 Type of Documents

Sl. No	Type of Document	No of Documents	Percentage
1	Book	83	0.23%
2	Book Chapter	83	0.23%
3	Conference Proceedings	324	0.88%
4	Conference Papers	4549	12.36%
5	Conference poster	55	0.15%
6	Departmental Technical Report	58	0.16%
7	Journal Article	30074	81.74%
8	Editorials/Short Communications	1320	3.59%
9	Patents	26	0.07%
10	Preprints	216	0.57%
11	Teaching Resource	4	0.01%
12	Other	1	0.00%
13	Conference/Workshop items	1	0.00%
	Total	36794	100%

Table-1 Document Type in the Collection

ePrints@ IISc Institutional Repository is more popular in collecting various type of documents. The Table –1 reveals various documentary types of publications deposited with ePrints@IISc repository. Among the total of 36794 documents, maximum 30074 (81.74%) number of documents were journal articles. Followed by 4549 (12.36%) Conference Papers, 1320 (3.59%) Editorial/Short Material, 324 (0.88%) Conference proceedings, 83 each (1.7%) Book and Book chapters, 58 (0.16%) Departmental Technical Report, 55 (0.15%) Conference Posters, 26 (0.07%) Patents, 4 (0.01%) Teaching Resource and 1 each (0.01%) Conference and other un identified resources.

5.2 Refereed and Non Refereed documents

Refereed/ Non Referred	No of Documents	Percentage
Refereed documents	35760	97%
Not Refereed documents	371	1%
Un identified	663	2%
Total	36794	100%

Table-2 Refereed and Non Refereed Documents

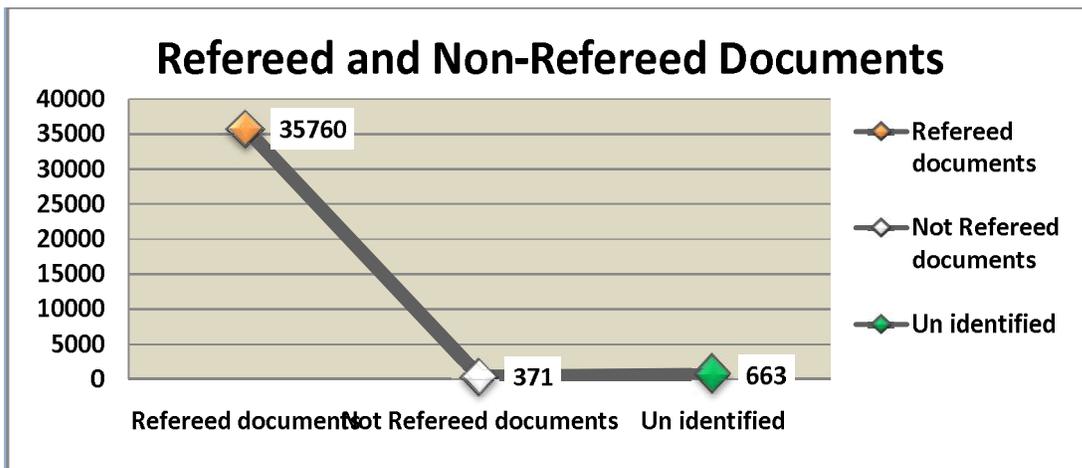
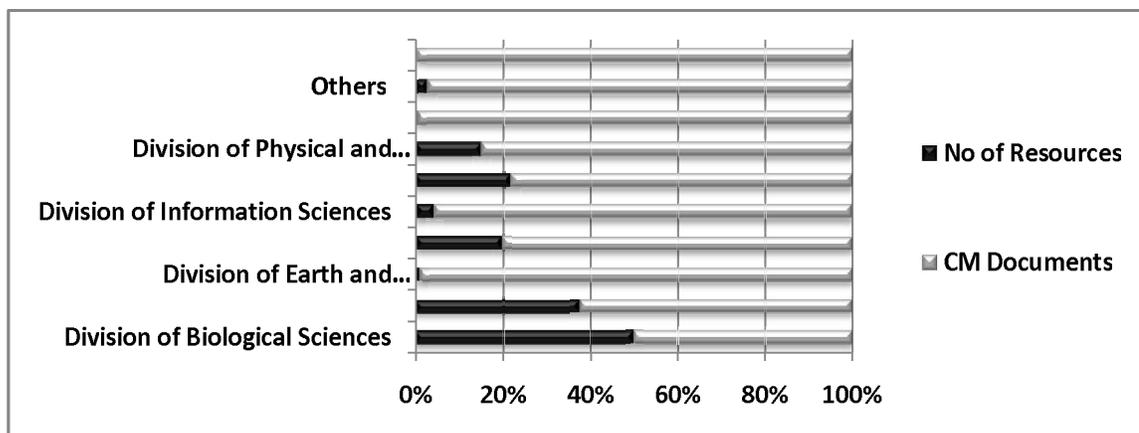


Fig-1 Refereed and Non-Refereed Documents

eprints@IISc covers the both Refereed and Non-Refereed documents. The data in the table-2 shows the availability of refereed and non-referred documents. It is clear that among the total of 36794 documents, majority 35760 of documents are refereed documents and rest of them non-refereed and unidentified.

5.3.Division wise contribution of Resources

Sl. No	Division	No of Resources	Percentage	CM Documents
1	Division of Biological Sciences	6344	16%	6344
2	Division of Chemical Sciences	9589	25%	15933
3	Division of Earth and Environmental Sciences	139	0%	16072
4	Division of Electronic Sciences	5213	13%	21285
5	Division of Information Sciences	957	2%	22242
6	Division of Mechanical Sciences	8641	22%	30882
7	Division of Physical and Mathematical Sciences	6617	17%	37500
8	Other centers/Units	86	0%	37586
9	Others	1087	3%	38673
10	Administration	3	0%	38676
	TOTAL	38676	100%	38676

Table-3 Division wise contribution of Resources**Fig-2 Division wise contribution of Resources**

Indian Institute of Science is a bunch of many branches of studies. There are more than ten divisions, keenly involved in teaching, research and development activities. The above table-3 shows the activeness in contributing their intellectual works in to its institutional repository so called eprints@IISc. The majority 9589 (25%) of documents appeared from the division of Chemical Sciences followed by 86411(22%) from the division of Mechanical Sciences, 6617 (17%) from division of Physical and Methemathical Sciences, 6344 (16%) from the division of Biological Sciences, 5213 (13%) from division of Electronic Sciences 1087 (3%) from other unidentified divisions, 957 (2%) from division of Information Sciences, 139 (0.0%) from division of Earth and Environmental Sciences 89 (0.0%) from other administrative units.

5.4 Age of sources available in IR

Sl. No	Decade source type available	No of sources available	Percentage	CM Sources
1	1913-1922	84	0.23%	84
2	1923-1932	97	0.26%	181
3	1933-1942	18	0.05%	199
4	1943-1952	36	0.10%	235
5	1953-1962	213	0.58%	448
6	1963-1972	744	2.02%	1192
7	1973-1982	3390	9.21%	4582
8	1983-1992	5448	14.81%	10030
9	1993-2002	9067	24.64%	19097
10	2003-Till date	17697	48.10%	36794
	TOTAL	36794		36794

Table-4 Age of sources available in IR

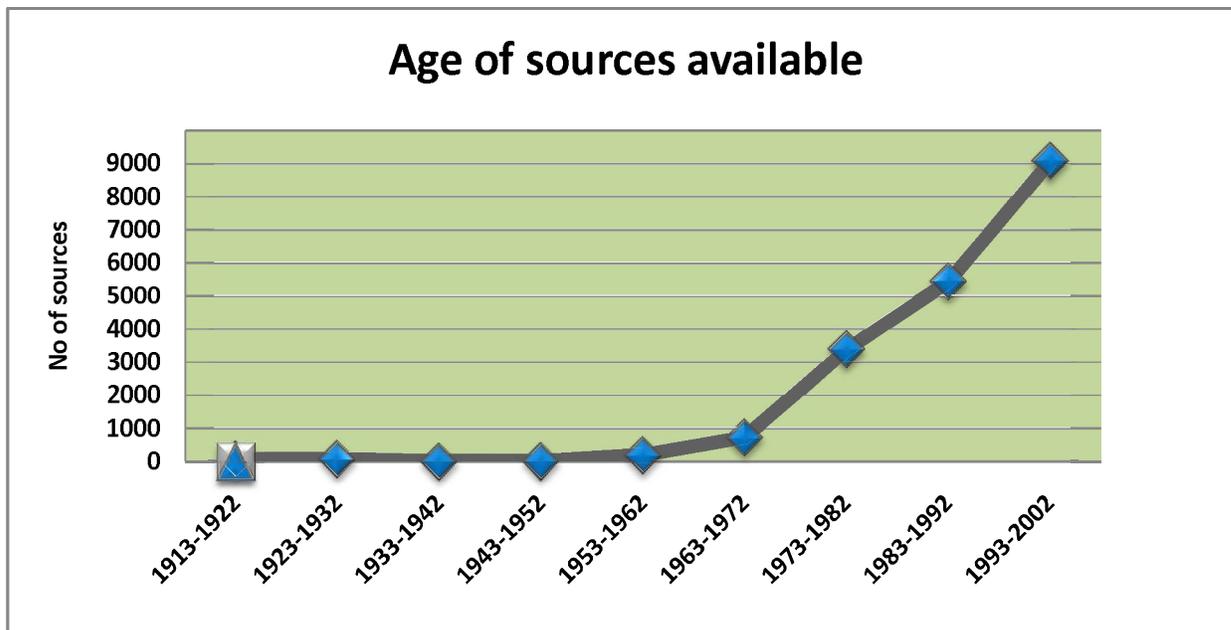


Fig-3 Age of sources available in IR

Age is referred to as length of time material has existed in ePrints@IISc repository. This is done to determine the recency and rare documents deposited. During 1913-1922, there are 84 old documents are found in the repository. Followed by this 97 are between 1923-1932; 18 in 1933-1942; 36 in 1943-1952; 213 in 1953-1962; 744 in 1963-1972; 3390 in 1973-1982; 5448 in 1983-1992; 9067 in 1993-2002 and 17697 from 2003 to till date.

The outcome shows that the tendency towards increasing number of volume of production. This could be due to increasing awareness of digital archives and its benefits for both sides of authors as well as their institutions.

5.5 Document status in ePrints@IISc

Sl. No	Status	No of Documents	Percentage	CM Document Status
1	Published	36471	99.12%	36471
2	In Press	52	0.14%	36523
3	Submitted	24	0.07%	36547
4	Unpublished	45	0.12%	36592
5	Others	202	0.55%	36794
	TOTAL	36794	100%	36794

Table -5 Document Status in ePrints@IISc

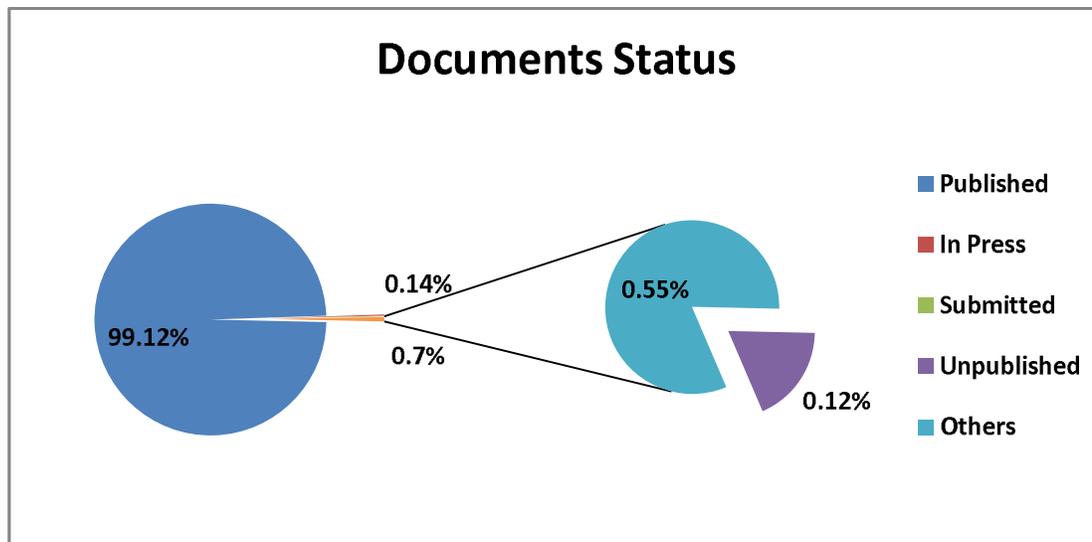


Fig-4 Documents Status

The table- 4 depicts documents status in ePrints@IISc. Among the total of 36794 documents, Majority of 36471 (99.12%) items are published documents, 52 (0.14%) are in Press, 45 (0.07%) are unpublished and 202 (0.12%) others.

This scheme of study reveals that already published documents are in majority and at the same time shows the upward trend.

5.6 Publications Formats

SL No	Format	No of Documents	Percentage	CM of Documents
1	HTML	21	0.04%	21
2	PDF	29459	50.67%	29480
3	Postprints	15	0.03%	29495
4	Plain Text	45	0.08%	29540
5	RTF	1	0.00%	29541
6	MicroSoft Power Point	3	0.01%	29544
7	Microsoft Excel	1	0.00%	29545
8	Microsort Word	3	0.01%	29548
9	Images JPEG	7170	12.33%	36718
10	Image PNG	18253	31.40%	54971
11	Archive (Zip)	2	0.00%	54973
12	Other	3161	5.44%	58134

Table-6 Publications Formats

* Documents published in multiple formats

Table-3 reveals the availability publications format in ePrint@IISc repository. Majority 29459 of documents are in PDF Format. Followed to this 18253 documents are in Image PNG, 7170 documents are in Images JPEG, 45 documents in Plain Text, 21 documents are in HTML, 15 documents are in Postprints, 3 each are in Microsoft Power Point and Microsoft Word, 2 documents in Archive(Zip) 1 each in RTF and Microsoft Excel. There are 3161 documents are there in the repository without naming any file format.

5.7 ePrint@IISc (collection)Rank Position in India

Name of the Institution	No of Documents	Percentage of share	Rank
Indian Academy of Science	91690		1
Indian Institute of Science	36794		2
NISCARE	23715		3
IIT Mumbai	14099		4
Central Marine Fisheries; Research Institute	9457		5

Table-7 ePrints@IISc Rank Position in India

The above table reveals the rank position of the ePrints@ IISc Institutional Repository. This ranking has done by considering number of documents available in the Repositories. It is identified that Indian Academy of Science stands top rank with having 91690 documents. Followed to this, Indian Institute of Science stands second rank with having 36794 documents; NISCARE stands third rank with having 23715 documents; IIT Mumbai stands fourth rank with having 14099 documents and Central Marine Fisheries Research Institute stands fifth rank with having 9457 documents.

6. Observations:

1. It is observed that Journal articles have been contributed in substantial numbers rather than, the other form of information.
2. Majority of the available documents in eprints@IISc are refereed documents. This exemplifies the treasure of quality repository.
3. Division of Chemical Sciences and Biological Sciences both contributed maximum number of documents to the repositories. It demonstrates that these two divisions are more active-centric in publishing and contributing variegated information sources to the repository.
4. The already Published sources of information finds its present on vast scale in to the eprints@IISc repository.

5. The study has reviewed that, PDF and Images JPGs formatted documents are more compared to the other formatted documents such as HTML, Plain text, RTF etc.
6. Only IIT, IIM and research and development organizations rank high in depositing maximum number of sources in to the institutional repositories and
7. Though the UGC (University Grants Commission) and NKC (National Knowledge Commission) supporting in establishment of institutional repositories at University and College level to disseminate information at global level, the study deciphered that only central universities, IITs and IIMS are taking keen interest in establishing Institutional Repositories

7. Conclusion

As gone through the overview on ePrints@ IISc Institutional Repository of Indian Institute of Science has successfully created its own remark in the model map of Institutional Repositories in India using the ePrints software. This effort could be replicated in all the Faculties in results of their citations, impact, index and prestige.

Nowadays, as like these research institutions, universities are also producing more digital objects like research articles, reports, thesis, Audio/Video, clippings and datasets in ever increasing number. Hence, there is also a need of setting up of institutional repositories. In this regard the government body called National Knowledge Commission has recommended and University Grants Commission have stated that, all public funded research should be made open access. It has been observed that there is a continuous growth in new IRs being registered and also there is a surge in the number of records over the period. There is need for concerted efforts in this area.

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NUCLEAR POWER GENERATION RESEARCH SEEN THROUGH SCOPUS: A SCIENTOMETRIC ANALYSIS

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Abstract

This paper attempts to analyze quantitatively the growth and development of nuclear power generation in global in terms of publication output as reflected in Scopus database during 1980 to 2012. A total of 9512 papers were published by the Nuclear Power Generation (NPG) researchers to various domains; In the subject category Engineering topped with 4716 documents, 46% publications were published in Journals as document type and the most preferred journals were Nuclear Engineering Design (214). Among 160 contributed institutions from 60 various countries, The Idaho National Laboratory ranked first with 137 papers. Country based analysis USA ranked 1st with 24% publications followed by Japan 7% and India ranked 11th with 1.4%. In Year wise analysis showed that Nuclear power generation papers gradually increased with average 288 papers per year, in 2008 topped with 745 articles slashed with 2009 with 545.

Keywords: Nuclear Power Generation (NPG), Scientometric Analysis, Year wise and Authorship pattern, Geographical distribution.

1. INTRODUCTION

Scientometrics is the quantitative study of the disciplines of science based on published literature and communication. This could include identifying the emerging areas of scientific research, examining the development of research over time, or geographic and organizational distributions of research. In the present study, we did the Scientometrics analysis of NPG

research, a significantly growing area in the knowledge driven world. Sciverse Scopus is the world's largest abstract and citation database of peer reviewed literature and quality web sources with smart tools to track analyze and visualize research. It's designed to find the information scientists need. Quick, easy and comprehensive, Scopus provides superior support of the literature research process. It contains 46 million records, 70% with abstracts. It has nearly 19,500 titles from publishers worldwide and includes over 4.6 million conference papers.

2. REVIEW OF LITERATURE

Thanuskodi¹ has showed in his study bibliometric analysis of articles and references provided at the end of each article contributed in Indian Journal of Chemistry from 2005-2009. The analysis cover mainly the number of articles, authorship pattern, forms of document cited, etc. All the studies point towards the merit and weakness of the journal which will be helpful for its further development. This study showed that most of the contributions are India. The authorship pattern of the articles published during the period of study. Maximum number of articles were contributed by two authors. This study also showed that majority of the contributors preferred journals as the source of information which occupied the top position. All the studies point towards the merits and weakness of the journal which will be helpful for its further development.

Pratt² utilized MEDLINE to perform a bibliometric analysis of the literature of AIDS for the period of 1981 to 1990. That study reported growth statistics for AIDS literature, number of different languages, countries of publication, and number of periodical titles. The AIDS literature grew from fewer than 700 entries from 1981 to 1983 to a cumulative total of 29,077 entries by the end of 1990. The greatest relative expansion came in 1983 with a 24-fold increase compared to the previous year. Gillaspay and Huber also employed Bradford's law to identify core journal publications for a collection focusing on AIDS in women. That study found that journal scatter for this subset of AIDS literature varied from the scatter in the general literature.

Thanuskodi³ examined the present study has been undertaken to assess the research performance of Indian scientists in ecology. The results of research have been published in different sources. The findings of the present study lead to the following observations: The largest number of publications was 54 in 2005.

Dutt, Garg and Bali⁴ analyzed 1317 papers published in the first fifty volumes of the International journal of Scientometrics during 1978 to 2001. They found that the share of papers by USA is constantly declining while that of the Netherlands, India, France and Japan is on the rise. The research output is highly scattered as indicated by the average number of papers per institution.

Yeoh and Kaur⁵ analyses the publication output of Research in Higher Education for subject support in collection development in the light of growing interest in diversified domains of

research in higher education. Consequently, analysis of 40 issues of publications revealed a diversified usage pattern of bibliographic reference sources by contributing researchers, with a cumulative total of citations being 8,374. A positive trend in research collaboration of contributing authors, and a steady growth in the use of reference sources, periodicals and web documents in the citations signify the trend of scholarly communication of research works in the electronic age. Similar to other disciplines of research findings, journals and books were the most cited source materials for researchers thrash out.

Thanuskodi⁶ identified the paper brings out the results of a bibliometric analysis of the journal titled "Indian Journal of Agricultural Research" for the period from 2001 to 2010. The data were downloaded from the journal's website. This study aims at analysing the research output performance of agricultural scientists on agricultural science subjects. 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. All the studies point towards the merits and weakness of the journal which will be helpful for its further development. The result showed that out of 602 articles joint authors contributed 564 (93.69%) articles while the rest 38 (6.31%) articles were contributed by single author. Study reveals that most of the contributions are from India with 98.67 % and the rest 1.33% only from foreign sources.

Verma, Tamrakar and Sharma⁷ revealed that the majority of articles in journals published in India have two authors and that the majority of the contributions are from New Delhi. Patra, Bhattacharya and Verma⁸ analyzed the growth pattern, core journals and authors' distribution in the field of bibliometrics, using data from Library and Information Science Abstract (LISA). Tiew⁹ found that 53% of journal articles contained self-citations and that there was a tendency for authors affiliated to the institution that published the journal to cite the journal.

A study by Oyeniyi and Bozimo¹⁰ threw light on co-authorship patterns as a function of an author's productivity. Out of the 1260 articles written by 420 authors, 940 were single authored while 382 were co-authored. They found that the highest number of publications by one author was 44 papers followed by 28 and 27 papers respectively. Authors who had five publications and below constituted 94.53% while those with 6 and above constituted 5.47%. The study also revealed that authors who topped the rank of productivity also topped the rank of collaboration.

Alemna¹¹ examined the periodical literature of Library and Information Science in Africa for the period 1996-2000 as in African Journal of Library, Archives and Information Science (AJLAIS). He observed that the degree of representation by various African countries varied. West Africa topped with 50.6%, followed by South/Central with 32.9% and East Africa with 12.7%. Developed country participation in AJLAIS was very minimal with 2.5% UK representation and 1.3% Canada representation.

Adenaik¹² analyzed some characteristics of the citations taken from two bibliographies on cowpea covering the period from 1888 to 1973. It was found that the literature doubled every 20 years, English language accounted for 87% of the literature and journal was the most popular medium of publishing. Subbaiah¹³ who studied Indian grape research literature covering 1901-1981, found clustering of research in specific areas, increase in collaborative research, and journals as the main source of information. Meera¹⁴ studied the characteristics of 4,840 citations on ecological literature published during 1994-1995 in terms of their subject, language and geographic dispersion, and author ranking.

3. SCOPE AND METHODOLOGY

The present study attempts to find out the publication pattern of global researchers in the field of Nuclear Power Generation (NPG). The study is based on the references and aims to analyze quantitatively the growth and development of NPG research in world terms of publication output as reflected in Scopus database during years, 1980 to 2012.

4. OBJECTIVES OF THE STUDY

The main objective of the study is to present the growth of literature and make the quantitative assessment of status of Nuclear Power Generation (NPG) research by analyzing the various features.

The specific objectives are:

- To measure the Year wise growth of Publications
- To measure the Source wise publications
- To measure the Institution wise distribution
- To measure the Document wise publications
- To measure the Country wise distribution
- To measure the Subject wise publications
- To identify the Citations and counts by year wise and the highest cited papers.

5. RESULTS AND DISCUSSIONS

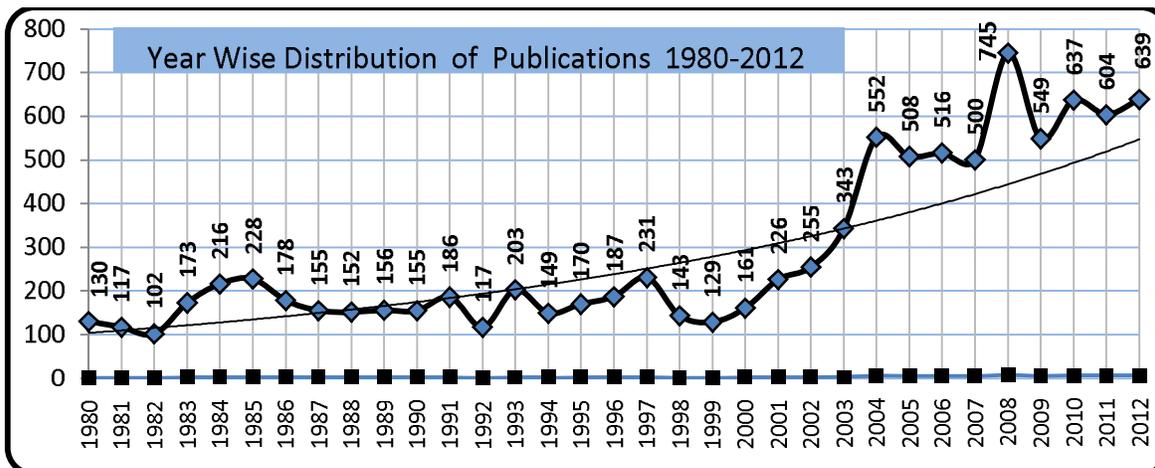
5.1. Year-wise distribution of Publications

During the study period 1980 to 2012, the Year wise analysis reflected with average 288 papers per year. In 2008 topped with 745 publications slashed with 2009 with 549 and the lowest were in year 1999 with 129 publications. The trend line (Fig.1) shows that Nuclear Power Generation (NPG) publications have gradually increased.

Table 1: Year wise distribution of publications

S. No.	Year	Articles	% of 9512	Cumulative	Cumulative %
1	1980	130	1.366695	130	1.3669
2	1981	117	1.230025	247	2.5967
3	1982	102	1.07233	349	3.669049622
4	1983	173	1.818755	522	5.487804878
5	1984	216	2.270816	738	7.75862069
6	1985	228	2.396972	966	10.15559294
7	1986	178	1.87132	1144	12.02691337
8	1987	155	1.629521	1299	13.65643398
9	1988	152	1.597981	1451	15.25441548
10	1989	156	1.6400	1607	16.89444912
11	1990	155	1.629521	1762	18.52396972
12	1991	186	1.955425	1948	20.47939445
13	1992	117	1.2300	2065	21.70941968
14	1993	203	2.134146	2268	23.85407906
15	1994	149	1.566442	2217	25.41000841
16	1995	170	1.787216	2587	27.19722456
17	1996	187	1.965938	2774	29.16316232
18	1997	231	2.428511	3005	31.59167368
19	1998	143	1.503364	3148	33.09503785
20	1999	129	1.356182	3277	34.45121951
21	2000	161	1.692599	3438	36.14381833
22	2001	226	2.375946	3664	38.51976451
23	2002	255	2.680824	3919	41.20058873
24	2003	343	3.605971	4262	44.80656013
25	2004	552	5.803196	4814	50.6097561
26	2005	508	5.340622	5322	55.95037847
27	2006	516	5.424727	5838	61.37510513
28	2007	500	5.256518	6338	66.63162321
29	2008	745	7.832212	7083	74.46383516
30	2009	549	5.771657	7632	80.23549201
31	2010	637	6.696804	8269	86.93229605
32	2011	604	6.349874	8873	93.28216989
33	2012	639	6.71783	9512	100
Total		9512	100		

Figure 1: Year Wise Publication



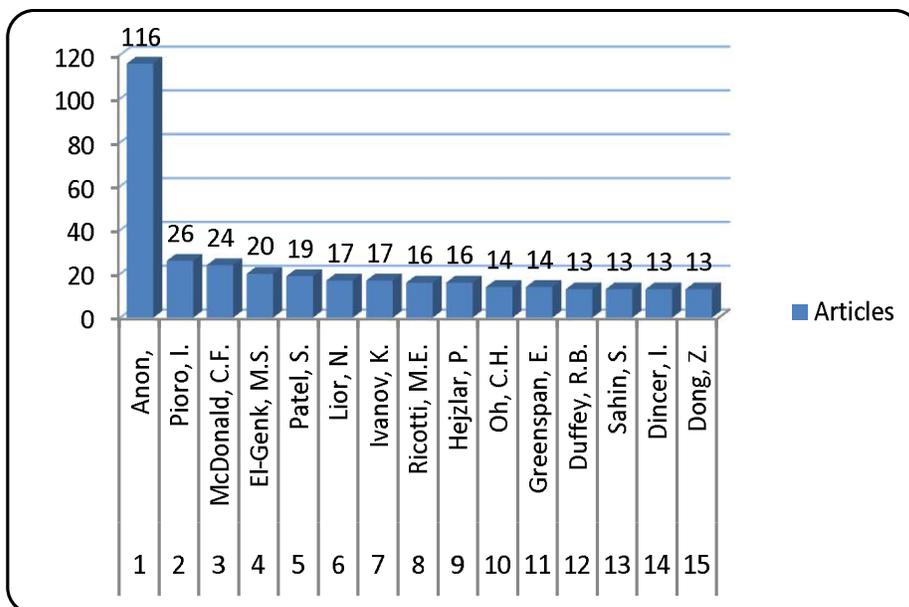
5.2. Author wise contributions

Author wise contributions shows, the total 157 authors published their contributions in the field of Nuclear Power Generation (NPG). Anon ranked first and published 116 articles, Poro, L. with 26 and C.F. Mc Donald with 24. (Table 2 and Figure 2 shows top 15 authors contributions).

Table 2: Author wise contributions

S. No.	Author	Articles
1	Anon,	116
2	Poro, I.	26
3	McDonald, C.F.	24
4	El-Genk, M.S.	20
5	Patel, S.	19
6	Lior, N.	17
7	Ivanov, K.	17
8	Ricotti, M.E.	16
9	Hejzlar, P.	16
10	Oh, C.H.	14
11	Greenspan, E.	14
12	Duffey, R.B.	13
13	Sahin, S.	13
14	Dincer, I.	13
15	Dong, Z.	13

Figure2: Author wise contributions



5.3. Authorship pattern analysis

During the study period 1980 to 2012, the authorship pattern analysis revealed that multiple authors contributions dominant in the field, the 5644 documents with 59%. Single authors with 3359 documents with (35%) followed by double authors 1747 documents with (18%), three authors 1300 documents with (14%) , four authors 1097 documents with (12%), five authors just 491 documents with (5%), six authors 387 with (4%) and more than six authors 622 with (7%). Among 509 documents with (5%) No author name available in the Nuclear power generation (NPG) field. Following Table 3 & 4 and Figure 3 & 4, stated clearly).

Table 3: Authorship pattern contributions

S. No.	Authorship pattern	Articles	% of 9512
1	Single Author	3359	35.31329
2	Double Authors	1747	18.36627
3	Three Authors	1300	13.66695
4	Four Authors	1097	11.5328
5	Five Authors	491	5.161901
6	Six Authors	387	4.068545
7	More than Six Authors	622	6.539108
8	No Author name available	509	5.351135
Total		9512	100

Figure 3: Author wise contributions

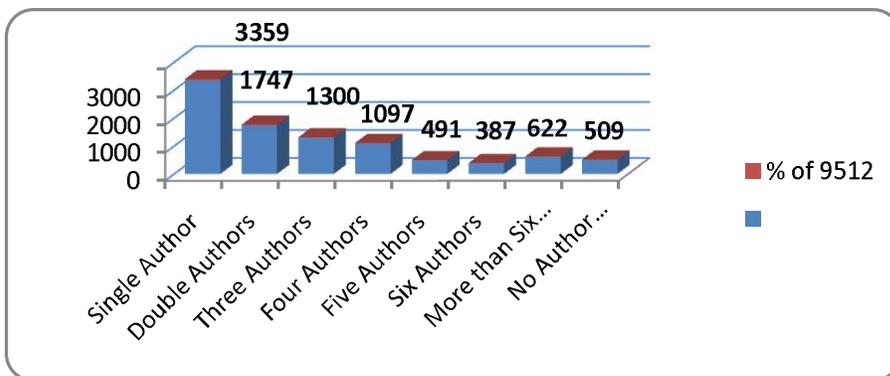
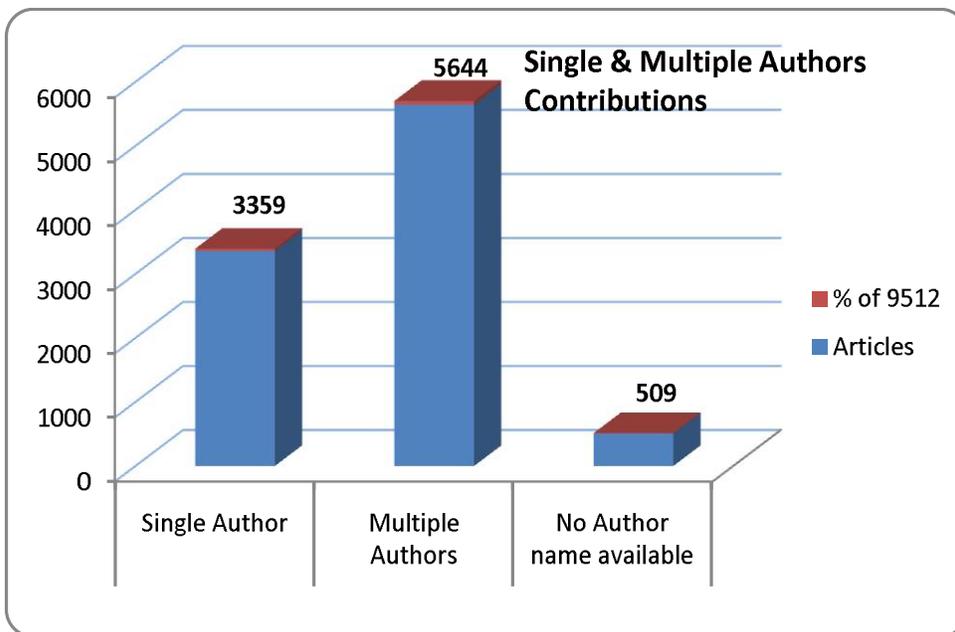


Table 4: Authorship pattern analysis

S. No.	Authorship pattern	Articles	% of 9512
1	Single Author	3359	35.31329
2	Multiple Authors	5644	59.33558
3	No Author name available	509	5.351135

Figure 4: Authorship pattern contributions



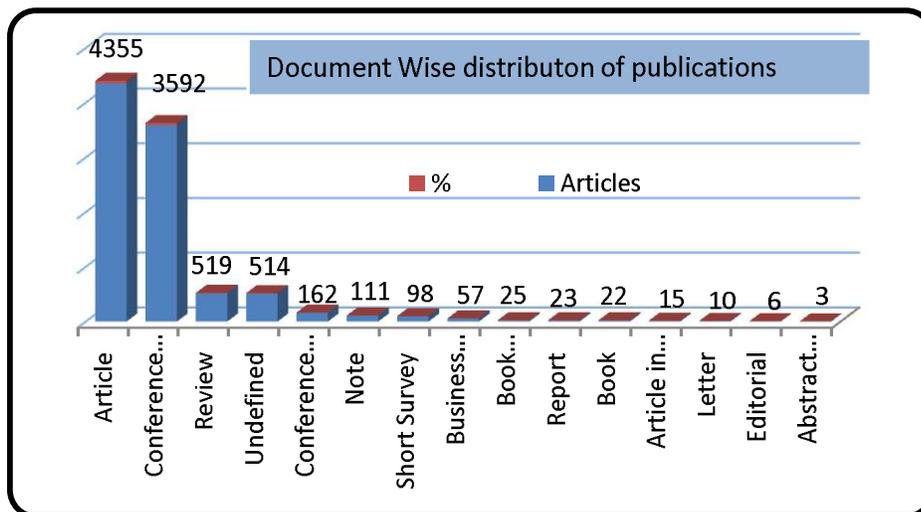
5.4. Document Wise Distribution

The global Nuclear Power Generation (NPG) has produced a total of 9512 publications. The highest number of publications was 4355 (45.8%) Journal articles, Conference Paper 3592 (38%), Review 519(5.4%), there Undefined documents were 514 (5.4%) and so on. (Table 5 and Figure 5 show the document wise contributions clearly).

Table 5: Document Wise Publication

S. No.	Document Type	Articles	%
1	Article	4355	45.78427
2	Conference Paper	3592	37.76283
3	Review	519	5.456266
4	Undefined	514	5.403701
5	Conference Review	162	1.703112
6	Note	111	1.166947
7	Short Survey	98	1.030278
8	Business Article	57	0.599243
9	Book Chapter	25	0.262826
10	Report	23	0.2417
11	Book	22	0.231287
12	Article in Press	15	0.157696
13	Letter	10	0.10513
14	Editorial	6	0.063078
15	Abstract Report	3	0.031539

Figure 5: Document Wise Publication



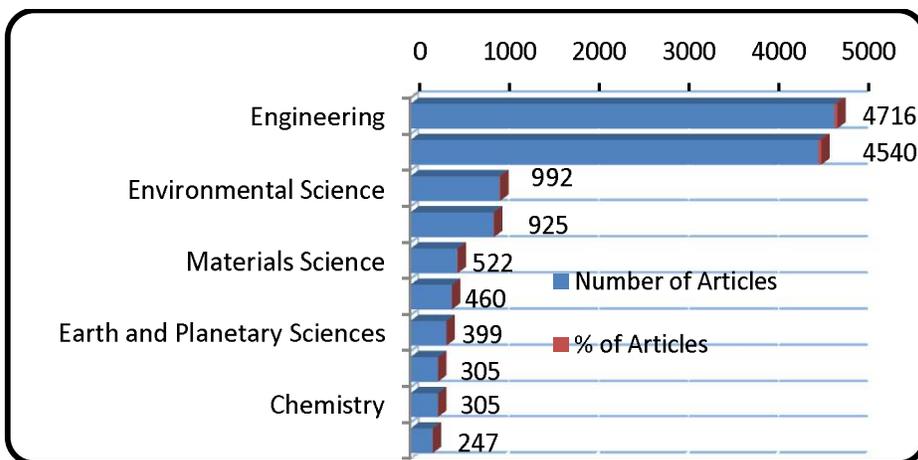
5.5. Subject wise Publication

The global Nuclear Power Generation (NPG) has produced 27 subfields into which Scopus classifies papers it indexes, Engineering 4716 (33%), Energy 4540 (32%), Environmental Science 992 (7%) Physics and Astronomy 925 (6.4%) and so on (Table 6 and Figure 6).

Table 6: Subject Wise Publication

S. No.	Subject	Articles	%
1	Engineering	4716	32.779593
2	Energy	4540	31.556266
3	Environmental Science	992	6.8951136
4	Physics and Astronomy	925	6.4294154
5	Materials Science	522	3.6282755
6	Chemical Engineering	460	3.1973309
7	Earth and Planetary Sciences	399	2.773337
8	Medicine	305	2.1199694
9	Chemistry	305	2.1199694
10	Computer Science	247	1.7168277
11	Social Sciences	223	1.5500104
12	Biochemistry, Genetics and Molecular Biology	115	0.7993327
13	Mathematics	115	0.7993327
14	Economics, Econometrics and Finance	113	0.7854313
15	Business, Management and Accounting	112	0.7784806
16	Agricultural and Biological Sciences	70	0.4865504
17	Multidisciplinary	66	0.4587475
18	Health Professions	39	0.2710781
19	Pharmacology, Toxicology and Pharmaceutics	30	0.2085216
20	Neuroscience	25	0.173768
21	Decision Sciences	23	0.1598665
22	Psychology	19	0.1320637
23	Arts and Humanities	10	0.0695072
24	Undefined	7	0.048655
25	Immunology and Microbiology	5	0.0347536
26	Nursing	3	0.0208522
27	Dentistry	1	0.0069507
Total		14387	100

Figure 6: Subject Wise Publication



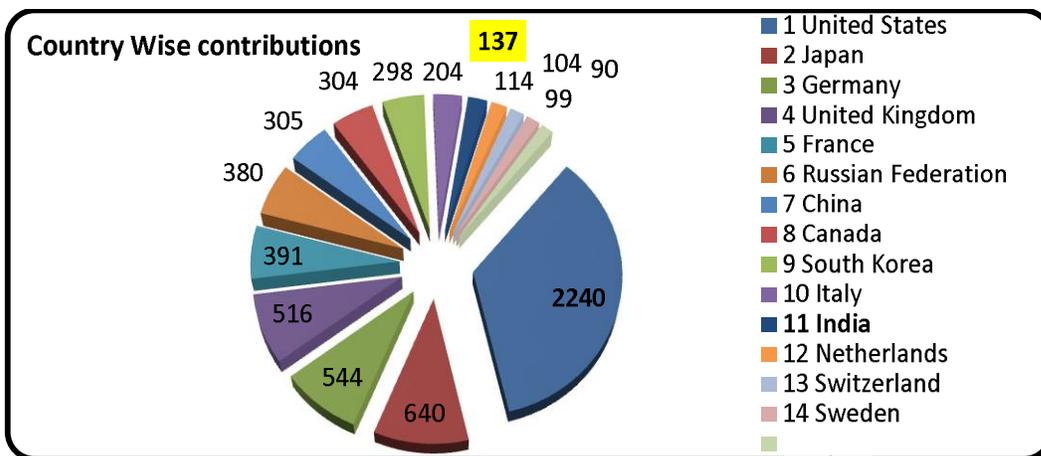
5.6. Country wise Distribution

The country wise distribution said that 90 different countries with 9512 documents in the field of Nuclear Power Generation (NPG). The USA ranked topped with 2240 (24%) publications, Japan 640 (7%), Germany 544 (6%), UK 516 (5.4%), France 391 (4.1%), Russian Federation 380 (4%) and China 305 (3.2%). India published 137 (1.4% publications with 11th position. The following Table 7 and Figure 7 show the top 15 countries contributions in this field.).

Table 7: Country wise Distribution

S. No.	Country	Articles	%
1	United States	2240	23.5492
2	Japan	640	6.7283
3	Germany	544	5.7190
4	United Kingdom	516	5.4247
5	France	391	4.1195
6	Russian Federation	380	3.9949
7	China	305	3.2064
8	Canada	304	3.1959
9	South Korea	298	3.1328
10	Italy	204	2.1446
11	India	137	1.4402
12	Netherlands	114	1.1984
13	Switzerland	104	1.0933
14	Sweden	99	1.0407
15	Spain	90	0.9461

Figure 7: Country wise Distribution



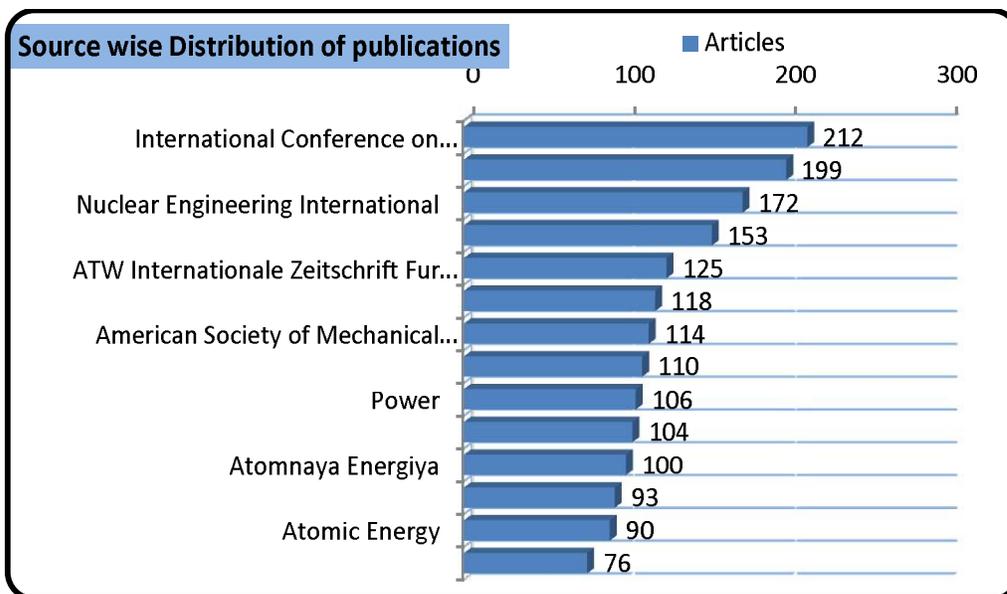
5.7. Source wise Distribution

Source wise analysis shows that, Nuclear Power Generation (NPG) publications published in 159 journals. The highest numbers of publications were in Nuclear Engineering and Design (214) and followed by International Conference on Nuclear Engineering Proceedings ICONE (212), in Proceedings of the Intersociety Energy Conversion Engineering Conference (199) and so on. The following Table 8 and Figure 8 show the top 15 ranking journals during the period study period.

Table 8: Source wise Distribution

S. No.	Source type	Articles	%
1	Nuclear Engineering and Design	214	2.2497
2	International Conference on Nuclear Engineering Proceedings ICONE	212	2.2287
3	Proceedings of the Intersociety Energy Conversion Engineering Conference	199	2.0920
4	Nuclear Engineering International	172	1.8082
5	Energy Policy	153	1.6084
6	ATW Internationale Zeitschrift Fur Kernenergie	125	1.3141
7	Nuclear Technology	118	1.2405
8	American Society of Mechanical Engineers Pressure Vessels and Piping Division Publication PVP	114	1.1984
9	Progress in Nuclear Energy	110	1.1564
10	Power	106	1.1143
11	Societe Francaise D Energie Nucleaire International Congress on Advances in Nuclear Power Plants Icapp 2007 the Nuclear Renaissance at Work	104	1.0933
12	Atomnaya Energiya	100	1.0513
13	Proceedings of the American Power Conference	93	0.9777
14	Atomic Energy	90	0.9461
15	Annals of Nuclear Energy	76	0.7989

Figure 8: Source wise Distribution



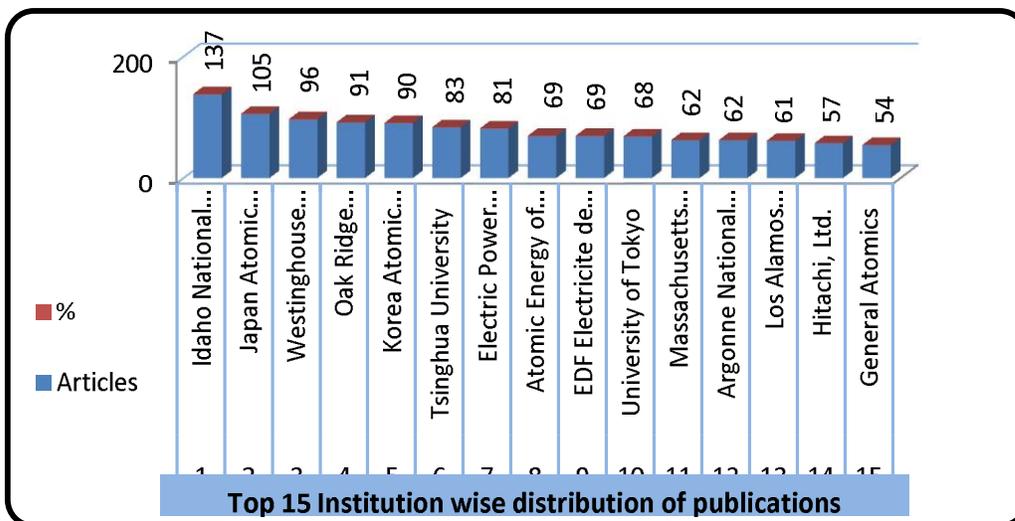
5.8. Institution wise Distribution

Although 160 institutions have published the articles in Nuclear Power Generation (NPG), only 16 institutions have published more than 50 papers in the study period. The Idaho National Laboratory, United States is top leading research institutions with 137 publications followed by Japan Atomic Energy Agency 105, Westinghouse Electric Company with 96, and so on. The following Table 9 and Figure 9 show that top 15 most productive institutions in NPG field.

Table 9: Institution wise Distribution

S. No.	Institution	Articles	%
1	Idaho National Laboratory	137	1.4402
2	Japan Atomic Energy Agency	105	1.0723
3	Westinghouse Electric Company	96	1.0092
4	Oak Ridge National Laboratory	91	0.9566
5	Korea Atomic Energy Research Institute	90	0.9461
6	Tsinghua University	83	0.8725
7	Electric Power Research Institute	81	0.8515
8	Atomic Energy of Canada Limited - Chalk River Lab	69	0.7253
9	EDF Electricite de France	69	0.7253
10	University of Tokyo	68	0.7148
11	Massachusetts Institute of Technology	62	0.6518
12	Argonne National Laboratory	62	0.6518
13	Los Alamos National Laboratory	61	0.6412
14	Hitachi, Ltd.	57	0.5992
15	General Atomics	54	0.5667

Figure 9: Institution wise Distribution



5.9. Citations contributions (Year wise)

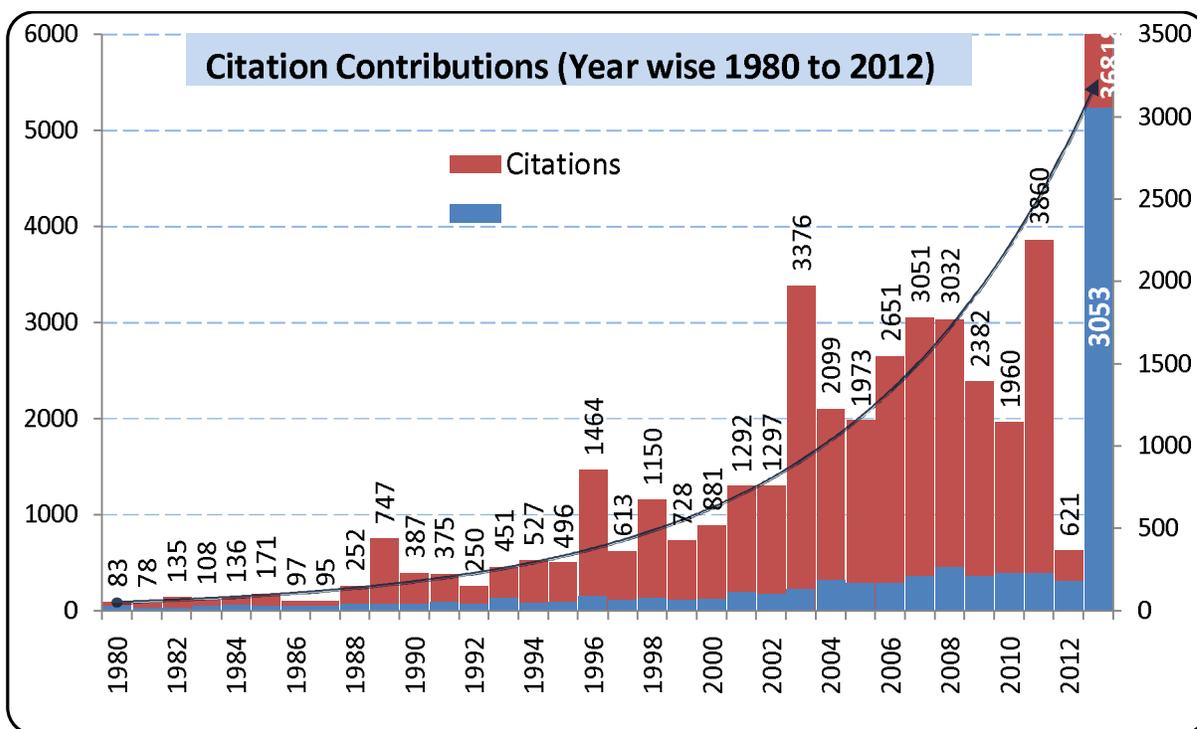
During the study period 33 (1980 to 2012) years the total number of citations 36,818 was identified on Nuclear Power Generation (NPG) indexed in Scopus database and citations count 3053. The citations were increased from 1989 onwards, particularly 2003, 2007 and 2008 more than 3000 citations identified. Notably that in the year 2011 scored highest 3860 citations (Table 10 and Figure 10).

Table 10: Citations contributions

S. No.	Year	Articles	Count	Citations
1	1980	130	23	83
2	1981	117	19	78
3	1982	102	13	135
4	1983	173	24	108
5	1984	216	32	136
6	1985	228	24	171
7	1986	178	29	97
8	1987	155	22	95
9	1988	152	37	252
10	1989	156	38	747
11	1990	155	40	387
12	1991	186	47	375
13	1992	117	36	250
14	1993	203	75	451
15	1994	149	45	527
16	1995	170	53	496
17	1996	187	88	1464
18	1997	231	58	613
19	1998	143	73	1150
20	1999	129	62	728
21	2000	161	67	881
22	2001	226	112	1292
23	2002	255	98	1297
24	2003	343	130	3376

25	2004	552	181	2099
26	2005	508	164	1973
27	2006	516	167	2651
28	2007	500	205	3051
29	2008	745	264	3032
30	2009	549	206	2382
31	2010	637	223	1960
32	2011	604	223	3860
33	2012	639	175	621
Total		9512	3053	36818

Figure 10: Citations contributions



6. CONCLUSION

This paper has highlighted quantitatively the contributions made by the Nuclear Power Generation (NPG), as reflected in Scopus database. During 33 years period the USA is lead in nuclear research publications and USA ranked 1st with 24% publications followed by Japan 7% and India ranked 11th with 1.4%. In Year wise analysis showed gradually increased with average 288 papers per year, in 2008 topped with 745 articles slashed with 2009 with 545. Generally, results of this study revealed that the contribution of Nuclear Power Generation (NPG) research literature is on gradual rise.

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INFORMATION SEEKING BEHAVIOUR IN ELECTRONIC ENVIRONMENT: A STUDY OF JOURNALIST IN DHARWAD DISTRICT, KARNATAKA

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Abstract

This article focuses on how information seeking behaviour of journalists and for this data was gathered by the questionnaire method and randomly selected the journalists of Dharwad District, Karnataka. It has been found the core purposes of accessing electronic information resources. In order to overcome the hindrances in accessing the electronic information resources of journalists, the study recommends that the awareness programs, hands on training sessions, product demos, orientation on web searching and retrieval skills should be organized at regular intervals.

Keywords: Information Seeking, ISB, Electronic Environment and Dharwad District.

1. Information Seeking Behavior

Information Seeking Behavior (ISB) is a favourite subject of research by library and information scientists. ISB is an important part of user studies which studies the casual relationship between the user of information and the information system. The concept of Information system is of recent origin. More generally, a system is defined as an assembly of inter-related components which are organized either naturally or by design in such a way as to achieve a specific common objective or purpose. System concept applied to information is called information system. In an Information system the various components like people, procedures and information resources are organized in such a way they interact to perform a series of functionally related tasks, such as storing and retrieving information to satisfy the information needs of variety of user.

Austere defines ISB as “The field, composed of studies that are concerned with who need what kind of Information and for what reason: how information is found, evaluated and used, and how these needs can be identified and satisfied.” ISB is thus concerned with establishing relationship with people, information and system of an order so as to obtain the best results. That Information system is the best, which provide maximum satisfaction to the users with

minimum cost within a very short time. The process of ISB includes defining information needs, use of sources of information, satisfaction and dissatisfaction derived in the process of seeking information, etc.

2. Need of the Study

As processors of information, it is important to gain an understanding of journalists' behaviors to assist them in conducting their daily routines more efficiently. With the adoption of new technologies in its early stages in Dharwad District, it was important to study information behaviors in relation to these new technologies. Technology can be an effective means of improving, and evolving, the journalism profession in hence there is need to conduct this kind survey to set updated state art information about journalist.

3. Objectives of the Study

The main objectives of the study are:

1. To find the types of information sources consulted by Journalists.
2. To find the purposes and areas of information seeking of Journalists.
3. To determine the frequency of use of various sources of Information by the Journalists of Dharwad District.

4. Research Methodology

Well-structured questionnaire on Information seeking behavior of journalists of Dharwad District. The research investigation is restricted to the existing/potential Journalists in Dharwad District. The primary data was collected using a well structured questionnaire. The descriptions also involve cross analysis of respondents. Respondents were mostly selected from the Journalists segments, who were the major respondents of the survey. The advantage of this technique is that it is both economical and reasonably reliable. There are around questions has been distribute to the working Journalists of Dharwad District. 47 filled in questions are received back the some has been interpreted for this survey.

5. Limitation of the Study

The study was restricted to working Journalist of Dharwad District only. The study was conducted for academic purpose only. The primary data was collected by survey method. We are prepared a detailed questionnaire was prepared personally distributed to Journalists Totally 60 questionnaires were distributed to the Journalists of Dharwad District. Out of 60 questionnaires distributed 47 filled in questionnaires were received back.

6. Data Analysis and Interpretation

Table: 1 Type of work

Type of work	Respondents	Percentage
Government	02	4.25
Private	45	95.75
Others	-	-

Table 1 represents Journalist type of working that 02 (4.25%) Government journalists and 45 (95.75%) Private Journalists are working in Dharwad District. It means more than 90% respondents are from private sector or independent journalists.

Table: 2 Language known by Journalists

Language	Respondents	Percentage
Kannada	47	100
English	40	85.10
Hindi	42	89.36
Others	16	34.04

Table 2 above given the information about the languages known by journalists in Dharwad District level that is all the journalists known kannada, English and Hindi language i.e. kannada language known by 100% respondents, followed by Hindi 89.36% and English 85.10%.

Table: 3 Information channels

Generally seek information from	Respondents	Percentage
Television	35	72.34%
Library	28	59.57
Internet	42	89.36
Print newspaper	30	63.88
If any others	09	19.14

Table: 3 reveals that 89.36% journalists seek information from internet, 72.34% of journalist seek information from television, 63.88% journalist seek information from print newspaper, 59.57% journalists seek information from library and 19.14% journalists seek information others sources. Here most of journalists seek information from internet.

Table: 4 Inspiration for make use of the Library

Makes to use the Library	Respondents	Percentage
Easy access to materials	18	38.29
Availability of materials	18	38.29
Atmosphere of the Library	27	57.44
Reading Habit	38	80.85

Table 4 represents majority of respondents make use of library because of their reading habits i.e.80.85%, 57.44% of respondents makes use for atmosphere, and 38.29% of respondents makes use the library for availability and easy accessing of materials.

Table: 5 Time spend by respondents in library

Time	Respondents	Percentage
Less than 15 minutes	09	19.14
15-30 minutes	11	23.40
1 to 2 hours	21	44.60
2 Hours or more	06	12.76

Table 5 reveals the spending time of respondents in library. Highest number of journalist spend 1 to 2 hours in library i.e. 44.60%, 23.40% of journalist spend 15-30 minutes in library, 19.14% of respondents spend less than 15 minute and least number of respondents spend more than 2 hours time.

Table: 6 Opinions about the services of library

Opinions	Respondents	Percentage
Very effective	09	19.14
Effective	13	27.66
Some what you effective	18	38.29
Ineffective	06	12.76
Very ineffective	01	2.12

Table 6 provides information about opinion about the services of library. 38.29% journalist says service of library somewhat effective and 27.66% journalist says service of library is effective, 19.14% says service library is very effective, 12.76% says service library is ineffective and lastly 2.12% says service library is very ineffective.

Table: 7 Purpose of library by respondents

Purpose	Respondents	Percentage
To barrow materials	18	38.29
back volumes of journals & newspapers files	15	31.91
To search database	17	36.17
To read material there	36	76.60
Others	04	8.51

Table 7 shows for which purpose you use library 76.60% journalists use the library to read material there and 38.29% to barrow materials, 36.17% use the library for the purpose of search database and some other journalist to study back volume of journals & newspapers files and others 31.91% & 8.51% respectively.

Table: 8 Sources used for the purpose of specific information

Sources for specific information	Respondents	Percentage
Government publication	32	68.08
Encyclopedia	19	40.42
Periodicals	21	44.68
Handbooks	16	34.04
Archival sources	28	59.57

Table: 8 represents 68.08% responds says the purpose of specific information is from publication and 57.57% information archival sources, 44.68% specific information is from periodicals, and other specific information is from encyclopedia and handbooks that is 40.42% and 34.04% respectively.

Table: 9 Sources used for the purpose of updating current information.

Purpose to update the current issues	Respondents	Percentage
Government publication	18	38.29
Periodicals	21	44.68
News magazines	22	46.80
News paper	42	89.36
TV and Radio Channel	38	80.85
Others	11	23.40

Table 9 this above table we can analyses that 89.36% journalists updated their current issues from newspapers, 80.85% from TV radio channels, 46.80% from newsmagazines and

46.68% from periodicals and other like government publication. Others that is 38.29% and 23.40% respectively.

Table: 10 Reading newspapers

Reading newspapers	Respondents	Percentage
Regular	42	89.36
Sometimes	05	10.63
Never	-	-

Table 10 this table says that 89.36% respondent read newspapers regularly and 10.63% journalist read newspapers sometime in a day.

Table: 11 Reading of different Newspapers

Reading of different newspapers	Respondents	Percentage
Times of India	35	74.46
The Hindu	38	80.85
Deccan Herald	30	63.82
Indian Express	26	55.31
Kannada Prabha	23	48.93
Vijayavani	32	68.08
Vijayakarnataka	28	59.57
Prajavani	33	70.21
Samyukta Karnataka	17	36.17
any others	03	6.38

Table 11 show the analyses that most of the journalist read the hindu newspapers i.e. 80.85% and secondly 74.46% respondent read Times of India, 70.21% read Prajavani newspapers and 68.08% Vijayavani newspapers, next The Deccan herald, Vijaykarnataka, Indain Express, Kannada Prabha, Samyukta karnataka and othrs i.e 63.82%, 59.57%, 55.31%, 48.93%, 36.17% & 6.38% respectivel

Table: 12 Specific areas in the newspapers

Specific areas	Respondents	Percentage
Political activities	26	55.31%
Government affairs	19	40.42%
Social activities	17	36.17
Economic activities/development	12	25.53%
Educational activities	11	23.40%
Business/finance	08	17.02%
Others	06	12.76%

Table 12 represents 55.31% responds specific area of need information is from political activities 44.42% government affairs and 36.17% of specific area of need information is social activities. 25.53% from economic activities, and also from educational activities, business / finance and other areas i.e. 23.04%, 17.02% and 12.76% respectively.

Table: 13 Purpose of background information.

Purpose of background information	Respondents	Percentage
Newspaper clipping files	32	68.08
Back issues of news paper	42	89.36
Archival sources	38	80.85
Periodicals	16	34.04
Handbooks	06	12.76
Others	00	0

Table 13 Shows 89.36% responds used for the purpose of background information from that issue of newspapers and 80.85% information is from archival sources. Than 68.08% is from newspaper clipping files also used for background information, periodicals handbooks also used for background information that is 34.04% and 12.76% respectively.

Table: 14 Useful of library for Professional study of the journalists

Opinion about useful of libraries	Respondents	Percentage
More useful	18	38.29
Useful	21	44.68
Less useful	08	17.02

Table 14 Interpret that 44.68% library is useful for their professional study, 38.29% says library is more useful and 17.02% respondent says library is less useful for their professional study.

Table: 15 Access the internet

Access the internet	Respondents	Percentage
Library	15	31.91
Internet cafe	18	38.29
Home	23	48.93
Office	39	82.97
Mobile access	23	48.93

Table 15: shows most of the journalists access the internet in office i.e. 82.97%. and some of the journalists equally access internet from home and mobile i.e. 48.93%, and other journalists access internet from library and internet cafe i.e. 31.91% and 38.29% respectively.

Table: 16 Formal sources used by journalist to collect information

Formal sources for getting information	Respondents	Percentage
Your personal collection	08	17.02
Internet	38	80.85
News agency reports	18	38.29
Television	22	46.80
Radio broadcast	06	12.76
Others	02	4.25

Table 16 Represent 80.85% responds are use this information us a major sources of collecting information and 46.80% is from television. Apart from that there are other sources used to collected information i.e. new agency report 38.29% personal collection 17.02% and radio broadcast 12.76% and lastly they collect information from other sources i.e. 4.25%.

Table: 17 Attending of training Programmes on how to use databases or Internet

Attending of training Programmes	Respondents	Percentage
Yes	18	38.29
No	29	61.70

Table 17 Shows 38.29% respondents are attending the training programs for the use of databases. And 61.70% respondents says they are not attending any training program

Table: 18 Opinion about Training

Training for journalist is important	Respondents	Percentage
Strongly agree	18	38.29
Agree	13	27.65
Strongly disagree	09	19.14
Disagree	07	14.89

Table shows most of the journalists strongly agree i.e. 38.29%for training is important for information searching 27.65% journalists says training is agree for information searching. 19.14% responds strongly disagree and lastly 14.89% responds disagree for training they say it's not necessary for searching this information.

7. Findings and Suggestions

In this attempt has been made to analyze and interpret the collected data and the student's opinion about information seeking behaviour of journalists of Dharwad District. On the basis of information collected, results are presented in tables. Some of the major findings of the study are listed here:

Majority of the journalists i.e. 45 (95.75%) are working in private institutions in Dharwad District as compared to government organization's journalists.

1. Majority of the journalists of Dharwad District are aware and use Kannada language i.e. 45 (100%).
2. Majority of journalists are having 5 to 7 years of experience in current position. Junior journalists are having 2 to 4 years (36.17%) experience.
3. Most of the journalists are having the habit of collecting the relevant information directly through the Internet (89.36%). It clearly indicates that they are largely seeking the information from the internet.
4. Majority of journalists access the Internet in the office i.e. (82.97%) but a few number of journalists are access the internet in library and internet cafe. Almost, i.e. 11 (23.41%) respondents use library daily and 12 (25.53%) respondents visit library twice a week.

8. Suggestions

1. The Institutional library should subscribe to more number of information sources in electronic format.
2. Majority of the respondent's refers resources in Kannada language, hence it suggested that Kannada resources in abundant number should be made available.
3. Parent organization library should be collect and provide the materials on the basis of the information needs and requirements of the working journalists.
4. More number of reference sources in different languages, general reading and bestseller books of the year should be included in the collection of the institute library,

9. Conclusion

Journalists worldwide generally agree that sources who are given a guarantee of confidentiality need to be protected from having their identities made public. A complex and often misunderstood set of protocols has evolved whereby journalists agree to receiving "off-the-record" information. Confusingly, it is seldom clarified whether this status means (a) that absolutely nothing at all can be revealed; (b) that the information may be used as an anonymous tip-off if the journalist can get it confirmed by other sources; (c) that the information may be used directly, but without attribution to the specific source.

If a seeker of information discovers that an information source is unreliable in the quality and accuracy of the information delivered he or she is likely to regard the source as lacking in credibility. As may be expected, this is a subject of considerable interest in consumer research, since advertisers must persuade consumers to believe their claims for products and services.

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