DEVELOPMENT OF PROTOTYPE MODEL OF CENTRALIZED LIBRARY SYSTEM FOR SINHGAD INSTITUTES HIGHER EDUCATION LIBRARIES USING OPEN SOURCE SOFTWARE FOR ENHANCING LIBRARY SERVICES

A thesis submitted to

Tilak Maharashtra Vidyapeeth, Pune

For the Degree of Doctor of Philosophy (Ph.D.)

In Library and Information Science

Under the Board of Social Science Studies

Submitted By

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Under the Guidance of

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November-2015

DECLARATION BY STUDENT

I hereby declare that the thesis entitled "Development of Prototype Model of Centralized Library System for Sinhgad Institutes Higher Education Libraries Using Open Source Software for Enhancing Library Services" completed and written by me has not previously formed the basis for the award of any Degree or Diploma or other similar title of this or any other university or examining body.

Place: Pune
Date:

Mr. Shirish Sharad Kulkarni
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DECLARATION BY GUIDE

This is to certify that the thesis entitled "Development of Prototype Model of Centralized Library System for Sinhgad Institutes Higher Education Libraries Using Open Source Software for Enhancing Library Services" Which is being submitted herewith for the award of the degree of Doctor of Philosophy in Library and Information Science of Tilak Maharashtra Vidyapeeth, Pune is the result of the original research work completed by Mr. Shirish Sharad Kulkarni under my supervision and guidance and to the best of my knowledge and belief the work embodied in this thesis has not formed earlier the basis for the award of any degree or similar title of this or any other University or examining body.

Place: Pune
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Dr. Nanaji G. Shewale
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CERTIFICATE

This is to certify that the thesis entitled, "Development of Prototype Model of Centralized Library System for Sinhgad Institutes Higher Education Libraries Using Open Source Software for Enhancing Library Services" submitted by Mr. Shirish Sharad Kulkarni for the award of the degree of Doctor of Philosophy in Library and Information Science, under faculty of Social Sciences to Tilak Maharashtra Vidyapeeth, Pune is the result of the genuine and bonafide research work completed by him under my guidance and supervision. To the best of my knowledge and belief, the work embodies in this thesis has not formed earlier the basis for the award of any degree of similar title or any other university or examining body. All references and various sources made use of in this research project have been duly acknowledged and the thesis of accepted standard of contents and presentation has been submitted for the consideration of the award of the degree.

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Mr. Shirish Sharad Kulkarni
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Abbreviations

AACR	Anglo - American Cataloguing Rules
ALA	American Library Association
AMC	Annual Maintenance Charge
APA	American Psychological Association (Style Manual)
ASCII	American Standard Code for Information Interchange
BNB	British National Bibliography
CAS	Current Awareness Service
CC	Colon Classification
CCC	Classified Catalogue Code
CCF	Common Communication Format
CCL	Common Command Language
CD-ROM	Compact Disk – Read Only Memory
CLS	Centralized Library System
CLMS	Centralized Library Management System
CMC	Computer Maintenance Corporation
CPU	Central Processing Unit
CSIR	Council of Scientific and Industrial Research
D.F.	Degree of Freedom
EDI	Electronic Data Interchange
ERP	Enterprise Resource Planning
FOSS	Free Open Source Software
FRBR	Functional Requirements for Bibliographic Records
GIF	Graphics Interchange Format
GPL	General Public License
ICSSR	Indian Council of Social Science Research
ICT	Information and Communications Technology
IFLA	International Federation of Library Associations
ILL	Inter Library Loan
ILS	Integrated Library Systems
ILMS	Integrated Library Management System
INFLIBNET	Information and Library Network

IP	Intellectual Property
IP	Internet Protocol
ISBD	International Standard Bibliographical Description
ISBN	International Standard Book Number
ISDS	International Serial Data System
ISHR	Indian Council of Historical Research
ISPR	Indian Council of Philosophical Research
ISSN	International Standard Serial Number
LAN	Local Area Network
LC	Library of Congress
LMS	Library Management System
MAN	Metropolitan Area Network
MARC	Machine Access Readable Catalogue
MHRD	Ministry of Human Resource Development
MOU	Member of Organization
NAAC	National Assessment and Accreditation Council
NCIP	Standard for Interlibrary Loan
OPAC	Online Public Access Catalogue.
OSPIs	Open Source Potential Indices
OSS	Open Sources Software
PDF	Portable Document Format
P Value	Table Value
RSS	Really Simple Syndicate
SDI	Selective Dissemination Service
SPSS	Statistical Package for Social Sciences
SYSTEM	Software Package
URL	Uniform Resource Locator
UPS	Un-interruptible Power Supply
WWW	World Wide Web
WAN	Wide Area Network

SUMMARY

The ICT (Information Communication Technology) is playing most important role in information dissemination with help of computer applications in libraries and information centers. These computer applications are available as commercial, free or open source set of programmes. Recently, the activities of library automation and modernization are much discussed topic in conferences and seminars. These are related to availability of various software, the available features and functional modules of the software. In addition to this, database standards and compatibility in data and exchange format, data migration, cost of procurements are some of the basic parameters of concern. Irrespective of the type and size, once a library and information center decides to go automation, it needs to decide whether to select in-house, commercial, free or open source software. Even though, all these options are available in India. All these types of softwares have some benefits as well as drawbacks. If we think of in-house developed Library Management System (LMS), it has a major limitation of upgrading the software versions as per growing technology. If we think commercial LMS, major issue is the high capital cost and annual maintenance charges (AMC) which also includes supporting operating system charges and expenditure on antivirus maintenance. Last two three decades, most of the institutions are using commercial LMS by spending huge amount on library automation. In general, it is observed that both in-house as well as some commercial software developers ignored database standards like MARC21, UNIMARC, CCF, MARC-XML, and Z39.50 (data exchange support standard). On the other hand there is an option of open source software (OSS) which is made available freely by IT experts and LIS professionals to automate the libraries. Users can download at no cost, use it and modify / customize it as per the need. The OSS which can reduce the cost of library automation and enhance the library services by supporting database standards. Unlike commercial softwares, OSS can update automatically (provided connected to internet).

In the present study, researcher has identified the libraries of Sinhgad Group of Institutes which are geographically distributed all over the Maharashtra in

twelve different campuses at various locations covering 109 institutions with 48 libraries of higher education. As on today, all these libraries are using various types of commercial and in-house type of softwares and creating a hurdle in delivering the best services and getting the benefit of centralized library facilities. Secondly, these libraries are also spending huge amounts towards library automation. Researcher feels, if all these libraries come under one open source LMS, it will be fruitful to save time of the users and staff, money and resources of the organization and it can also enhance the quality of services provided by individual libraries.

Researcher has studied the present situation of the libraries in terms of services offered presently by commercial LMS in Sinhgad Group of Institutes and collected the information about features and facilities included in these systems. Current work exhibits OSS concepts, tools, techniques and features, etc. Researcher has studied the feasibility of the proposed model with the help of primary and logical data for making a decision of developing a model. In the feasibility study, it has been observed that, open source software, viz. Koha, can be an alternative solution to build centralized library management system for Sinhgad Institute libraries which can enhance the library services. After the feasibility study, researcher has developed a prototype model of centralize LMS considering Koha open source software.

It has been observed that, there is an opportunity to save the time of the users and staff of the library and improve the quality of the services provided by the libraries by introducing new services with the proposed centralized model. There is also an opportunity for the organizations to use the existing resources effectively and also to save on the cost incurred on various library automation aspects. If institute hires some technical expertise or provide training to the existing library staff regarding open source software, it will be the most powerful alternative to the commercial as well as in-house library management system.

Chapter-I
Introduction

1.1 Introduction:

In the 21st century, libraries are the major role players for organization, storage, retrieval and dissemination of the information for development of the society. After the World War II (1939-1945), many countries realized the importance of knowledge and focused themselves towards the growth of research, which led to rapid creation of vast information in all sectors. This information exposition in various sectors has created a need of getting a control on bibliographical index of published material (Phadke, 2012). The information explosion and development in Information Communication Technology (ICT) revolution has created major challenges in the library system with the changing expectations of the users. Now a days, information is available in different formats, like printed, non-printed, electronic and digital formats, bibliographical databases are also available in digital formats and according to experts; to manage this vast amount of digital information, libraries needs computer applications which can serve changing requirements. These applications are generally developed by commercial vendors or are available under open source licenses with terms and conditions (Barve & Dahibhate, 2012). According to P.S.G Kumar (2002) the areas of library automation can be categorized into two main areas i.e. library housekeeping and information handling.

The term automation was first introduced by D. S. Harder in 1936. Library automation is passed through several developmental phases to introduce the computers in library. To automate our libraries, three methods are suggested by Phadke (2012) and these are; library automation by using in-house library management system, commercial library management system and open source library management system. According to Lakpathi (2014) there are three types of library management softwares available in Indian market, i.e. commercial library management systems, open sources and free library management systems to automate our libraries. These have been designed and developed for various libraries and information centers.

Library Automation Using In-house Software: As a solution, when the commercial software cost was highly expensive, at initial stage the IT experts, in the organizations used their skills to develop the library management software by their own efforts. It is observed that, the database standards are absolutely ignored by such developers. The developer had concentrated only on basic facilities like issue-return and creation of master databases. But in most of the cases, it did not bear fruit, the key reason behind that is mobility of IT expert towards IT industry and changing technology affects the updating of the software or its versions. The gradual reduction in prices of commercial Library Management System (LMS) led to replacement of in-house development approach by commercial LMS.

Library Automation Using Commercial Software: The commercial softwares are also introduced with good features, more security and advanced technology at national, international and local level. In India, AutoLib, EasyLib, SLIM, Librarian**,** SOUL (Software for University Libraries) and LibSuite, etc. are some of the brands developed by the software developer. These commercial LMS are also changing their interface as per driven technology, but they cannot able to reduce the cost of library automation. According to Altman (2001) our libraries are automated more than three decades ago, but we are yet to get a success in creating uniform bibliographical database of all the libraries. Many commercial library software developers have also ignored data entry support with library standards, such as MARC 21, Z39.50, AACR-II, etc. which are available for various purposes like, cataloging and classification.

In India, not all the libraries and information centers have gone for library automation, those got automated are mostly using the commercial LMS. It is observed that, libraries are spending huge amounts on library automation, now a days the tentative cost of the commercial LMS starts from Rs. 50,000/- and goes beyond Rs. 10,00,000/-. The automation expenditure consists of LMS capital cost, different hardware and software along with Annual Maintenance Charges (AMC), operating system charges (yearly/permanent licenses) and antivirus installation charges. To support this discussion, Red Hat India Pvt. Ltd, sponsored a study on, Economic Impact of Free and Open Source Software:

India, conducted by De Rahul (2009) focused on the charges related to operating system, antivirus and other supporting (office related) application softwares. According to this report, the tentative cost for operating system was Rs.3,600/- onwards per computer (yearly) to Rs. 16,500/- for permanent licenses in year 2009. According to him, if only High Schools in India (Approx. 152,000 nos.) use FOSS (Free or open source operating system packages), India will save $26.6 billion dollar. He also discussed about antivirus installing cost, with the help of various sources, the antivirus sale is growing from $313 million dollars in the year 2001 to $4,810 million dollar in year 2008. He also predicted about antivirus installing cost will be $38,000 million dollar in year 2013 in India.

According to Bharti (2010) now a days libraries are moving towards advanced library services which are based on advanced technology and web, but the rising cost of technology, reduction in staff, devaluation of rupees against major currencies and budget cut are the major concern in India affecting on library services. The rising cost of implementations has compelled the libraries to use or search other options, if available i.e. open source softwares for library automation.

Open Source / Free Software: An Open Source Software (OSS) has a wider scope in software industry. There are two types of software in open source software, one is called ‘free software’ and another is ‘Open Source Software’. Richard M Stallman (1983). Open source software applications are made available freely from central pools like www.sourceforge.net where the users can download the programme along with ‘Source Code’, where users are able to install, use and change or modify these software programs as per their requirements. In addition to this users can also distribute, evaluate the programme and provide feedback to the developers. Open source software has two basic properties, the first one is `Source Code` or programme and it can be converted into proprietary version or commercial version. Free softwares are the readymade set of programmes and free for downloading but user cannot change the programme as per his need as the source code is not made available.

There are so many open source softwares available on the web for various purposes. If we think of the open source software, they are available for operating system platforms, i.e. Linux, (Operating system), Mozilla (Web browser) derived from Netscape, Open Office (in place of MS Office) and Perl (a very popular programming language), MySQL and PostgreSQL (Worlds most advanced open source database management software), etc. (Mishra, 2010). Additional to this UNIX, Ubuntu (Operating system) Android (Mobile operating System) are also popular programmes. Android based applications are popular programmes which are used in mobile technology. In the area of programming language, Mango dB is programming language, Java, C, C++, Java Script, PyLab, Python, etc. options are available on Internet.

Library Automation Using Free / Open Source Software (OSS):

Open source technology used in creation of digital libraries with the help of open source digital library management software like Greenstone, DSpace and E-print etc. (Coyle, 2002). On the other hand library management softwares like Koha, NewGenLib (Open Source) and e-Granthalaya (free) which are being used as an integrated library management system. OSS has been using 'Collective Intelligence' in developmental process of the software, the utilization of public intelligence in development process, resulting in an escape from drawbacks of commercial software. It is possible due to Web 2.0 technology. Open source software like 'Koha' has a facility to connect our library database to cloud and according to IT experts, Singh (2014) there are so many companies like, Tata Consultancy Services (Mumbai), Infosys (Bangalore), Wipro Limited (Bangalore), etc. are the top ten companies in India for providing their cloud services.

Use Status of OSS at International Level:

Researcher, Breeding (2011) has carried out a survey of automation softwares used in United States (US) academic and public libraries and found that, many libraries in US continue to adopt Open Source Integrated Library Systems (ILS) rather than proprietary products. According to Barve & Dahibhate (2012) Evergreen and Koha integrated library systems have become mainstream open

source software are being used all over the world and 'Koha' is one of the old, popular and international based open source software used for library automation.

Use Status of OSS in Indian Context:

In India the first installation of OSS (Koha) was deployed in St. Joseph's college, Devagiri, in the Indian State of Kerala. In 2007, Delhi Public Library has started to use Koha open source LMS. In Tamilnadu, 32 district libraries and Connemara Public Library were automated and networked using OSS; Anna Centenary Library in Chennai also using OSS, for library automation. From year 2010 Mysore University is using open source software. Educational institutions under Institute of Human Resources Development (IHRD) have adopted OSS in their libraries, by providing in-house training for library staff and professionals. In corporate sector, Jain Irrigation Pvt. Ltd. has moved towards OSS, Koha, in this year (Raval, 2013). Mahatma Gandhi University Library, Kottayam, Kerala officially moved to open source library management system on 13th August 2013. Dr. Sheena Shukkur, Pro-Vice-Chancellor of Mahatma Gandhi University, Kerala inaugurated 'Koha' system at Mahatma Gandhi University Library (Kumar, 2013). In Maharashtra the private organizations like Symbiosis, Pune, has also moved towards open source software. Bharti Vidyapeeth's Dr. Patangrao Kadam Mahavidlaya, Sangli, Pillai Group of Institutes, Panvel (Mumbai) is also switched from commercial LMS to Open Source Software.

In research sector, Most of the government organizations like CSIR (Council of Scientific and Industrial Research), National Environmental Engineering Research Institute, Nagpur had published an advertisement for recruitment of Project Asst. (Library) on 16th August 2013 on their official website www.neeri.res.in/recruit.html asking the incumbent having specialized knowledge of OSS. CSIR's, National Institute of Oceanography (NIO), Goa has too published an advertisement for recruitment of Senior Technical Asst. (Library) on their official website www.itg.nio.org asking the incumbent having specialized knowledge of OSS based on Linux operating system. From this information it is clear that, now government sectors is also aware about open source software utilization.

According to Bharti (2010) the trend is moving towards OSS and web 2.0 applications are attracting librarians towards open source software. The areas where libraries can see the implementation of open source softwares are library automation, digital repositories, consortium planning, content management and office management, etc. According to Tripathi & Prasad (2010) it has been observed that, in India uses of open source software are in initial stage and still not implemented up to the desired extent at college level and many of the libraries hesitate to work with open source software technology and some library professional feels uncomfortable with new technology or they find it difficult to adopt open source software with fear of handling such systems.

Considering above information, researcher feels that there is still scope to study the problems and prospective in library automation area and hence the researcher has selected a case of Sinhgad Group of Institutes for this study. This group of institutions is geographically spread all over the Maharashtra with their schools and colleges. Researcher is presently working with Sinhgad Institute as a librarian, having a considerable acquaintance with the environment of the institute, identified an opportunity in Sinhgad Institutes, to enhance in the library services and reduce the cost of library automation by introducing technology driven alternative solution to the existing library management system through this research.

1.2 Need of Study:

Different studies reveal that, a large number of libraries are automating their library operations using commercial library management softwares. A huge amount of money is poured for the purpose of library automation using commercial library systems. In a developing country like India, it's getting difficult for the libraries to survive due to the financial crisis. On the other side there are many Open source software available over the internet to download freely and start using. Unlike the commercial software, these softwares are updated frequently. Each of these software packages has pros and cons but it is expected to meet the library standards and will help to provide enhanced services to the library users at lower cost and faster than ever. Most of these open source software are far better and effective in terms of their features. With this study, the

researcher would like to study and compare the feasibilities and features of OSS along with commercial softwares used in Sinhgad Institute libraries.

Website of Sinhgad Institutes (2013) gives following information of their institutions. There are total 12 campuses along with 109 higher educational programmes at various places in Maharashtra. It is observed that, there are 48 libraries that are facilitating library services to these programmes by using different types of commercial LMS. At present, Institute is spending huge amount for library automation. Inspite of the huge expenditure, these softwares are not able to connect to each other as the facilities and features are different for each LMS. Most of the library management systems are using old technologies for frontend and backend; these LMS are not updated. Most of these softwares are not able to give web based services. To avoid duplication of data entry work and to build efficient resource sharing among these institute libraries this study is very important. Researcher feels that, if all these libraries come together with uniform LMS platform in the network, it may reduce the cost of library automation, enhance the library services and utilize existing resources effectively. This study will also help the aspiring librarians who wish to automate their library or to make a decision to switch between the commercial and open source software.

1.3 Significance of Study:

1. **Networking of libraries with single LMS:** The development and growth of Information Communication Technology (ICT) has been changing the applications in hardware, software and networking technology. The users are also using these advanced applications based on web technology. World Wide Web (WWW) has played the most important role in networking technology, and that is why the centralized controlling is with single library management software is possible in library automation even if the libraries are geographically distributed and able to connect through network. Interlinking of all the Sinhgad group of institute libraries, with single LMS is possible with the help of the network.

2. **Cost reduction:** This research will also show the cost analysis of commercial software used in Sinhgad Institutes higher education libraries. It is possible to reduce the cost of library automation in which various types of hardware, capital cost of software, and cost of other supporting software are included. This research will give direction to saving the recurring cost of library automation.

3. **Enhance the library services:** From this study, all library professionals will recognize various types of commercial library management software used by Sinhgad Institutes libraries. Researcher has compared the commercial library management software features with open source software for providing an informational direction to professionals about the LMS features. This study will also develop implementation plans for enhancing the services of libraries.

4. **Transparency in library administration:** This study is helpful to organization heads who wants to keep centralized control on various managerial aspects like administration and communication. This study will also be helpful to librarians for centralized control on various aspects like, administration, distribution of budget, to keep control on purchase, to make transparency in circulation, getting uniformity in centralized data entry process, communication, etc.

5. **Resource sharing:** This study is helpful for maximum utilization of the available library items or resources, utilization of human resource by sharing their works with the help of technology, i.e. support in data entry, organizing bibliographic records as per international standard, etc.

6. **Change the attitude of librarians towards OSS:** Most of librarians have hesitated to use open source software. The researcher believes that the successful achievement of this study will be changing the attitude of librarians towards use of open source software instead of commercial library systems.

7. **Maximizing diffusion or circulation of OSS:** This study will help in maximizing the diffusion, utilization and circulation of open source software among the professionals.

8. **Build a strong relationship:** This study may help to build a community among the librarians and software developers for upgrading their systems as per professional need.

1.4 Statement of Research Problem:

The above information directs attention towards the facts related to library management system. Researcher feels that, open source software implementation will enhance library services and may reduce the cost of organization. To understand the facts of these issues, the present research work is undertaken and it has been titled as *"*Development of Prototype Model of Centralized Library System for Sinhgad Institutes Higher Education Libraries Using Open Source Software for Enhancing Library Services*"*, which deals with specific issue; the needs of organization and demands of library professionals.

1.5 Objectives of Study:

This research mainly focuses on the following objectives-

1. To study the services presently offered by automated libraries of Sinhgad Institutes.
2. To study concepts, tools and techniques related to OSS.
3. To evaluate the library management softwares used by Sinhgad Institute's higher education libraries.
4. To compare commercial and open source softwares in terms of features and services.
5. To study the feasibility and implementation of centralized library system using open source software in Sinhgad group of institutions.
6. To build a prototype model of the centralized library system of Sinhgad Institutes higher education libraries using open source software for enhancing library services.

1.6 Hypothesis of Study:

1. Individual libraries falling under one parent organization or institute use different library management systems for library automation and thereby creating a hurdle for centralized library system.
2. Implementation of centralized system can enhance the utilization of resources in terms of technical processes like cooperative acquisition, cataloging, union catalogue, etc.
3. Using a single library management system, irrespective of commercial or open source can enhance the quality of services provided by individual libraries.
4. Use of open source software can be an economical solution for library automation in terms of the consistency and the cost involved.

1.7 Research Methodology:

This research is descriptive and analytical in nature and is of inferential approach. To conduct this research, researcher has used **descriptive research method** to collect the data from responding libraries.

1.7.1 Research Techniques:

Researcher has used **Survey technique** to conduct the present research, among the group of Sinhgad Institute libraries. There are total 48 higher education institute libraries under the umbrella of Sinhgad group of institutes. Researcher has used census enquiry among these libraries. A **census enquiry** is techniques which are having two meanings. The Dictionary of social research methods, (2014) defines; a census enquiry is an attempt to collect data from every member of the population being studied rather than choosing a sample. The other is a specific form of social survey organized by governments with the aim of collecting information from every household in the country.

1.7.2 Research Tools:

A **questionnaire and observation** tools are used as per the necessity to support the **survey** of institute libraries. In additional, researcher has discussed with some librarians to stimulate their personal opinions about library automation and their future views regarding library services. The literature review is also conducted to analyze the past and present situation in the area of library automation. While

preparing the questionnaire proper care has been taken to cover all the aspects related to library automation which covered under study to fulfill the objectives of this research. The questions are divided into ten sections systematically and arranged logically. The discussions with librarians are unstructured in nature to get more information.

1.7.3 Selection of Sample:

The higher education libraries of the Sinhgad Institute libraries are the population of this research. Researcher has **selected entire population** for the data collection through census enquiry. The sample of this particular research is 43 automated and 5 non-automated libraries i.e. the entire size of population is 48 respondent libraries. The researcher has determined the parameter of interest regarding this research, in terms of sentence which is to determining the problems and prospective in library automation using open source software.

Sample Selection of OSS for Study:

Researcher has selected Koha, NewGenLib (open source) and e-Granthalaya (Free Software), integrated library management softwares by **purposive sampling method** on the basis of following criteria, for conducting the detail study of selected softwares in terms of its features and facilities comparison with existing commercial library management software used in Sinhgad Institute libraries.

Criteria 1: Popularity of the open source software

Criteria 2: The software package must be available for free download and installation at no cost via an open source license.

Criteria 3: The software package should be relatively well known and commonly used as well as inferred from the number of bases installed, especially in credible organizations or university.

Criteria 4: The software must be used either on Linux or Windows, as these are commonly used platforms.

1.7.4 Scope of Study:

The scope of the research is divided under four areas which is given blow,

1. Geographical Scope- The geographical scope of the present study covers 12 campuses of Sinhgad Institutes that includes 48 higher education libraries from all over the Maharashtra.

2. Topical Scope- The topical scope of the present study is restricted to study various commercial softwares used in Sinhgad Institute higher education libraries and study of Koha, NewGenLib and e-Granthalaya LMS. The purpose of this study is not to present which is the best library management software as compared to the other or not attempt to give the rank for any particular software to indicate the best software.

3. Analytical Scope- The analytical scope of the study is to focus on the objectives of the study, and on the techniques followed such as classification of data, presentation of data, percentage calculation, comparison, testing of hypothesis through statistical devices. Past four years statistical information is collected to find out the facts related to the cost and services in this study i.e. (Jan 2010 – Dec. 2013)

4. Functional Scope- The functional scope is confined to offering a set of meaningful suggestions about development of prototype model for centralized library system using Open Source Software (OSS) like, 'Koha' for enhancing the library services.

1.7.5 Limitations of Study:

1. Open source software has wider scope in the software industry, like Digital Library Management Software (DLMS) and Integrated Library Management Software (ILMS) etc. This study deals only with the ILMS packages like Koha, NewGenLib (OSS) and e-Granthalaya (free software).
2. Common questionnaire is designed to get responses to the relevant questions from automated and non-automated libraries and circulated only among the Sinhgad Institute libraries.
3. Ambiguity/doubts were expressed by the respondents while filling the questions related to the cost, and hence some of the respondents stated approximately cost in the questionnaire.

1.7.6 Data Requirement for Study:

For the present research work, the data related to the following aspects was of prime importance;

- Profile of Sinhgad Institutes.
- Profile of Sinhgad Institute higher education libraries.
- Details of Sinhgad Institute higher education libraries in terms of collection and library personnel.
- Details of IT infrastructure of the Sinhgad Institute higher education libraries.
- Present status of existing library automation system.
- Reasons for non- automation of the remaining five libraries.
- Extent of existing library automation system, their features, applications, expenditure.
- Use pattern of existing library automation systems and expectations of the users and library staff from software.
- Open source software literacy and opinions or comments related to using OSS.

1.7.7 Data Collection Sources:

In order to achieve the objectives of this research, researcher has categorized the data into primary data as well as secondary data and rearranged scientifically into primary and secondary sources of the data collection.

1. Primary Data –

The primary data was collected through fact finding techniques like, administering structured questionnaire, personal interviews or discussions and onsite observation.

a. Questionnaire: In order to elicit data from respondents, researcher has prepared questionnaire for librarians of Sinhgad Institutes. Thus the structured questionnaire was administered to obtain necessary primary data.

b. Personal interviews (informal) or discussions: Researcher has collected the necessary data through personal interaction and discussion with librarians of Sinhgad Institutes.

c. Personal observation method: Researcher has collected relevant data from respective libraries. The relevant data was also collected by personal silent observation of libraries and personnel work style of institute librarians.

2. Secondary Data –

In order to avail the secondary data necessary for the study, researcher has used books, Periodicals and Journals. Researcher has also personally visited different units of Sinhgad Institutes higher education libraries and official websites of related units of Sinhgad Institutes. The definitions, concepts and bibliographical data is collected from indexes, abstracts, bibliographic databases, dictionaries, encyclopedias, etc. relevant informational tools to state the information about terminologies and development of bibliography.

1.7.8 Data Analysis Plan:

Data is collected through various sources and analyzed by scientific and systematic way through statistical softwares like Statistical Package for Social Sciences (SPSS) and Microsoft Excel using the techniques like, graphs, tables, charts, etc. Similarly the hypotheses were tested with the help of, test of proportionality method of Statistics. The data analysis was processed on computer for the purpose of maintaining accuracy in order to draw meaningful and constructive measures if possible. In addition to this, American Psychological Association (APA) style manual is used to create a bibliography of used references.

1.8 Chapter Organization:

In present work, researcher has organized the study in eight logical chapters of which the outline is given below.

Chapter I: Introduction

In the introductory part of this first chapter, researcher has described the concepts information explosion, need of library automation, methods of library automation

and cost incurred on supporting softwares as stated by various research scholars. Along with this, use status of open source software at national and international level has been explained in this chapter. This chapter also described the need, objectives, hypothesis and significance of this research. Researcher has also explained the research methodology, research tools and research techniques which are being used for this study. Apart from this, researcher has also stated the sampling techniques, selection of sample, scope and limitations of this research.

Chapter II: Review of Literature

In this chapter a detailed literature review is carried out with the help of primary and secondary documents. In addition to this, the literature is collected from online (www) source also. The researcher has reviewed the literature on history and evolution of library automation, case studies relevant to this research, methods and challenges of library automation in India. History, growth, need, advantages of OSS and comparative studies of commercial and OSS, case studies related to data migration, etc. also reviewed. The evaluation of reviewed literature is also explained in the last point of this chapter.

Chapter III: Library Automation: Commercial and Open Source Software

This Chapter further deals with, the theoretical information on the various aspects related to library automation, commercial softwares and open source softwares. Major aspects studied comprises of history and evolution of library automation; methods of library automation, definitions and advantages of automation. Researcher has also illuminated the information on some open source as well as free library management softwares. The information on some OSS packages has stated with the help of secondary data in terms of features and facilities.

Chapter IV: Sinhgad Group of Institutes

In this chapter researcher has given information about the establishment, growth, development and mission statement of the organization where the research is conducted. The purpose of describing this information is to display the information about research area, research organization and research population, etc. The brief information on the libraries of Sinhgad Institutes, their automation status and extent of library automation is also explained.

Chapter V: Data Presentation, Analysis and Interpretation

This chapter covers the analysis and interpretation of relevant data collected through questionnaire on various aspects like, general information about Sinhgad Institutes and libraries, cost incurred for library automation and its IT infrastructure of individual libraries, use pattern of various LMS packages, data structures / data formats of different libraries, resource sharing practices among Sinhgad Institutes, knowledge / IT literacy about open source software. In this chapter, data is analyzed with the help of tables, charts, pie-charts, percentages, circles and many more techniques of data analysis as per necessity.

Chapter VI: Feasibility Study of the Proposed Model

In this chapter various types of feasibilities like, economic, technical, operational, and scheduled feasibilities are being checked out to make a decision for introducing the proposed prototype model for centralized library management system using open source software for Sinhgad Institute higher education libraries.

Chapter VII: Development of Prototype Model for Centralized LMS Using Open Source Software

This chapter specially deals with the plan to develop “Koha” based centralized library management system. It also comprises the steps related to installation of “Koha” library management system. This chapter also highlights the required hardware and software, customization for group and individual libraries, customization of library material, plan of data importing, cost of outsourcing of service providers and training cost, etc. Finally, researcher has presented a proposed model for Centralized Library Management System (CLMS).

Chapter VIII: Findings, Suggestions and Conclusion

This chapter deals with the list of findings, related to aspects like, information about Sinhgad Institutes and their libraries, IT infrastructure, services, automation status, cost involvements, use pattern of various LMS packages, resource sharing practices, OSS awareness and enhanced features and services from Koha. Testing of hypothesis, findings from feasibility study and feedback of prototype model is also part of this chapter. Further, the study is concluded with a logical conclusion.

Annexure:

This section contains bibliography, Questionnaire and feedback form of prototype model, etc. The list of bibliography is created on the basis of reviewed literature as well as literature that is used either directly or indirectly.

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Chapter-II
Review of Literature

2.1 Introduction:

Reviewing of the literature in the area of research is the preliminary step before attempting to plan the study. A critical review is a means of evaluating and interpreting all available research relevant to a particular research question, topic, area or phenomenon of interests. It contains three phases, planning of review, conducting of reviews and reporting of the reviews. A review of literature gives, in-depth knowledge related to the subject matter which helps to reveal the gaps remained in the available literature and provides direction, guidance and sometimes even different perspectives to look at the particular question. In a nutshell, it serves the purpose of providing a background related to the earlier studies, reports, articles, books etc. It gives a proof that the present study has already taken note of what others have done and written in the concerned area. Therefore, it is necessary to review all kinds of literature related to the subject matter.

In this chapter researcher has reviewed the literature that is available through books, Ph.D. thesis, M. Phil. dissertations, research papers, reports, articles, various websites and other published sources in the field of chosen research problem. This chapter further deals with literature reviews related to history and evolution of library automation, case studies on library automation, case studies related to OSS and comparative studies on OSS and their problems. Researcher has also reviewed thoughts and definitions expressed by various authors towards OSS concept and OSS movement at national and international level and benefits of OSS. In the last point the evaluation of the reviewed literature has been also discussed in this chapter.

2.2 Library Automation:

In 1936, D.S. Harder has used the term “automation” to mean automatic handling of parts between progressive production processes. The word “automation” has

been derived from Greek word “Automose” it means something, which has power of self-movement or spontaneous motion**.**

History and Evolution of Library Automation:

Phadke (2012) states the history and evolution of library automation. Author writes, in 1936 the first efforts were taken for library automation by the University of Texas, in which they used a mechanical system in their circulation function. Then in the year 1940-1949 IBM has introduced computers in circulation function for semi mechanical applications by including edge-notched cards, optical coincidence and Peek-a-boo card system. The library automation first introduced in 1950s in America (USA) but it has really grown in the next decade after reducing prices of computers. In 1950-1959 the period of punched cards has been known for development of data processing equipment’s and micro image searching systems. In which Dr. H.P. Lune has made the first computational index in 1957, at that time the first step of library automation was completed by making computerization of the cataloguing cards and developing their indexes.

Raizada (1965) According to the author, in the Indian scenario the first attempt of library automation can be traced after 1960. The Indian libraries and information centers had made efforts to ‘automate’ their libraries for providing information services with punched card systems. A couple of second generation computers were used at Kanpur and Bombay. In 1964, INSDOC was the leader in experimenting with computers for their application in documentation and informational work. Initially they made use 72 of the IBM 1620 Model- I and that was available at IIT Kanpur. Initially the first attempt was to collect the data for union catalogue of scientific serial.

Haravu & Raizada (1967) Haravu and Raizada carried out an experiment with IBM 1620 in computerized data retrieval, as part of this course in documentation and reprography conducted by INSDOC, with the cooperation of Raizada who initiated computerization in INSDOC. The objective of his experiment was to find out the suitability of IBM 1620 computer for storage and retrieval of data. The program for this experiment was written in FORTRAN 11 D language. The programming done in this experiment may be considered under three heads like

for storage of data, retrieval of data and presenting the data in an intelligible form. The data on the code sheets was key punched and verified.

Murty & Arora (1974) According to the authors, the next experiment carried out at INSDOC. The computerization was on preparing for author and subject indexes to Indian Science Abstracts. In 1969, an attempt was made to develop and complete an integrated program deck (level) to process the union catalogues for Mysore (now Karnataka) using the computer facility at Delhi School of Economics. It is said that the computer system posed certain problems for this data file, though finally the main part with indexes was produced. To overcome the problem of online storage limitations, the INSDOC completely redesigned the work to suit the IBM 360/44 computer at the Delhi University computer center.

Harold (1966) this research paper submitted on ‘‘Experimental Studies in Automated Document Classification” (Development Corporation Santa Monica, California) where as he presented his studies in the use of factor analysis a mathematical technique for deriving classification categories for a set of documents. Author writes, in an automated classification, the class membership is determined on the basis of the words contained in the documents and the documents can be ordered into classes on the basis of similarities or differences in vocabulary. He had investigated the applications of factor analysis to these problems of document classification. He concluded that the techniques of automated document classification can be used to organize the specialized document collections.

Pandey & Sharma (1995) in this research paper history of library of automation is given very well. Author writes H.P. Luhn had organized computerized indexes in 1950s. Computers were entered and found some place in American libraries during this decade. However their use and applications was very limited and restricted due to the high cost of hardware and non-availability of application software packages. During 1960s the cost of hardware was reduced (slashed) down and appreciable attempts were made towards development of library application packages. This led to increased use of computers in libraries and printing industries. In April 1960 the American Chemical Society published its

'Chemical Titles' through computers. In this direction effort was seen through MARC-I. In the year 1963 W.K. Gilbert prepared a report on computerization of Library of Congress. On the basis of this report of MARC-I project was started in 1966, and the work of bringing out of the Library of Congress Catalog in Machine Readable Catalog (MARC) form was started and completed.

Author writes, The Indian Statistical Institute, Calcutta was first in India who has installed computer systems in 1955 and to develop an indigenous computer in 1964. In India computers were used in library work for the first time possibly by INSDOC when they computerized the author and subject indexes of 'Indian Science Abstract' in 1965. Then in 1967 the INSDOC has brought out with the 'Roster of Indian Scientific and Technical Translators' with the help of computers. In 1978 INSDOC initiated SDI service as a NISSAT project with Chemical Abstracts and INSPEC data-bases, with the use of CAN/SDI software of IIT, Madras. In 1970s many libraries has attempted (ventured) in preparing computerized databases.

After, getting a financial support of NISSAT, many library networks were initiated and are operative, some of notable (famous) of these networks are CALIBNET (Calcutta Library Network) and DELNET (Delhi Libraries Network), INFLIBNET (Information and Library Network) PUNENET (Pune Library Network) etc. Among other networks notable are NICNET, INDONET, SIRNET etc. Nowadays many institutions such as DRTC, INSDOC, DESIDOC, NISSAT etc. are engaged in imparting training for computer application in library work through regular, sponsored and adhoc courses. The price of computer hardware and software has considerably reduced. Owing to these factors computers have become popular in Indian libraries.

Mahapatra & Chakrabarti (1997) in the book titled, "Redesigning the Library", authors has discussed about, journey of printed bibliographical database and its conversion towards electronic format. In this book of third chapter authors has also discussed about technological growth in information technology sector and its impact on libraries, in fourth chapter, authors has expressed his views on implementation of library management software.

Haravu (2009) in this research paper entitled “Emerging Initiatives in Library Management Systems” the author has discussed about evolution of library management system, changes occurring in information technology, user expectations and searching behaviors. The evolution of library management system, first generation period was 1950-1960s, and it was stand alone and no standard metadata in use. In 1960-1970s, MARC standard (Machine Access Readable Catalogue) is used for bibliographic records. After the year 1971 to 1990 there was pre internet generation and LAN, WAN, MAN networks are introduced. After the year 1992 - 2000 internet based services were started, in which generally web 1.0 based service was introduced, with the help of this, it is possible to get OPAC on web server. After the year 2000 there was web 2.0 was the platform of choice for software. In the concluding remark author comments on changing technological growth in commercial and open source software by incorporating the ideas and features provided by web technologies for library automation system. Author says, there is no doubt that open source initiatives particularly the community-sourced ones are likely to expand the options for libraries worldwide. Services to libraries will probably be the next big opportunity rather than products.

Case Studies and Other Literature Published on Library Automation:

Faisal & Surendran (2008) this case study report is specially created for Kendriya Vidyalaya named a report on Automation of Library at Kendriya Vidyalaya, Pattom Thiruvananthapuram. In this report, authors has given an account of information about advantages of library automation, steps derived for library automation and draft of plan, to automate the library with “Libsoft” integrated library management system.

Choudhari (2010) in this research paper author is focusing on 21st century what are the challenges to manage the libraries. Author mainly discussed about the area of budget, extensive library services, e-resource management, and impact of IT in library administration. In the concluding remark he suggests, library automation is essential aspect for providing the services to the library users. Author also says libraries are no longer confined within walls of a physical building but are virtual

electronically omnipresent and librarian's attitude is highly essential towards library automation.

Singh (2003) in this research paper researcher has discussed about library automation and the major role played by various library networks (INFLIBNET) for information dissemination. However author has discussed about the library automation efforts were being made in academic libraries especially in institution of special characters like IITS, IIMS etc.

Trapthi & Prasad (2010) in this book editor has mentioned the current situation in the preface, message about limitations in library budget, open source software movement, the implementation of OSS in e-governances, e-publishing and so on. In preface message editors especially writes that libraries have limited finance for serving the users against the increasing cost of software. The price of hardware is going down day-by-day, user demand for quick service affecting the library budget which appears to be shrinking day-by-day. The open source software technology is open source it is possible to reduce the cost involved in software and hardware and also it is a good technology for librarians for library automation. Lastly author writes, librarians have to keep on scratching their heads to have the cheapest solution with maximum features for library automation with open source software. Editor'ssuggested "Koha" is the free and open source software as a automation tool to automate all the activities of a library.

Tiwari (2010) in this book entitled "Library Automation" divided into nine chapters the author has given the definition of library automation in first chapter, author stated, library automation is the application of computers to perform traditional library housekeeping activities such as acquisition, serial control, administration, circulation OPAC and reports. Author says, library automation in India was slow process and got movement in 1980s. New professional library management software packages entered the Indian market and Indian companies have also tried to make it with an Indian flavor. Author also focuses on the impact of library automation can extent the quality of cataloguing information presented to the user choice. Author, directed towards automation can reduce amount of staff and time devoted to repetitive activities that must be done in any properly

functioning library. This book is designed to equip library professionals with basic knowledge about library automation. It also describes library networking, multimedia resources, online cataloguing and bibliographic databases in depth. In the last chapter author has discussed the problems and prospective of emerging library automation system.

Hopkinson (2009) in this research paper, researcher had discussed on last 25 years history regarding library automation and also find out the library automation research trends. For this purpose researcher had focused on developed and developing countries scenario, Nigeria, Thailand and India are taken as case studies. In this, researcher has said that open source software is the solution for realizing the economic problem.

Phadke (2010) this reference book is basically written in Marathi language. This book is divided into three sections; advance library computerization, library automation with advanced information technology and advanced librarianship. Author writes library automations first stage has been coming to an end now and starting a new phase, advance library automation, it contains web 2.0, open source, e-publishing and in advance librarianship contains information literacy. This book has given a lot of information on computer history, need of library automation, benefits of library automation, and information about various types of commercial as well as open source software. On page no. 323 – 334, author has discussed web 2.0 and its services like, RSS fields, Weblogs, Wikis, instant messaging, tagging, social bookmarking, and podcasting. In 16th chapter Page number 336 – 345, author has written on OSS and given information about installation of Koha, NewGenLib, and DSpace. Detailed descriptions about these library automation and OSS are discussed in theoretical background chapter of this thesis.

Bhardwaj & Shukla (2000) this paper entitled a “Practical approach to library automation” author describes the issues like explosion of information and shortage of space, the growth of users, cost hike in printed as well as electronic materials and benefits of resources sharing. Author also discusses the aims, objectives and need for the change of library tools and technique under the changing

environment. In this paper author has discussed the concepts of library automation, library automation areas such as acquisition, database management, classification, cataloguing, circulation, serial control, information retrieval, communication networks, and documentation services etc. The author simplifies the steps of software selection with the comparison in between some leading softwares.

Methods of Library Automation:

Phadke (2010) in this reference book author has discussed on three methods of library automation which are, library automation by in-house software, automation by commercial library management software and automation by open source software. In discussion of library automation by using in-house software, author writes, as a solution, the commercial software cost was highly expensive, the organizations used to develop the library systems by their own efforts. It is observed that, the database standards are absolutely ignored by such developers. The developer had concentrated only on basic facilities like issue-return and creation of master databases. But most of the cases, it did not bear fruit, the key reason behind that is mobility of IT expert towards IT industry and changing technology affects the updating of their versions. The gradual reduction in prices of commercial LMS led to replacement of in-house development approach by commercial LMS. In discussion about, library automation using commercial software, author writes, the commercial software are also introduced with good features, more security and advanced technology but the cost of the software, updating charges, AMC charges, service problems and benefits taken by the library compared with amount paid for, create headache for the libraries. There are so many commercial software developing in India, at national and local level, AutoLib, EasyLib, SLIM, Librarian**,** SOUL (Software for University Libraries) Libra 2000, Library manager, LibSuite, Libris, Libex.net, Lybsis, Lalanda, Nexlib, Swirl (software for informational retrieval), Gyanodaya, Biyani Technologies. On the International platform, other options are available to choose commercial software brands i.e. ADLIB library for Windows, Alice Library Automation Software, Book Librarian for Windows (for Schools), CDS/ISIS, Endeavor Voyager (ORACLE RDBMS), EOS Library system (Windows), Keystone Library Automation System, Innovative Interfaces Millennium, Micro Librarian System,

MINISIS, OLIB, Sagebrush Library Automation System, SIRS Mandarin M3, SRIS/ Integrated Library Management System, STAR/ Libraries, Surpass Integrated Library Management system, Tech-Lib, TLC (Integrated Library System), URICA Version , VTLS (Phadke 2010). These LMS are also changing their interface as per driven technology, but they cannot able to successes reducing the cost of library automation. In the discussion of, library automation using open source software, author writes, there are two types of softwares in OSS, one is called 'free software' and another is 'Open Source Software'. The open source softwares are free for downloading along with source code free softwares are not provides source code of the software. (Richard M Stallman).

Challenges for Library Automation in India:

Swar & Pandey (2008) this research paper author has discussed the challenges in the higher education system in India. Author says, Indian higher education system is suffering from lack of funds, autonomy, burden of affiliations etc. The real weak point of Indian higher education system is structural, and there is a need for rapid development in technology and communication. After the effect of globalization on education system brought rapid developments in technology and communication, we are foreseeing changes within learning systems across the world as ideas, values and knowledge, changing the roles of students and teachers, and producing a shift in society from industrialization towards an information based society, and researcher has sure that if libraries will made strong, it will be possible to make information based society.

One more case study is sponsored by Red Hat Pvt, Ltd, On Economic Impact of Free and Open Source Software - A Study in India, by Rahul, De (2009). This study is basically focused on cost of operating system, cost of antivirus and other office tools, which is being using for servers and desktops selling in India. Researcher has evaluated their approx. cost consumption of selected ten companies and predicted the market value (up to 2013) of the operating system software industry. According to author, the PCs (computers) sale at different distribution channels across the country have grown exponentially from about 430000 units in 1998 to about 3.6 million units in 2008 and he predicted to be about 5.5million units in 2010 and about 10.31 million units in 2013 only in India,

and approx. Rs. 3600/- considered for operating system the OS market may be in billions.

Bharti (2010) in this research paper, author has directed towards the challenges along with new developments in IT industry. Author writes, information technology is developing rapidly in various sectors. Library is also affected by the rising cost of technology, reduce in staff, devaluation of rupees against major currencies and budget cut are the major concern. The rising cost of implementations has compelled the libraries to use other options, if available i.e. open source software for library automation.

Altman (2001) One more study is focused that, many commercial library software developers have also ignored data entry support with library standards such as MARC 21, AACR-II, etc. that are available for cataloging and classification".

Kulkarni & Shewale (2014) it is observed that there are variations in the cataloguing and in classification numbers from library to library. In India, many university and college libraries are in the process of creating online public access catalogues (OPACs) after the automation, many software developers ignored the basic principles of classification and cataloging system at the time of library software development resulting in non-standardization of the library management system.

2.3 Open Source Software:

History and Growth of Open Source Software:

Many research scholars has studied and stated history and growth of open source software, Krishna (2001) has written the book entitled "Technological Future of Library and Information Science" which is further divided into eleven chapters. Each chapter shows various new aspects derived in library and information science technology, customer care, information education and evaluation are the major aspects discussed. Aim of this book is to bring out the role of new technologies in libraries in present day information environment and their new challenges and promises for library and information sciences. According to author, library sciences have two categories - public and technical. Operations

involving direct contact with the library users are considered as public services and all other operations are considered as technical services. Author says that 60% library staff is assigned to technical work.

Pandey & Verma (2010) in this research paper author has studied the definition given by open source foundation, open source tools like Linux, Apache Web server, Mozilla Web browser. Researcher has keenly focused on brief history of open source software. Researcher has pointed out year wise steps of evolution in the area of open source software. Researcher states, in 1969, there was a creation of UNIX in AT and T Bell Labs and development of ARPANET, first transcontinental high speed computer network was established. In 1973, there is a growth in popularity of UNIX. AT and T was prohibited by law to start any other business than telephone or telegram services. Hence AT and T started licensing UNIX without support. In 1974-1975 user groups were starting to grow wherever UNIX was introduced to share ideas, information, programmes, bug fixes and hardware fixes. In 1983 there was a development of ARPANET into what is today known as the Internet. Then 1985 Richard Stallman, a programmer at the MIT AI Lab, starts the free software foundation. The Free Software Foundation (FSF), started in 1985, intended the word 'free' to mean "free as in free speech" and not "free as in free beer." Since a great deal of free software already was free of charge, such free software became associated with zero cost, which seemed an anti-commercial response to trends in software world towards proprietary software packages and non-access to source code. He started to design a new operating system called, GNU. New license called General public license (GPL) was developed to allow individuals to incorporate their own rights in “free software”. In 1990 most components of GNU were complete except for Kernel *(Kernel, is an innermost layer of the operating system).* Then in 1991 Linus Torvalds, then student in Finland developed the UNIX compatible Kernel called Linux under the GPL, releasing the source code freely and later combined with GNU with Linux to create the operating system Linux. User communities helped to modify the source code to make operating system function better. Then in 1994 Launching of the first Linux distribution by Torvalds Led to an explosion of new Linux based on open source operating systems and application software to run on Linux platform. Then in 1998 the “free software” idea did not immediately

become main stream and hackers Bruce Perens and Eric Raymond agreed that the problem lay in the term “Free” Together with other prominent hackers, they founded the “open source” software movement and called it the Open Source Initiative.

According to Coyle (2002) Open Source Software (OSS) has wider scope in software industry. Open source software has been used extensively in various industries for operating system (OS) like Linux, Mobile OS - Andrioid, MySQL - database, application programming language- Java, Web scripting language - PHP, Web server - Tomcat etc. Bharti (2010) states that, the trend is moving towards OSS and web 2.0 applications are attracting librarians to use open source software, the areas where libraries can see the implementation of open source softwares are library automation; digital repositories, consortium planning, content management and office management etc. are the areas of automation. According to Coyle (2002) open source technology is used in creation of digital libraries with the help of open source digital library management software like, Greenstone, DSpace and EPrints etc.” On the other hand library management software like Koha, Evergreen, NewGenLib and e-Granthalaya are being used for library automation housekeeping activities. Open source software applications are made available freely from central pools like www.sourceforge.net whereas, the users can download, install, and use these software programs. They can also distribute, evaluate these software programs and provide feedback to the developers.

Randhawa (2013) the research paper entitled, open source library management softwares, which was presented in e-Library Science Research Journal, researcher has discussed on advantages, limitations of open source softwares. Researcher has majorly focused open source softwares like, Koha, Evergreen, ABCD, SENAYEN, BiblioteQ. In the concluding remark of this paper researcher has suggested, library science professionals should always update at accept changing the scenarios in IT sector. Researcher has also focused on worldwide growth in using OSS technology as more economical and effective. Researcher suggested, librarians and programmers should work together in order to implement open source integrated library systems and at the same time, library professional are

also required to acquire new skills for developing and managing the library by using open source LMS. For taking benefit from OSS additional training of advanced technology its education for the professionals is essentially required.

Dangi, Kumar & Verma (2010) this research paper namely "Applications of OSS in development of libraries and information centers" has provided definitions of OSS by different views to reflect a string of ideas in OSS field. According to author, an OSS is typically created and maintained by developers crossing constitutional and national boundaries by collaborations by using internet based communication and development tools. Output is generally a certain kind of "free" often through a license that specifies that applications and source code are free to use, modify and redistribute it as long as all user, modifications are similarly licensed. Quality, not profit, drives OS developers who take personal pride in seeing their working solution adopted. This paper also focuses on ten commandments given by Open Source Initiatives (OSI) that is, free redistribution, source code, derived works, integrity of authors source code, no dissemination against fields of endeavor, distribution of licenses, licenses must not be specific to a producer, license must not restrict other software, and licenses must be technology-neutral. This paper also shows the benefits of OSS. According to authors view, the biggest advantage of OSS is, software can be converted into local languages to provide benefits for local peoples with the source code available. Author also says that, OSS saves time to provide distribute the software. This also brings down the cost of development and the time involved in upgrading the software. As in the concluding remark author writes, due to rising cost of automation of libraries and information centers OSS can be used as alternative to modernize the libraries.

Sudge (2012) this research project is submitted for Ph.D. degree course in Tilak Maharashtra Vidyapeeth, Pune In this research project entitled, "Modernization of libraries attached to the defense training and education institutes in India: A study with reference to services and sources*"*. Researcher has directed towards the present status in defense training and educational institutes in the light of information technology and its applications. Researcher has suggested a model for

defense education and training libraries for adopting benefits of electronic publications with the help of networking technology.

Tamane (2011) this study entitled “A study of library automation and library management softwares used in Sinhgad Technical Education Society Pune city” submitted for M.Phil. course. This research is basically presented in Marathi language. In this thesis researcher has focused on current situation of library automation in Sinhgad Institutes, Pune, as well as studied used library management software. Researcher has suggested commercial library management softwares are working properly for providing the services, but researcher was not able to focus on their expenditure due to limitations of study.

Gokhale (2008) this study entitled “Analytical study of library softwares used in various management institute libraries in Mumbai city” submitted for M.Phil. In this dissertation researcher has focused on library management softwares used in various Management institutes in Mumbai city Researcher has commercial library management softwares as well as in-house library management software, in the service point of view. In this research, researcher was not able to focus on their expenditure and benefits of LMS, due to limitations of study.

Kemdarne (2012) this study entitled “Study of library automation and networking in dental college libraries affiliated to Rajiv Gandhi University of Health Sciences, Bangalore” submitted for Ph.D. course. In this research researcher has used descriptive research method and survey technique for data collection. Researcher has focused on various library housekeeping operations and also studied various OSS packages and concluded ‘NewGenLib’ open source software is a good option for networking the libraries for reducing the cost of Library automation.

Chavan (2007) this study entitled “The study of open source library management softwares” submitted for M.Phil. course, in this research, researcher has focused on various open source software packages. Researcher has concluded NewGenLib and Koha softwares are good softwares for college libraries and both software fulfill maximum need of college libraries. Yet, NewGenLib software is better than Koha to use in Indian college libraries. Researcher has also given directions to the

future research by expressing the areas like comparative study of open source and proprietary library softwares and the study of proprietary (commercial) library softwares.

Meaning and Definitions of OSS:

Sasikala (2005) Open source software can be defined from different point of views to reflect a string of ideas in the field of open source software technology, open source software means:

- Open source software is typically created and maintained by developers crossing institutional and national boundaries, collaborative by using internet-based communication and development tools;
- Products are typically a certain kind of "free", often through a license that specifies that application and source code (the programming instruction written to create the application) are free to use, modify, and redistribute as long as all users, modifications, and redistribution are similarly licensed;
- Successful application tend to develop more quickly and with better responsiveness to the needs of users who can readily use and evaluate open source application because they are free;
- Quality, not profit, drives open source developers who take personal pride in seeing their working solutions adopted.

Free Software Foundation (1986) published a definition for free software by Richard Stallman, who was president of free software foundation (FSF). The definition codifies four essential freedoms that computer software users should be entitled to, run the program for any purpose, study how the program was and adopt into your needs, redistribute copies, improve the programme and review your improvements to the public.

According to Open Source Initiative (OSI) 1998, open source software by giving ten characteristics description for software product considered as OSS which are, free redistribution, source code, derived works, integrity of the author`s source code, no discrimination against persons or groups, no discrimination against field

of endeavor, distribution of license, license must not be specific to a product, license must not restrict other software and license must be a technology (neutral).

Main Aspects of Open Source Software:

Altenhoner & Bibliothek (2005) this research paper has discussed the main aspects of open source software which are given below,

- Free re-distribution
- Accessibility of the quell code
- Changeability of the code and reuse in new software
- Inviolability of the original code
- No discrimination of certain persons or groups
- No restrictions for certain areas of usage (especially restrictions to commercial sectors)
- Distribution of the license, (no distribution with new rules!)
- License must not be valid for a certain product (e.g., as part of a software distribution)
- License must not compromise other software (that, e.g., is also included at the same data storage; disclosure agreements)

Need of Open Source Softwares (OSS):

Kumar (2005) in this research paper researcher has described the need of open source software, through expressing his views on OSS. The computer technology is changing rapidly and the problems and challenges are being created in library system. The Price of commercial library management softwares is very high and financially weak libraries cannot invest large amounts for library automation. Annual Maintenances Charges (AMC) is required for software updating and maintenance. Library community is largely made by not-for-profit, publicly funded agencies. The principles and practices of open source software are very similar to the principles and practices of modern librarianship. Both value free and equal access to data, information, and knowledge. On the other hand it is no doubt for adoption of OSS may lessen the time and manpower engaged in the library operation, so that the alternative is open sources software. Open source library

management softwares consist of the entire essential functional module which was available with proprietary or commercial softwares.

Advantages & Limitations of OSS:

Kumar (2005) in this research paper researcher has described the advantages of the OSS, through expressing his views regarding OSS. The open source software is free, more reliable, more secure, boasts faster development cycles, and better than commercial software in the area of features, performance and cost. The budget cuts, increased demand for services, lack of adequate staffing are creating hurdles to the librarians.

Randhawa (2013) in this research paper titled, open source library management softwares, author has expressed some limitations regarding OSS. According to Randhawa, at the time of up gradation of open source software, library needs support, for that library has to hire some experts help or make to arrangement with some big company.

Comparative Studies of Commercial Software and OSS:

Singh & Barik (2010) in this research paper authors has focused on open source software concept with some definitions, given by free software foundation (FSF) and Open Source Initiative (OSI). Author has discussed benefits of open source software, difference between open source software and commercial software, future of open source software. Author has also focused on some library automation software packages like, Koha, NewGenLib, Evergreen, PMB, Athenaeum Light, Avanti, Firefly, Java Book cataloguing system, ITIL Library management system, My Librarian, My Library, OpenBiblio, Open Book Open Source Library System, Open-LIS, PhpMyLibrary, Sean Soft Library Loan Management System. In the concluding remark author says, though open source concept is of one or two decades origin, it has taken a special place in the field of library automation. Most of the small and financially weak libraries are taking steps to accommodate this software. He also says, like commercial software it is most users friendly and flexible.

Mulla (2012) in this research paper, researcher has done survey in Mysore city, to find out current status of library automation. In that researcher has finds, there are more than 30 academic and research libraries. Researcher stated that, out of 23 libraries, only 17 libraries have computers and out of 17 libraries only 14 libraries have automated their library operations. In this study the investigators have touched various aspects related to library automation. The libraries that have not automated have given reasons for the delay to start automation work. Many libraries have network connections for sharing the information. The libraries operate with MYLIBNET, DELNET and INFLIBNET networking programmes.

Farzana & Khalid (2007) this research paper reviewed the current status of software used in the libraries of Lahore, to explore the satisfaction level of the software users, and to find out their problems and suggestions. To fulfill the research objectives, researcher has used survey technique. Researcher has conducted survey of automated libraries in Lahore for comparing academic (university, college, and school libraries), public and special libraries. Researcher has collected opinions from the whole population and collected data was analyzed quantitatively and qualitatively, and conclusions were drawn along with some recommendations. This research is limited to the automated libraries of Lahore and focuses on the comparison of software and determining librarian's opinions. The comparative analysis of softwares is helpful for foreign and local vendors of library software. It will also provide guidelines for libraries in developing countries, which are planning to automate their library services, helpful in selecting and maintaining software and choosing the most suitable library automation software to fulfill their library needs.

Kushwah, Gautamand & Singh (2008) this research paper describes about the comparisons of library management softwares on the basis of discussions with the library community regarding software used in India. It also includes the information available in related literature. Features of library automation software, which are mostly in practice by libraries i.e. Libsys and SOUL, are compared with open source system KOHA. For this purpose researcher has done survey of 57 various types of libraries as a sample. While surveying libraries, we had a discussion with library managers where they expressed problems, in using,

Libsys, SOUL and other library management systems. These problems can be summarized as, high cost, new version or new feature, additions are charged heavily. 10% to 20 % cost of total price is charged as a maintenance cost especially by commercial vendors, some software have not introduced any new addition after its first version is released.

Singh & Deka (2008) this research paper mainly focused on, the different open source software. In this paper researcher has discussed the problems of library automation in Assam in terms of economic, trained manpower, negative attitude of authorities and most cases the library professionals are not conversant (familiar) with the library automation environment. In this paper researcher had predicted, in the near future libraries may think to adopt open source software. According to researcher open source software has a very good prospect for automation of libraries and information centers in Assam, in economic and service point of view.

Hasan (2009) in this research paper researcher has tried to find out the list of open source software, its characteristics, its benefits, drawbacks and future challenges. This paper also gives an introduction of the OSS concept, describes the open source software and explains the meaning and definition of the term open source software. It also explains some important issues with reference to the explanation of the open source software. Researcher has also focused on some reasons, in use of OSS and its need to the library in current scenario.

Vasupongayya & Keawneam (2011) this research paper, researcher has focuses on various OSS by reviewing 15 open source library management system packages which are useful for library automation along with open source digital library software. The review focuses on the abilities to perform four basic components which are traditional services, interlibrary loan management, managing electronic materials and basic common management system such as security. In addition this, environment, basic requirement and supporting aspects of each open source package are also mentioned in detail.

Don (2011) this research paper aims to examine the adoption of the open source library management system, Koha, amongst Australian special libraries. This paper shows several Australian health libraries and special libraries have decided to join the Koha community. Author suggests, although libraries are adopting open source technology, they aware that open source is free and reduction in costs and time. Koha software is highly and continued adoption and development of open source library systems in Australia appears certain. Most Australian Koha installations have occurred in the last 3 years and few libraries have long-term experience with open source products. As the number of open source system users increases, there will be increased pressure on support companies and developers for further enhancements of open source software. These developments will need to be managed efficiently and effectively to maintain the currently very high client satisfaction levels. Koha can be strongly recommended as an open source system worthy of consideration by librarians seeking a low cost web-based alternative to conventional library systems.

Egunjobi & Awoyemi (2012) the purpose of this paper is to make a strong case for the adoption of open source software in various libraries and information centers. Researcher had find out there are several challenges and problems/ constrains in the development of library automation system with open source software in Nigeria, i.e. poor information and communication technology (ICT) infrastructure, poor funding, and poor ICT skills among library staff, as well as choosing appropriate software solutions. This paper discusses, Adeyemi College of education library automation processes using the Koha library management software. It highlights the strategy adopted, major automation areas, and various factors to be considered by librarians when developing automation processes for their libraries. This paper also shows that, automation can improve the libraries relevance to the academic community. It further reveals that, library staff enjoy working in an automated environment and the patrons enjoy services rendered using an OPAC instead of a card catalogue. The introduction of open source software such as Koha is therefore a positive revolution in libraries in Nigeria and other countries.

Reddy (2013) this research paper, researcher has mainly focused on the study of Free/Open source integrated LMS like, Koha, NewGenLib and e-Granthalaya. A thorough analysis of all these three LMS has been done and listed the features available in all the three softwares, in findings, researcher stated that, Koha and NewGenLib has more advanced and varied features than e-Granthalaya. According to the author, overall NewGenLib has more enhanced features which are significant for library automation and it can be selected as ILMS and e-Granthalaya has simple interface with less options and easy to use and install.

Singh (2012) this study is funded by "Institute of Museum and Library Services" (IMLS). In the abstract of this study, it is clear that, this study is related to comparison of open source softwares, Koha and Evergreen integrated library systems (ILS) to improve and understanding the OSS and getting the information about technical support from the community. In this study researcher has focused on benefits of open source products to gain the benefits related to customization, flexibility, the lack of vendor lock-in.

Brave & Dahibhate (2012) this research paper has discussed about an information account on different types of OSS and their updating date. Authors has also discussed about OSS benefits and drawbacks. In this paper researcher has mainly focused on D-Space, E-prints (Digital library management software), Drupal (Web site Designing software), Koha (Library management software), Zotero (Citation Management Software) etc. Researcher says that, out of these softwares KOHA has been installed widely across the world. This paper has also expressed that; many commercial library software developers have ignored data entry support with library standards (such as MARC 21-21, AACR-II, etc.) The Researchers have also put the future of next generation catalogue that, these catalogues will display images / covers of book, CD, audio/video files, table of contents, summaries, reviews, relevance ranking, Faceted search, spell checking, Amazon like contents, RSS feeds (which deliver new acquisitions of books and search updates) also readers can be able to write reviews /comments about a book, initiate, discussions about a book, ratings and tag clouds, create reading lists and share with others through a more versatile web OPAC interfaces, mobile / e-mail notices of overdue/return/reserved, books as well as access to library web OPAC,

Users may be interested in knowing what their neighbors are reading, listening and watching, user ratings bookmark and share. In the concluding remarks the researcher has written OSS is useful for saving time, money, and resources. Now libraries have been completely dependent on providing new services to its users based on computer applications.

Tripathi & Prasad (2010) In this book editors have collected twenty two selected research papers and case studies presented in the national level seminar on OSS library solutions held by department of LIS, Banaras Hindu University, Varanasi. These papers contain introduction of OSS, applications of OSS, e-resources knowledge management, future of open sources library solutions etc. In this book foreword message is written by A.R.D. Prasad, he writes OSS has come up to liberate library community. Librarians can implement OSS in the areas of library management system, digital libraries, e-publishing consortium management system. On page no. xiv is suggests that librarians have to keep on scratching their heads to have the cheapest solution with maximum features for library automation. Koha is free and OSS (FOSS) automation tool to automate all activities of library. He also observed that many of the librarians hesitate to work with the OSS. They find it difficult to adopt OSS model with a fear of handling such systems. Apart from this many library professionals find they are uncomfortable with new technology and want someone else to handle on their behalf. This dependency creates monopoly in favors of vendors and often leads to kind of blackmail situation for library system customers.

Kumar (2005) in this research paper author has discussed on free and open source softwares. Author has also compared Koha, PhyMyLibrary and OpenBiblio library management system in terms of facilities.

2.4 Library Services and Facilities Using Various LMS:

Thorave (2012) this study entitled "Implications of Web 2.0 for library and information centers: a new dimensions towards building advanced academic libraries" submitted for M.Phil. course. This research project is divided into six chapters; the main focus is on web 2.0 and its applications in library. Researcher suggests that, web 2.0 might be useful to LIS professionals for dissemination of

information and also to provide advanced services. Web 2.0 is all about user participation, it follows users need at central stage, model thought participation, open applications and services. The term "Open" in this context has two meanings, i.e. Open Architecture, and Open Standard. Researcher has also discussed the tools related to web 2.0 technologies, i.e. Flicker, or cut, Face book, YouTube, Blogs, Wikis, RSS feeds, Podcasts, Scribed, weblogs, Instant Messaging, Tagging, Social Book marking etc.

Kumar (2005) in this research paper, author has discussed the open source software features, which are under open license i.e. General Public License (GPL). They are compatible with Linux, Windows and Mac Operating system, Web interface, MARC support, Z39.50 standard, Barcode input and generator, Entire software is customizable, Active development status and worldwide user community, Multi-language support.

Installation of OSS: Koha

Shewale & Barve (2011) in this research paper titled, Lib live CD for Novice Users; researcher has provided information regarding Koha installation with the help of live CD along with hardware requirements and software requirements for installing the Koha system.

Omeluzor & Others (2012) in this research paper titled, Implementation of Koha Integrated Library Management Software (ILMS): The Babcock University Experience. Researcher has shared his experience about installation of Koha. In concluding remark researcher has expressed that, this work was based on facts and experiences gathered before and during the implementation period. It elaborates the basics and suggests steps toward successful implementation of ILS.

Data Migration Case Study:

Matoria & Upadhyay (2005) in this research paper researcher has described his experience about data migration. The purpose of this study is to share the experience gained during the migration of library data from one LMS to another LMS. Researcher has expressed his experience regarding MINISIS, CDS/ISIS, TECHLIB PLUS etc. to switchover to e-Granthalaya OSS. According to him, step

by step approach is useful to migrate the data from one system to another will be gives successful result.

2.5 Centralized Library Management System (CLMS) Using OSS:

The growth and development in information technology along with hardware and software results to get more facilities from the software programmes and these programmes can be runs with the help of new advanced technological tools on the web. Normally we are using one commercial software programme (One License copy) for one library. The development in software, hardware and technology; it is possible to run one software programme for multi locational libraries. The centralized library system using OSS can be runs on more platforms of operating systems. It can be used to reduce duplication of work for similar category libraries with more facilities along with library database standards. It can be use resources of other group libraries for inter library loan. It may be helping to reduce the capital cost of the library automation. This type of experiment can get a control on budgetary and administrative work for getting more transference in the library automation era. This type of experiment is doing in Symbiosis international University, Pune (Maharashtra). Pillai Institute of Technology, Panvel (Mumbai, Maharashtra) is one more example of using multi locational LMS for their institutes. Both the institutes are using one open source library management system for multi locational libraries.

2.6 Evaluation of Reviewed Literature:

The various studies have been carried out by the experts, researchers, and academicians in the field of library automation. There are a number of research articles; project reports as well as thesis submitted for Ph.D. and M.Phil degree level in the area of open source software and library automation. There is also availability of comparative studies of commercial library software packages vs. OSS. Most of the Ph.D. scholars have conducted the comparative study of commercial library software packages. But till now, nobody has checked the practical aspects for implementing open source software for centralized library management system by doing feasibility of proposed model by developing prototype LMS using open source software in this institute.

On the basis of above discussed literature disclose the broad conclusion as a review of literature helps the researcher to determine the precise subject area. It helps to understand the importance, background and the present situation related to the subject selected for the research. So the investigation presents the first attempt and it would be an original and significant contribution to the literature on the concerned subject. It is revealed through review literature that the area of present study is unexplored and no study as on same to this topic has been done.

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Chapter-III
Library Automation: Commercial and Open Source Software

3.1 Introduction:

The development in networking and information communication technology is providing an opportunity to the library professionals to show their skills by using various applications to provide advance library services to their users by automating the libraries. This theoretical chapter divided into two parts; one is information of 'Library Automation' and about different type of open source Library Management Softwares (LMS). This chapter also includes comparison of various open source library management softwares in tabular format and concept of centralized library system. At the same time, researcher has tried to focus on new technologies, its utilization in library house-keeping operations.

3.2 Library Automation:

The word "automation" is derived from Greek word "Automose" means something which has power of self-movement or spontaneous motion. In 1936 D.S. Harder has used the term "automation" to mean automatic handling of parts between progressive production processes (Kumar, 2002). Library automation is the use of computers for library house-keeping operations, through the applications of library software. Library automation is applicable for library house-keeping operations, which includes acquisition, serial control, cataloguing and circulation, etc.

3.2.1 Definitions of Library Automation:

There are many definitions given by various scholars. According to Webster's Third New International Dictionary of English languages, "automation is the techniques of making an apparatus, a process or a system operate automatically". In other words, it is the machinery that mathematically manipulates information storing, selects, presents and records input data or internally generated data. Mechanization of library house-keeping operations predominantly by computers is known as library automation (Gove, 1986).

According to Encyclopedia of Library and Information Science, "Automation is the technology concerned with the design and development of process and system that minimize the necessity of human intervention in operation"(Kent, 1997).

According to McGraw Hill Encyclopedia of Science and Technology, Automation is "a coined word having no precise generally accepted technical meaning but widely used to imply the concept, development, or use of highly automatic machinery or control systems" (McGraw, 1982).

According to Oxford English Dictionary, Automation is "application of automatic control to any branch of industry or science by extension, the use of electronic or mechanical devices to replace human labour" (Simpson & Weiner, 1989).

After understanding all these definitions, researcher confines Library automation is nothing but use of technology in library house-keeping operations.

3.2.2 An Overview and Historical Background:

Automation of the library has passed through several developments, which can be divided into three parts or phases. First phase called the "Experimental" and the period was 1930-1960, the second phase called the "Local system" and the period was 1960-1970 and the third phase called the "Co-operative System" and the period was 1970- onwards. The period 1930-1960 which was considered experimental phase, moreover begins in 1936, there was the first equipment which was used in libraries for data processing. The University of Texas had adapted a mechanical system for its circulation function. In 1960, i.e. the first half of the 20^{th} century, library automation began in the U.S.A. after the World War II. During this period, many libraries in North America and U.K. had started the use computers for processing of information. Many techniques were introduced in the universities along with national libraries. Several of these systems were like tabulators, sorters and punched cards were used in circulation section i.e. it has been used in providing books on loan, serial control, acquisition, cataloguing etc. (Laxminarayan, 1986). In the U.K., the public libraries of Camden, West Sussex (country of south England), the University libraries of Newcastle and Southampton were involved in the experimental phase. Many systems such as

edge-notched cards, optical coincidence, punched cards, and early computers developed during this phase and failed due to computer technology. At that time computer technologies were not developed up to desired expectations and librarians were not sufficiently definitive in their requirements of the computer based system. IT professionals thought that they knew the librarians' requirements of the computer based system. It was thought that all the individual systems in a library should be simultaneously converted to computer based systems (Tedd, 1977). Then the local systems phase in the period (1960-1970) of the digital computers was applied offline for general purpose as well as retrieval of information. During this period, many librarians have used computer as a tool in their organization. Most of these systems were developed locally, either in an academic library, special library or public library. In this phase the focus was mostly on acquisition, cataloguing and circulation process. During this phase, Online Public Access Catalogue (OPAC) was in an experimental stage in the U.S.A. In 1963, MARC i.e. Machine Readable Catalogue have come into existence at the Library of Congress, U.S.A for providing standardization in library automation. In 1967, Ohio College Library Centre (OCLC) was set up as an online system, which has marked the beginning of cooperative systems and union catalogue. In 1969, the Library of Congress had started distribution of records in the new MARC II format (Tedd, 1977). The cooperative systems phase considered starting at 1970 onwards. In 1970s there had been tremendous growth in library cooperation and resource sharing practices with the help of computer based systems. In this phase, designing of online systems and conversion of batch systems into online mode was done and also focused on library network and databases. The magnetic tapes and floppy disks were used for storing the information. In the 1980s there was little bit intensive use of online systems networks, optical disks, CD-ROMs and microcomputers have been came in libraries (Rajagopalan, 1986).

3.2.3 Growth of Library Automation:

Kaul (1999) has written information about the growth of library automation from 1940. The period 1940-1949 was the period of semi-mechanical applications was introduced for including edge-notched cards, optical coincidence, and peek-a-boo cards. Then the period 1950-1959 was started for to use of punched cards, data

processing equipment, early computers and micro image searching systems. Then the period between1960 to 1969 was for use of digital computers used for general purpose and feasibility studies of online interactive and advance micro image systems as well as in experiments for library networking. In 1970-1979 the period was for design of online systems and conversion of batch systems into online mode, growth of library network and databases.1980-1989 intensive use of online systems, networks, mini and microcomputers, optical disks, CD-ROMs, FAX etc. In 1990s, use of internet and library networks aimed towards higher levels of computer applications such as recording through electronic media, artificial intelligence, etc. (Sharma, 1995). However, researcher has stated following objectives, to support this section.

3.2.4 Objectives of Library Automation:

According to Faisal & Surendran (2008) the main objectives of library automation are, to improve control over collection, to have an effective control over the entire operation, to use and improve the existing services effectively, to share the resources among various libraries in a region, to reduce the duplication in the technical processes of library house-keeping operations and to share the existing resources. Hence, it is clear that, the library automation objectives are the entire process related to library administration work.

3.2.5 Advantages of Library Automation:

Faisal & Surendran (2008) stated the advantages of library automation. Author writes, automation may provide users the timely access of library materials, it eliminates routine tasks or performs them more efficiently, it may reduce the amount of time spent on material acquisition, serials management, budget administration and record keeping, and it supports new means of information retrieval by introducing patrons to global information. It allows patrons to use search strategies that can be used with card catalogue, it allows patrons to search library material from various locations outside the libraries, and it motivates users, equips them with problem solving and information retrieval skills, and provides them with lifelong learning experiences. However, few minor disadvantages are also expressed by many scholars.

3.2.6 Disadvantages of Library Automation:

There are some disadvantages of library automation expressed by scholars,

1. Budget problem from organization: India is a developing county, and many research scholars wrote about, the budget cut problems regarding library. Organization cannot able to provide sufficient budgets to the libraries.
2. Technology is not economical: Hardware and software technology is not born in India and all the required material is costly.
3. Fear of Employment Retention: This problem is unique in India, because peoples / library professionals frightened to lose their jobs due to computer entering in the library.
4. Need training: It is observed that, this technology is fast growing and moving technology so there is need to get more and more training as per technology driven.

3.3 Types of Library Automation:

There are three major ways to automate the libraries described by (Phadke, 2010). The first type of library automation method is, using in-house library management software; second library automation method is using commercial library management software and third is using open source software which has been discussed shortly in introduction of chapter number first.

3.3.1 In-house Software: These softwares are basically developed by local expertise. Many organizations or colleges have used their own skills and efforts for developing library management software. These types of softwares name or their index or any information is not available or it is totally unpublished work. There are so many reasons behind in-house softwares being replaced by commercial software. The main reasons are mobility of IT expert towards IT industry and changing technology was affected to update LMS versions and reducing prices as compare to old prices.

3.3.2 Commercial Software (National)

These commercial softwares are also introduced with good features, more security and advanced technology but the cost of the software, updating charges, AMC charges, service problems and benefits taken by library, instead of paid amount is

creating headache to the organizations. There are so many commercial softwares developing in India, some of these are, developing in India to fulfill the changing needs of library automation.

Sr. No.	Commercial LMS Name	Sr. No.	Commercial LMS Name
1	AutoLib	9	Libris
2	EasyLib	10	Libex.Net
3	SLIM	11	LIBSIS
4	Librarian	12	Nalanda
5	SOUL	13	NexLib
6	Libra 2000	14	SWIRL
7	Library Manager	15	Gyanodaya
8	LIBSUITE	16	Biyani-Tecno
Source: (Phadke, 2012)			

3.3.3 Commercial Software (International)

On the international platform there are many commercial software developers who have developed commercial software on international platform. Some of them are given below. The commercial software is also changing their interface as per driven technology, but developers cannot able to success to reduce the cost of aspects related to library automation. Now a days the trend is moving towards OSS and web 2.0 applications are attracting librarians towards open source software.

Sr. No.	**Name of LMS**	**Sr. No.**	**Name of LMS**
1	DLib	10	MINISIS
2	Alice	11	OLIB
3	My Librarian	12	Sagebrush
4	CDS/ISIS	13	Mandarin M3
5	Endeavor Voyager	14	STAR/ Libraries
6	EOS	15	Surpass
7	KeyStone	16	Techlib
8	Millennium innovative	17	TLC
9	Micro Librarian System	18	URICA
Source: (Phadke, 2012)			

3.3.4 Open Source Software (OSS):

Now a days open source softwares are very popular in society. The programme applications are available through internet to the common peoples. It is also part of technological advancement with the collaborative efforts which is taking place

around the world. Open source software has two basic properties, the first one is `Source Code` or programme and another is, it is illegal to convert an open source software into proprietary version or commercial version. Open source software is similar to a peer review, which is used to the progress of LMS. The open source model replaces central control with collaborative networks of contributors. Every contributor can build on the work that has been done by others in the network, to reduce time span 'reinventing the wheel'. The following table shows some open source library management softwares.

Sr.	**Name of Free/OSS : ILMS**
1	Koha
2	NewGenLib
3	e-Granthalaya
4	PMB
5	Evergreen
Source: for ILMS: (Kumar, 2005)	

The following table shows some open source Digital Library Management Softwares (DLMS)

Sr.	**Name of Free/OSS: DLMS**
1	DSpace
2	EPrints
3	Fedora Commons
4	Greenstone
5	Drupal
Source: for DLMS: http://www.researchgate.net	

3.4 Steps Derived in Library Automation:

According to Faisal & Surendran (2008), the main steps in the process of library automation are feasibility study of project implantation, selection of software package, software and hardware requirements, determine the collection for the automating system, installation of the software, data entry, allocation of authorities, arrangement of OPAC availability to the users, arrangements for training to staff and users, evaluation of the System, and future planning, etc.

3.5 Open Source Software:

As already discussed in chapter number one, there are two types of softwares in Open source environment one is called ‘free software’ and another is Open Source Software (OSS). The free software, which has a readymade programmes, which are made available by the developer through internet, user can download, install and use without any modification, another one is OSS, whereas source code is available, user can download, install, able to modify, distribute the programme as per his need.

3.5.1 Brief History of Open Source Software:

When IBM and others sold the first large-scale commercial computers, in the year 1960s, they came with some software which was free (libre), in the sense that it could be freely shared among users, it came with source code, and it could be improved and modified. The history of open source initiated by Open Source Initiative (OSI) begins with evolution of UNIX. Author states, in 1969, there was a creation of UNIX in AT & T Bell Labs and development of ARPANET. In the year 1973, the time was for growth and popularity of UNIX and AT & T was prohibited by law to start any other business than telephone, and hence AT & T started licensing without UNIX without support. In 1974-1975 user groups were starting to grow wherever UNIX introduced to share ideas, information, programmes, bug fixes and hardware fixes. In 1983 there was a development of ARPANET into what is today known as internet. In 1985, Richard Stallman, a programmer at the MIT AI Lab, starts free software foundation in response to trends in software world towards propriety software packages and non-access to source code. Start to design on new operating system called GNU, (General Public License) developed to allow individuals to incorporate their own rights in “free Software”. During the 1980s and early 1990s, open source software continued its development, initially in several relatively isolated groups. USENET and the internet helped to coordinate transnational efforts, and to build up strong user communities. Slowly, much of the software already developed was integrated, merging the work of many of these groups. As a result of this integration, complete environments could be built on top of UNIX using open source software. In many cases, system admins even replaced the standard tools with GNU programs. At that time, many applications were already the best ones in

their field (UNIX utilities, compilers, etc.). In 1990 most components of GNU complete except for Krnal. In 1991 Linus Torvalds, student in Finland developed the Unix- Compatible Kernal called Linux under the GPL, releasing the source code freely and later compatible with GNU with Linux to create operating system. In 1994, Linux is first distributed by Torvalds led to an explosion of new Linux based open source operating system. In 1998, the free software idea did not immediately become main stream and hackers Bruce Perens and Eric Raymond agreed that the problem lay in the term free. After that they founded the Open Source Initiative (Pandey & Verma, 2010).

3.5.2 Open Source Software Movement:

It was started by Richard Stallman in 1983 and the term "Open Source" was given by Christine Peterson of Foresight Institute in 1997. Open source has covered its foot after the evolution of UNIX. Eric Raymond had grown wings in 1997 by publishing article "Open source software is not covered under individual Intellectual Property Rights" (Mishra, 2010). The 'Cathedral and the Bazar' and O'Reilly trained in to fly in the sky by his 'Free Software Summit', A Splinter group of this movement advocated that the term "Free" software should be replaced by "Open source software" because of cost but in reality open source software is not Zero cost software. The problem arise from "free" i.e. Zero cost, but open source indicates the attention towards "freedom." Open source software has become an international phenomenon, during the last decade; the open source software phenomenon has become a trend in information systems because of fast growing number of open source software users and software products in large variety of domains. Open source software is already being adopted and used as a software platform in a number of fields including library and information management. Then in the 1985, Richard Stallman, a programmer at the MIT AI Lab, starts the free software foundation, intended the word 'free' to mean "free as in free speech" and not "free as in free beer." Since a great deal of free software already was free of charge, such free software became associated with zero cost, which seemed anti-commercial response to trends in software world towards proprietary software packages and non-access to source code. He starts to design a new operating system called, GNU. New license called General public license (GPL) developed to allow individuals to incorporate their own rights in "free

software". In 1990 most components of GNU complete except for the operating system Kernel.

During the 1990s, many open source projects have produced a good quantity of useful software. Some of them are Apache (widely used as a WWW server), Perl (an interpreted language with lots of libraries), XFree86 (the most widely used X11 implementation for PC-based machines), GNOME and KDE (both providing a consistent set of libraries and applications to present the casual user with an easy to use and friendly desktop environment). The "open source" label came out of a strategy session held in Palo Alto in reaction to Netscape, January 1998 announcement of a source code release for Navigator Mozilla (the free software project funded by Netscape to build a www browser), etc. (Randhawa, 2013) of all these projects, GNOME and KDE are especially important, because they address usability by non-technical people. Their results are already visible and of good quality, finally allowing everybody to benefit from Open source software. The software being produced by these projects dispels the common legend that open source software is mainly focused on server and developer-oriented systems. In fact, both projects are currently producing lots of desktop personal productivity applications. In 1991 Linus Torvalds, then student in Finland developed the UNIX compatible Kernel called Linux under the GPL, releasing the source code freely and later combined with GNU with Linux to create the operating system Linux. User communities helped to modify the source code to make operating system function better. During 1991-1992, the whole landscape of open source software and of software development in general, was ready to change. Two very exciting events were taking place, although in different communities. In California, Bill Jolitz was implementing the missing portions to complete the Net/2 distribution, until it was ready to run on i386-class machines. Net/2 was the result of the effort of the CSRG to make an unencumbered version of BSD Unix (free of AT & T copyrighted code). Bill called his work 386BSD, and it quickly became appreciated within the BSD and UNIX communities. It included not only a kernel, but also many utilities, making a complete operating system. The work was covered by the BSD license, which also made it a completely free software platform. It also included free software under other licenses (like for instance the GNU compiler). In Finland, Linus Torvalds, a student of computer science,

unhappy with Tanenbaum's Minix, was implementing the first versions of the Linux kernel. Soon, many people were collaborating to make that kernel more and more usable, and adding many utilities to complete GNU/Linux, a real operating system. The Linux kernel and the GNU applications used on top of it are covered by GPL. In 1993, both GNU/Linux and 386BSD were reasonably stable platforms. Since then, 386BSD has evolved into a family of BSD based operating systems (NetBSD, FreeBSD, and OpenBSD), while the Linux kernel is healthy evolving and being used in many GNU/Linux distributions (Slackware, Debian, Red Hat, Suse, Mandrake, and many more). The late 1990s are very exciting times with respect to open source software. Open source systems based on GNU/Linux or BSD are gaining public acceptance, and have become a real alternative to proprietary systems, competing head to head with the market leaders. In many niches, the best choice is already open source. The announcement of the liberation of Netscape Communicator, in 1998, was the starting point of a rush of many big companies to understand open source software. Apple, Corel and IBM, for instance, are trying different approaches to use, promotion or development of open source software. Many companies of all sizes are exploring new economic models to succeed in the competitive software market. The media has also started to give attention to the formerly marginal open source software movement, which is now composed not only of individuals and non-profit organizations, but also of small and medium companies (Jesus, 2000).

In 1994 launching of the first Linux distribution by Torvalds Led to an explosion of new Linux based on open source operating systems and application software to run on Linux platform. In 1998 the “free software” idea did not immediately become main stream and hackers Bruce Perens and Eric Raymond agreed that the problem lay in the term “Free” together with other prominent hackers, they founded the “open source” software movement and called it the Open Source Initiative (Pandey & Verma, 2010).

3.5.3 Definitions of Open Source Software:

In 1986 the definition was published for free software by Richard Stallman, President of free software foundation (FSF). The definition codifies four essential freedoms that computer software users should be entitled to, run the program for

any purpose, study how the program was and adopt into your needs, redistribute copies, improve the programme and review your improvements to the public.

According to Chudnov; Open source software is typically created and maintained by developers crossing constitutional and national boundaries, collaborating by using internet based communication and development tools. Output is generally a certain kind of `free`, often through a license that specifies that applications and source code are free to use, modify, and redistribute it as long as all users, modifications are similarly licensed. Quality, not profit, drives open source developers who take personal pride in seeing their working solution adopted" (Dangi & Kumar, 2010). In 1998 Open Source Initiative (OSI) has also defined open source software by giving ten characteristics description for software product considered as OSS which are,

1. Free redistribution: The license must allow end user to redistribute the software, even as part of long software package and may not charge royalties for this right.
2. Source code: The distribution must make the source code freely available to developers.
3. Derived works: The license must permit modifications to be made to the software for redistribution under the same licenses.
4. Integrity of the authors' source code: The licenses may require that modified distribution be renamed, or that modifications be made via patch file (Service Pack) rather than modifying the source code.
5. No discrimination against persons or groups: The OSS software license not be discriminated against any person or group of persons.
6. No discrimination against field of endeavor: This includes commercial or controversial endeavor
7. Distribution of license: the same license must be passed on to others when programme is redistributed.
8. License must not be specific to a product: A programme may be extracted from a large distribution and used under the same license.
9. License must not restrict other software: This license cannot prescribe the terms of other software with which it is distributed.

10. License must be a technology (Neutral): The license cannot restrict the use of the programme to any individual interface or platform (Singh & Barik, 2010).

3.5.4 Core Working Aspects of OSI Organization:

The Open source Initiative (OSI) is established in 1998 for advertising and introducing Open Source Software worldwide. The first president of this organization was Aeric Raymond. He was president of OSI up to 2005; Headquarters of the OSI organization is in San-Francisco, USA. There are two organizations namely OSI and Free Software Foundation working actively for open source technology. The main working aspects of these organizations are, to promote and distribute open source software, to give approvals to OSS and Software tools, to create awareness about OSS among the users worldwide, to provide education about OSS to the users, to develop some postulates to provide licenses under open standard requirements. The main postulates are also laid by Open Source Initiative for getting open source licenses; these are No International Secret, Open Source: on Web technology, No Cost, if patent taken: no royalty should be charged, no agreement required for using OSS, no need of any technology for using OSS, at the time of distribution of OSS; it is necessary to announce particular software is followed open source compliance / open source postulates laid by open source Initiative (Phadke, 2010).

3.5.5 Attributes of Open Source Software:

The following first four characteristics of the open source softwares are discussed by Altenhoner & Bibliothek (2005) at Proceeding of World Library and Information Congress: 71th IFLA General Conference and Council at Norway. Which are given below, and remaining characteristics are stated by Ferraro (2005) which are also explained below,

Programme Source Code: It generally open conducted development corresponds to the academic tradition to directly exchange results of (scientific) work, provide research data etc. So far, that “rule” attaches itself to the experiences of many people uses established communication channels and co-operation methods.

Technical Flexibility: Many OSS projects integrate a large number of developers with very different emphasis and background. That facilitates the understanding for special requirements and, at the same time, offers the potential to quickly implement needed adjustments.

Increasing Speed: The speed by which there is a reaction to problems, errors or security leaks of the software is legendary. A large group of people that want to make a product successful and immediately undertake the tasks and test new versions is significantly faster and more successful than the proprietary competitors.

Motivation: OSS developers are technically sound as part of a community that works on a collaborative success to product. Often they are the professional developers that create OSS for the society. They maintain standards for government financed projects to provide the resulting software cost-free to motivation support purpose.

Library Standards: The superimposition on mostly international based (Internet) standards generally ensures a greater independence from the single suppliers. The accessibility of a code allows, at least in theory, to hand over oncoming tasks to others – though that is, in practice, mostly less realistic. In a broader perspective that also applies for the long-term readability and usability of the software, because the open, to standards related approach acknowledges the needed sustainability on the developer's side from the beginning. Now a day`s most of LMS developers are trying to introduce library standards related to Cataloguing, Classification System, Communication protocol etc. Some additional attributes are added by Ferraro (2005) these are given below,

Towards Reduced Cost: Open source software is free. Libraries pay only for the product support and training (if any) that they need. Whole community of software users are benefited, when user or sponsor contribute any development or new functionality. Software functions are paid for only once making open-source software extremely cost-efficient. Libraries are using open source software benefit from many advanced technology solutions that they otherwise could not afford to

develop themselves yet they still have the option to steer development if they so desire. Moreover, since open-source software developers like Lib-Lime use a business model that relies on providing support and training for software rather than selling the right to use the software, the per library support costs go down.

Innovative and Collaborative: Open source empowers libraries to innovate and collaborate. Not only can libraries download and use open source software for free but also libraries are able to modify it as per the requirement, provided redistribute the result for free. This is not just a theoretical model; libraries worldwide are actively involved in improving open source Systems.

Outsourcing Services for Maintaining System: In a proprietary software development model, libraries had to pay high license fees to use the software. If a vendor is not providing library with adequate support or is not allowing library the freedom to customize and improve the software to meet library's needs, switching vendors means switching software. And then there is the matter of migrating data from one vendor to another vendor. Open source software, since all you're paying for support, switching to another service provider or migrating to an in-house solution is also simple way but open source software model means that your data is your proprietary.

3.5.6 Open Source Software Licenses:

Most of the peoples don't know about copy-right act or patent. Patent can be issued only for any procedure or algorithms while software's can be protected by copy right act. The Open Source Initiative (www.opensource.org) has been put up to constitute upon the open source license. According to Open Source Initiative (OSI) for licenses to be considered as open source software it must have following attributes, Allow free distribution of the code, Make the source code available to the public, Allow code modification, May allow redistribution of the code as original plus patches, Should not make any discrimination against specific users, Should not make a discrimination against usage fields, Must allow for distribution of original license, The licenses must not restrict any other Software (Koohgoli, 2012). Under these definitions there are 70+ licenses are listed in Open Source

Initiative (OSI) as reorganized open source licenses, mainly it can be categorized into two categories; one is Permissive licenses and another is GNU licenses.

Permissive Licenses: It may generally put no restrictions on the licensing of the derivative code, except generally a citation and requirement that the license text is kept in its original form in the modified or distributed code.

Restrictive Open Source Licenses: It is also called protective copy left license it generally aims to keep their code and their modified versions as an open source. They do so by requiring that, all programs with modified versions be provided under the same licenses as the original software that was obtained.

GNU: The GNU public licenses is one of the stronger licenses, either as EPL or LGPL are not stronger. Under the restrictive or permissive license all the programmes are protected under copy right laws, and copy right owner always remains the author of the software. All the licenses required that you identify the copyright owner and include the original licenses in your derivative project. None of the recognized open source licenses are approved by Open Source Initiative (Koohgoli, 2012). The evaluation of open source software is different from commercial software. A major difference for evaluating the open source software is that the information available for open source programs is usually different than for proprietary programs; source code, analysis by others of the program design, communication between users and developers on the performance of the software. Often proprietary programs always hide source code and other information from customers and only allow operating the software.

3.5.7 Advantages of Using Open Source Software:

OSS is beginning to have a long term effect on smaller and medium size libraries. Those libraries are not able to purchase commercial software due to high cost of the LMS they can have an option as an alternative of OSS for library automation. The users of the open sources software have an authority to download, use, modify and also redistribute the versions of the software. The OSS features are developing and updating on collaborative and open efforts. The following points express some reasons.

1. Open source software helps librarians to be self-dependent.
2. Librarians can change the software according to the requirements of their library and library users.
3. It helps libraries to manage their libraries in a cost effective manner. Open source solutions generally require no licensing fees. The only expenditure on outsourcing support for media and documentation.
4. There's no need for license compliance. Once you obtain the OSS you can install it as many times and in as many locations as you need.
5. Open source support is freely available and accessible through the internet via the Internet. As well as many IT companies are now supporting open source with free online and multiple levels of paid support. For example Lib-Lime, Koha community.
6. Technical support is available for open source—often superior to proprietary solutions. First,
7. In open source software the bugs are identified by the users.
8. Collaborative intelligence discovers the new advanced to the services to grow status of the library professionals.
9. Open source software is self-governing and suitable for any type of small as well as big library.
10. OSS gives opportunity to upgrades the skills of the librarians who implement, and supports to the immense variety of constantly developing information products and services.
11. Escape from AMCs and Vendor Lock: Open source exists as a declaration of freedom of choice, in addition to AMCs, there is lack of portability and the inability to customize software to meet specific needs..
12. Continuous quality improvement of Software: Evidence and research indicate that open source software is good stuff. The peer review process and community standards, plus the fact that source code is out there for the world to see, tend to drive excellence in design and efficiency in coding.
13. The web based enterprise management provides the capability to integrate or consolidate server, service, application and workstation management for powerful administration of the work (Randhawa, 2013). However there are some limitations discussed by some scholars for using open source software.

3.5.8 Limitations of Using Open Source Software:

According to Kamble (2012) Open source softwares required more training to operate it, for any up-gradation or changes required outsourcing support, it provides more authority to users and fully web based applications may dependent on Internet.

3.6 Open Source Software: International Scenario

Open source software has been used extensively in information technology (IT) industry. In the library science field many open source initiatives, such as OSS like, Koha, NewGenLib, Evergreen, Invenio, Senayan are used for library management system, in which Koha is maintained by and used by libraries all over the world, addition to this, the web site (www.capterra.com) shows, that currently it is used in more than twenty countries like Australia, Colombia, Canada, England, France, Germany, India, Italy, Mexico, Nigeria, New Zealand, Norway, Pakistan, Portugal, South Africa, Spain, Taiwan, and United states. If we think about digital library management software and content management softwares the main softwares like, OPALS, Greenstone, DSpace, Plone, and Drupal, EPrint, Jhoomla etc. are available on web using OSS technology (Breeding, 2002).

3.7 Open Source Software: Indian Scenario

In India, use of OSS (open source software) is in initial stage and still not implemented up to the desired extent. In India the first installation of OSS (Koha) was deployed in St. Joseph's College, Devanagari in the Indian state of Kerala. Delhi Public Library has started using OSS (Koha) from 2007. Most of the Government organizations like (CSIR), private organizations, universities are organizing seminars, conferences and workshops in the field of OSS, with the purpose of providing technical knowledge to the library professionals to become an expert in using OSS. In research sector, Now CSIR (Council of scientific and Industrial Research) is also moving towards OSS. CSIR, National Environmental Engineering Research Institute, Nagpur had published an advertisement for recruitment of Project Asst. (Library) on 16.08.2013 on their official website: www.neeri.res.in/recruit.html and the job requirements are good knowledge of library Management software and also OSS. CSIR, National Institute of

Oceanography, Goa has also published an advertisement for recruitment of Senior Technical Asst. (Library) on their official website: www.itg.nio.org and the job requirements are, working knowledge of OSS based on Linux operating system. (www.itg.nio.org).

In academics Mahatma Gandhi University Library, Kottayam, Kerala officially moved to Koha, Open Source Library Management system on 13th August 2013. Dr. Sheena Shukkur, Pro-Vice-Chancellor of Mahatma Gandhi University, Kerala inaugurated Koha system at MGU Library (Kumar, 2012).

Central Library and other Departmental libraries in Cochin University of Science and Technology adopted OSS in 2009 by installing Koha. In Tamilnadu, 32 district libraries and Connemara Public Library were automated and networked using OSS, (Koha). Anna Centenary Library in Chennai also selected using OSS, (Koha) for its automation. From 2010, Mysore University is also using OSS, (Koha). Educational institutions under Institute of Human Resources Development (IHRD) have adopted OSS, in their libraries by providing in-house training for library staff & professionals as well as Symbiosis college of Management, Pune (Maharashtra) is also going through OSS this year. In corporate sector, Jain Irrigation Pvt. Ltd. is moving towards open source software (Kulkarni & Shewale, 2014).

3.8 Open Source Software: LMS Packages:

There are so many library management open source softwares, available on the Internet. Researcher has tried to find out the list of some open sources library management softwares from the literature. Breeding (2002) has carried a study on some OSS packages with their theoretical background, with the help of this study; researcher has given the following information regarding OSS library management software packages. Researcher has also taken a help of literature and official web sites of this LMS packages, to state the information on OSS library management software which are given below,

3.8.1 Koha:

This is the first open source library management software, originated in New Zealand (1999) by a small team of programmers which was working for a consulting company (Katipo communications). Katipo communications, suggested during the proposal process, that the software they developed should be released under the GNU General Public License (GPL) to ensure the project lived on and would be able to be supported by other companies (Raymond, 2001). During the development process the new integrated library system was playfully named C4 or "Cheap and Cheerful Copy of C… which is old name of the system, but the library wanted to come up with a name that meant something and so they decided on the name Koha (Ransom, Chris and Rosalie, 2009).

A. Features and Facilities:

The features and facilities are discussed below,

1. Zero Capital Cost:

The capital cost of the programme is Zero but in actual, to install the Koha in your system some technical knowledge is required for installation. Many smaller libraries cannot afford to purchase, install, and maintain an ILS. And Koha is a usually preferred by libraries. Koha Installs more than one operating system platform. At present Koha is running on multiple operating systems like, Windows, Linux and Mac OSX operating system in conjunction with the Apache Web server. It requires minimum hardware resource support**.**

2. Latest Frontend and Backend Technology:

Koha is using MySQL backend database for storing the unlimited data entries and Java for the front end means for programming language. This system is using,

3. Perl Module

(Date::manip, DBI, Set:: scalar, DBM :: MySQL of other SQL database module, Authen DBI for optional security, CDK for optional telnet interface).

4. Multi Locational LMS:

Koha has an multitasking capacity, multitasking refers to the capacity of the system to allow more than one user to have simultaneous access to the same database and allow them to carry out the work of their choice in any module.

5. Web Based System:

Koha is basically web based system, supports all the applications based on Web technology. This system supports web 2.0 utilities in the form of library services.

6. Updates unlike Commercial:

The KOHA contributors are frequently working to update the software features as per their need.

7. Cloud Compatible:

Koha has cloud computing facility that's why it attracts libraries to install Koha in their libraries, Koha is using Amazon C-2 cloud server to facilitate to the libraries.

8. RFID Compatible:

Koha is compatible for RFID by installing SIP2 server.

9. Able to Customize LMS:

It is completely menu driven in all functions, able to customize as per our need.

10. Multilingual Support:

It has multilingual language support gives it international appeal especially since the developer base is so diffuse around the globe.

11. Library Standards:

Koha is built using library ILS standards like MARC 21, UNIMARC or USMARC support along with Z39.50 standard. Koha is able to provide world-cat, Google scholar and amazon.com for searching the other relevant books with the help of OPAC.

12. Koha User Group:

The technical support is available from web as well as from Katipo Communications Limited, e-mail, and mailing lists also it has email discussion group of users on the web.

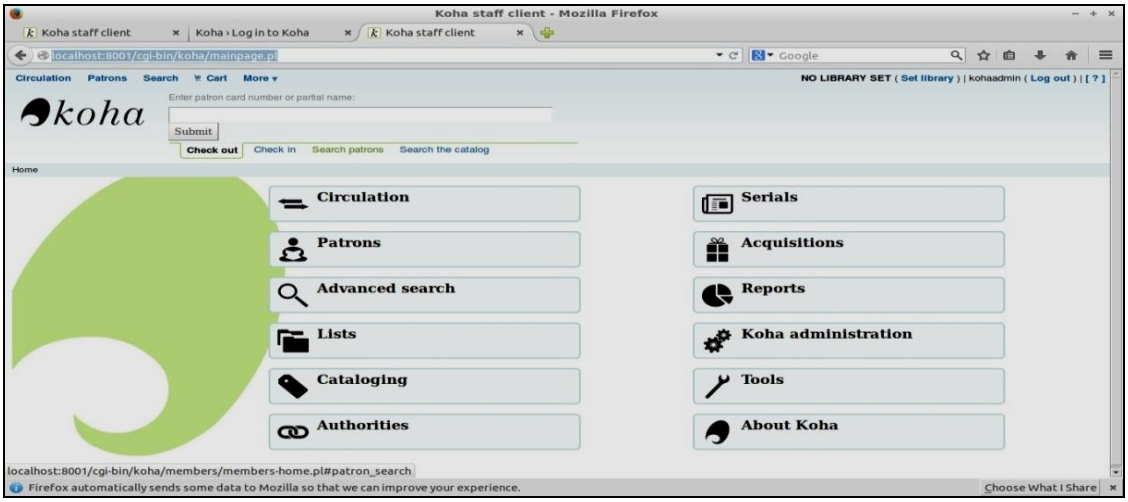
13. Availability of outsourcing the troubleshooting services :

Koha has no vendor lock in, so libraries can receive tech support from any party they choose. If librarian or Koha user is not able to install Koha, there are some organizations as well as professionals available to provide support in Koha installation. The Informatics, Bangalore, M/s. Nucsoft OSS Labs, Bangalore, DELNET, these companies are providing help for Koha installation.

B. The Main Modules of Koha LMS:

The following figure given below shows the first look of the main modules in Koha. This LMS containing twelve modules like, Acquisition, Serials,

Cataloguing, Circulation, Patrons/Members, Authorities, Koha Administration, Advance Search or OPAC, Lists, Reports, Tools, System Information. (http://www.Koha.org)



The details of each module is described theoretically as well as tabular format as per necessity,

1. Acquisition Module:

This module basically distributed in ordering, receipt monitoring invoice processing, accessioning and payment monitoring. the sequence of options provided in this module is almost in the order of the workflow involved in the activity, all this type of work is done by this module, brief description of the operations is given below in tabular format,

Sr.	Acquisition Module	Short Information
1	Acquisition Module	Manage purchase orders
2	Suggestions Management	New purchase suggestion
3	Late Orders	This module shows late orders and non-receiving order of subscription
4	Budget	Budget administration
	Manage Orders	
	Add Vendors	
	Order Search	
5	Funds	Funds for
6	Currencies	Currencies and exchange
7	History Search	In this module history of the book supplier Along with book author, Book name can be searched as well as demanded books with a specific period with its price etc. Can be searched by history search sub module. Report can also be generated.

2. Serials Module:

This module basically helps in serial control management; it consists of following sub modules,

Sr.	Serials Module	Short Information
1	Add New Subscription	Periodical & Journal etc.
2	Claims	There is a link from main serials page to 'Claims, Koha can able to send email to serial vendors if you have late issues.
3	Check Expiration	Subscription period

3. Cataloguing Module:

Cataloguing module basically allows entering the cataloguing details into the records created in acquisition, cataloguing is done in MARC 21 format. For cataloguing data can be imported through Library of Congress database with the help of Z39.50 server facility. This facility can run only with Linux Operating System. Cataloging module works with following additional sub modules. This module consist of following sub modules,

Sr.	Cataloguing Module	Short Information
1	Search	Helps for searching words, title, author, subject, item type, branch etc.
	Add bibliographic details	Cataloguing of accessing item
	Subscription	Purchasing management to circulation Mgt. of periodical subscription related work done with this module.
	Late Issue	Monitoring of subscribed issues
	Virtual Shelves	User / Staff able to generates his own virtual shelve
2	Add New Records	Books, Periodical, etc.
3	Z 39.50 Search	Import Export Data (International Standard)

- **Search:**

The search module helps for searching words, title, author, subject, item type, branch etc. search can be done, as well as in other option Item barcode, call number, IBSN and Publisher search is also possible. For search bullion search facility is also provided by Koha.

- **Add Bibliographic details:**

In this module cataloguing of accessing item is being done. In add bibliographic mandatory fields have to be filled up. If the book is donated then direct entry of that book can be done.

- **Subscription:**

The Subscription module of Koha provides control of periodical subscription and subsequent monitoring of the schedule arrival of individual. It maintains a record of budget sanction for serial under different categories. The system is capable of handling serials which may be gratis. The subscription process for a new serial is imitated by entering its details and starting subscription year. The journals name, publisher, country of publication and starting subscription year are the pieces of information which are mandatory and must be entered to initiate the subscription process of a new serial.

- **Late Issue: (Related to Subscription)**

This module monitoring of issue to be received as per respective frequency of each subscribed serial. It shows the late issues and not received issues.

- **Virtual Shelves:**

With the help of this module virtual shelves can be generated for the users as well as users can also generate their virtual shelves. A private bookshelf is managed by library staff and can be seen only by library staff. A public shelf can be seen by everybody, but managed only by library staff. It can be managed freely by any user.

4. Circulation Module:

Circulation system module includes most of the elements of circulation section required in a library. Each sub module includes activities of different aspects of work normally carried in the circulation section. It has got a provision to automatically calculate overdue charges. This module helps to have effective control over financial as well as circulation activities. Some another sub module of Circulation module includes: The circulation module consist of following sub modules, which are given below,

Sr.	Circulation Module	Short Information
1	Check In	Issue
2	Check Out	Return
3	Search the Catalogue	Web OPAC, OPAC
4	Branch Transfers	Within Group Libraries
5	Reserves Pending	Given by users to the Literature
6	Over Due items	Details of outstanding dues against a member

- **Issue/Return (Check-in and Check-Out):**

It is also called as charging and discharging process of items. In this, checking out of document is initiated by entering the valid borrower's identification number or membership number and document or items are identified by accession number. If the documents/items which are already borrowed or not in the database at the checkout time, the system automatically provides a data screen to enter bibliographical details of the document. Checking in is a simple and straight forward operation. Inputting document identification number invokes the process by displaying the details of the borrower. Issuing can be done with the help of barcode reader as well as manual.

- **Branch Transfer:**

This model helps for transferring of reading material from one branch library to another branch library is possible.

- **Pending Reservation:**

The reservation can be made either at copy specific level or title specific level. Once the document of reserve is returned a suitable massage will be displayed and the system can produce a notice to the concerned member about the availability of the item for borrowing. The system can also maintain a reservation queue and proper monitoring of it is done automatically.

5. Patrons/Membership Module:

Membership module of Koha software enables registration, cancellation, and modification of membership having varied borrowing privileges can be maintained. Similarly, different categories of items having varied loan period can be defined in Koha. Membership module includes,

Sr.	Membership Module	Short Information
1	Search Patrons	Verification of Membership
	Check Out	Issue
	Check in	Return
2	Add Member	This facility is provided to enroll members to the library and create new membership records
3	Add organization	This facility enables to create records of college or institute members.

- **Search:**

This facility enables to find whether a member has got any dues of borrowed material outstanding against user name, staff can find these outstanding dues by member name and code.

6. Authorities Module:

Authorities module of Koha LMS enables to allocation of rights or access privilege associated with various files of directories in a networking environment, these access rights determine which users / staff can access rights to various functions viz. Acquisition, cataloguing, circulation and so on. Access rights will enable the staff is responsible to undertake work in a particular field of module. User or staff will have access only to selected module/modules on which he is supported to work. To enable the staff to perform their duties and functions access rights will have to be given by librarian of section head. The software design ensures that different module is accessed by only authorized person. The Koha authorities' module consists of following sub modules,

7. Koha Administration Module:

This module consists of following main and sub modules, which are given in tabular format,

Sr.	Administration Module	Short Information
1	Basic Parameters	
	Libraries and Groups	Able to create libraries and their branches with code.
	Item Types	Coding to library items
	Authorized Values	It is related to MARC frameworks in Koha
2	Patrons and Circulation	
	Patron Categories	Able to create patrons categories
	Cities and Towns	Relevant information regarding patrons

	Road Types	Enables to help for entering street, boulevard, Avenue, into this section, you will save your time from typing.
	Patron Attribute Types	User profile
	Circulation and fines rule	Define circulation and fines rule
	Library trans for limit	Define circulations limit
	Items circulation	Define, Permissions & restrictions on item circulation
3	Catalogue:	
	MARC bibliographic framework	Define bibliographic framework
	Koha to MARC mapping	To add the right MARC fields
	Keywords to MARC mapping	This related to Keywords display in OPAC as we like them.
	Authority type	Stop some words like wait, what, etc. theoretically help stop this sort of junk from happening.
	Classification sources	Define classification sources
	Record matching rules	This is online help or these rules are the burly bouncer for the backend of cataloguing
	OAI self-configuration	
4	Acquisition Parameters	
	Currencies and exchange rates	Able to select currencies and exchange rates as per necessity
	Budgets	Able to create budget files
	Funds	Allocation of funds
5	Additional Parameters	
	Z39.50 Client Targets	Data exchanges: Standard i.e. one catalogue talk to another.

8. OPAC Module:

Koha has a user-friendly web based OPAC search module. In a multi-user and multi-locational environment, a terminal could be dedicated to the users so that they could access the OPAC. Koha provides suitable and sufficient security to ensure that the users are given only read-only access to the database. Further, it is possible to define the database that can be thrown open to the public for consultation. The database can be searched virtually by any field. OPAC module functions are given below,

Sr.	OPAC Module	Short Information
1	Catalogue Home	This facility enables users to search reading material, as well as recent additions in library. This enable user to login to OPAC.
2	Advanced Search	Search: Title, Author, Subject, Serials titles etc.

3	Suggestions	Online Suggestions can be made by authentic user.
4	Customization of OPAC	User can see his personal page on OPAC
5	My Reading History	Enables reader to see his own reading history

- **Advanced Search:**

This facility enable users to search with any word, title, author, subject, serials titles, item type and branch. Other options enable user to search with call number, ISBN, publisher and published between a time periods.

9. Lists:

Sr.	List Module	Short Information
1	Lists	Most issuing borrowers, Most issued items

10. Reports Module:

This module provides facility to generate various reports; this module is divided into four key modules. This module also having sub modules like, Guided Reports, Statistics Wizards, Top Lists, Inactive, Other (SQL Reports) is included.

Sr.	Reports Module	Short Information
1	Stat Wizard	This sub module generate statistical reports, Related following sub modules
	Acquisition	Facility enables to see report of placed order, receive order form particular book seller
	Borrowers	It generates reports of borrower's category, borrower's
	Catalogue	Various reports which are needed in catalogue sections.
	Circulation	Provides reports on aspect of activity carried under circulation section of library
2	Outsider	This facility enables user to see reports of borrowers without issues, Item not issued
3	Top Lists	This facility enables to see reports of most issuing borrowers and most issued item in a period.
4	Other Statistics	This facility provided other statistical information useful for library house-keeping work
	Inventory/ Stocktaking	Helps to do stock verification with the help of barcode
	Catalogue by item type	Item wise catalogue can be done along with Print facility
	Till Reconciliation	It helps to withdraw daily Reports, yesterday and Daily Report: today can be generated.
	Overdue items	This facility provides details of outstanding dues against a member
	Average loan item	This facility provides to see average circulation of different departments in a time period.

11. SQL Reports:

The reports like, duplicate holds, list of patrons with holds awaiting pickup, patrons with holds waiting at library, count of hold filled by another branch, list of all patrons from a single branch with open hold requests, list of all items currently on loan to another library, list of all items currently borrowed from another library, holds placed in date range, holds filled in date range, monthly holds placed by branch, monthly holds placed and filled by branch, monthly holds filled by branch, over dues with holds waiting, top 10 titles placed on hold in the last 6 months, holds to pull, holds to pull at branch, count of holds by month, cancelled holds, single title holds, holds ratio by home branches, holds queue workaround, average wait time on holds, titles with more than x holds, stale holds, these features are covered.

Sr.	SQL Reports	Short Information
1	Patron Reports	Patron related various reports are covered in this,
2	Circulation Reports	Statistical various reports related to issue / return of items
3	Cataloging/ Bibliographic Reports	Barcode search report, Accession register sorted by barcode number report etc.
4	Accounting Reports	Related to fines and credits etc.
5	Statistical Reports	Related to total number of items circulated from a branch other branch, Patrons with most checkouts in date range,
6	Notices Reports	Overdue notices to the patrons to be sent
7	Acquisition Reports	Related to purchasing, orders of items etc.
8	Serial Reports	Related to serial Mgt. i.e. Serials during the month, Late issues, Latest issues, Issues received in a range
9	Miscuing Reports	Troubleshooting, Backup, Share OPAC etc.

- **Patron Reports:**

The reports related to, new patron list, patron birthday report, patrons of specific age range, patrons with staff permissions, super librarians, patrons with staff permission, and if they are super librarians, new patrons by category at branch new patrons by category in date range, expired patrons w/out checkouts, missing emails, patrons w/ checked out items, new patron count (previous month), new patron count (by branch/category), new patrons by branch (year to date), count of new patrons, count of expired patrons, patrons with all attribute values, patrons with a specific attribute value, duplicate patrons, restricted patrons, patrons with notes or messages, patrons with no checkouts, patron with messages but no email,

count active patrons, count active patrons by category for a specific month, list active patrons, patron search by sort1, expired patrons, guarantor list patron permissions, permissions check, patron without image, missing or invalid email format, ex heavy borrowers, these features are covered.

- **Circulation Reports:**

The reports related to date wise list of checked in books, circulation numbers in a time frame for all item types, per branch, circulation of two call numbers, track in house use, track in house use hourly, track in house use in hourly range, checkouts by hour in selected date range, all checked out books, over dues contact information, over dues call list or guarantor, over dues by attribute, over dues w/item info when patron has no email, over dues by item type, checkouts by call number (previous month), renewals by call number (previous month), checkouts by item type (previous month), previous day's circulation stats, previous month's circulation stats, previous month's checkouts/renewals by collection code, previous month checkouts/renews by patron category, all circulation actions on date, all circulation actions on patron categories and date, checkouts & renewals in date range, weekly checked out by branch number of checkouts by branch, not circulating items (date specific), non-circulating items, non-circulating items in x years, patrons w/ books due tomorrow, patrons w/ items issued today, count of transfers by other branches list of transfers to other branches, transfers as interlibrary loans, transfers as interlibrary borrows, materials checked out to other libraries, list that totals the circulation of each section, overdue materials, long over dues, count of circulation by alpha call number prefix, circulation by literary form, top 10 circulating books, low circulating items, over dues at a specific branch, items with no circs in a specific timeframe, checkout by shelving location, checking by shelving location, renewals by shelving location, local use by shelving location, circulation transaction counts, checkouts & renewal counts by call number, detailed report of long-over dues charged-off in the last week, average checkouts, self-check circulation stats, old circulation issues since the beginning, list of total check-out books (which are not returned, sort date wise and branch wise), list of total holds placed at a specific branch during a specified period, issues placed at a specific branch during a specified period, percentage of circs by collection code, these features are covered.

- **Catalog / Bibliographic Reports:**

The reports related to, the cataloguing related reports which is, barcode search report, accession register sorted by barcode number report, total collection size, total collection size by date, URLs in catalog, null item type, null barcodes, items with "X" C Code, Items with "X" and "Y" IT types, call numbers, complete shelf list, all barcodes, new bib records, average age by collection code, bibs marked on order, list new items, another new items report list of items added to catalog in last 30 days, count of all items, count of all items by item type, count of all items and broken down by branch, count of all titles, count of all bibs and items per branch, count of all bibs and items by item type statistical count of total number of items held by each branch, all bibs without items, all bibs where last item deleted, all bibs where last item deleted in time frame, weeding tool, inventory report, inventory report by location, items added by collection, damaged items with title, action log entries of items damaged within the last day, count by call number, count by call number for items added last month, items added in date range, previous month items created, previous month items deleted, items deleted in date range at branch, previous month items created by item type, previous month items deleted by item type, withdrawn items with details, records without items, call number shelf list, duplicate titles, duplicate titles with same date, duplicate ISBN, duplicate ISBN alternative, duplicate titles using title and ISBN, duplicate ISBN with links to bib records, duplicate ISBN in time frame, duplicate bibs using the 001, bibs with specific keyword in subjects, bibs without subjects, bibs without RDA specific fields, bibs suppressed in OPAC, list of items marked lost/missing, list of items marked lost/missing w/ hold info, validate coda bar barcodes used by north American libraries, find unused sequential barcode ranges title or subtitle list, records cataloged with a specific framework, withdrawn titles list to send to OCLC, deleted titles list to send to OCLC, collection evaluation report, titles by general materials designation, count of items added by cataloger, count of items added by cataloger, count of bibs modified by cataloger, titles on a particular branch and shelving location, language material bibs, materials based on biblio item type, authors not in the authorities, terms not in the authorities, lost items & who lost them, basic item information by call number range, biblio items without a Koha item type, bib records added/deleted in time frame, item records added/deleted in time frame, authorities' records added/deleted in time frame, all

titles with 008 for continuing resource, bibs with different item types, author list by branch, biblio with like data in a subfield of a field, mismatches between two fields and two subfields, list all records with at least one subject, bibs with diff item types attached, bibs with series info, percentage of collection by collection code, these features are covered.

- **Accounting Reports:**

The reports related to accounting work is likely to, fines patron and item information, patrons fines, patrons fines at branch, patrons more than an amount in fines, patrons credits, collections report for unique management, total forgiven fines today, total fines paid today, yesterday's fines by branch, yesterday's lost item charges by branch, yesterday`s lost item charges, yesterday's account management fees by branch, yesterday's account management fees, yesterday's forgiven charges by branch, yesterday's forgiven charges of the entire system, yesterday's various fees by branch, yesterday's sundry fees of entire system, yesterday's credits by branch, yesterday's credits of entire system, yesterday's new card fees by branch, yesterday's new card fees of entire system, yesterday's payments by branch, yesterday's payments of entire system, year to date fines by branch, year to date fines of entire system, total fines owed, write-off fine by date range, payment or fine detail with date range, yesterday's amount collected of entire system, amount collected in specific date range of the entire system, accounting for date range, payments collected at a branch in a date range, these features are covered.

- **Statistical Reports:-**

The reports related to statistics of library which are, shows the total number of items circulated from a branch other branch, patrons with most checkouts in date range, new materials added inactive borrowers, number of links clicked in the last month, list of links clicked in the last month, statistic for daily catalogers achievement in date range for bib records, statistic for daily catalogers achievement in date range for item records are covered.

- **Acquisition Reports:-**

The reports related to acquisition, which are as, orders in date range, all orders ledger, titles ordered in a fund, amount encumbered, amount spent, tax receipt, orders with like data in a subfield of a field, etc. are covered.

- **Serial Reports:-**

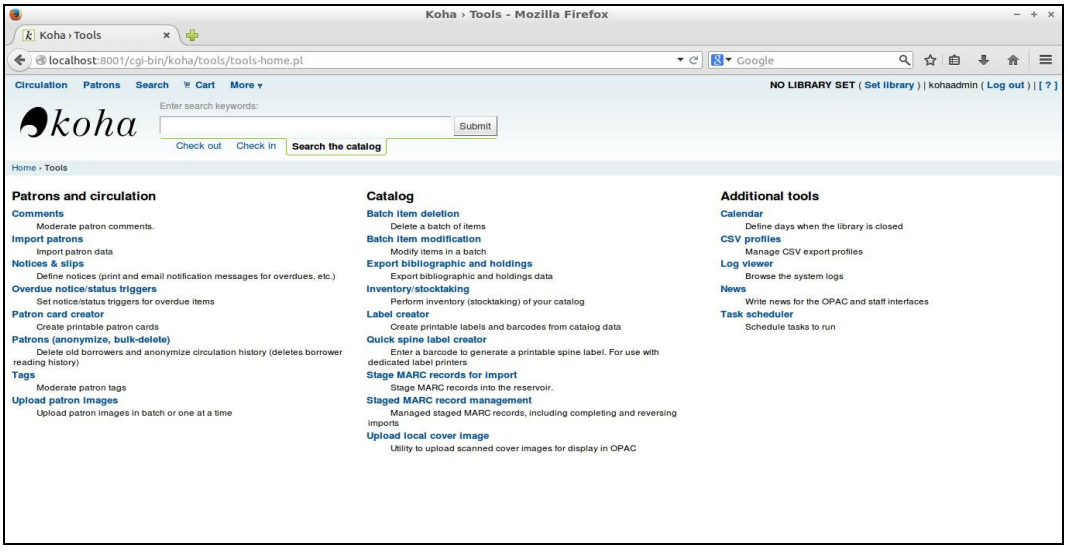
In this module, the reports related to, the total serial received during the month, missing/late/claimed serial during the month, late issues, latest issues, issues received in a range, year range of serials holdings, etc. are covered.

- **Miscuing Reports:-**

In this module the reports related to, the backup/share OPAC layout from system preferences, OCLC number lookup, troubleshoot accidental checkout when action logs are disabled etc. are covered.

12. Tools Module:

In this module catalogue related tools and calendar, log viewer etc. information cab able to get which is shown in the following figure.



13. About Koha :

Before using Koha system, the software has to be properly installed through a series of commands provided by expert. Then several default parameters as applicable to the individual libraries need to be defined for use. This default value

not only minimizes the number of keystrokes during the data entry but also ensure the proper function of various modules of the system according to individual requirements of a library. The system parameters are as follows;

Sr.	About Koha Module	Short Information
1	Library Branches	The different branch libraries can be able to manage with this Koha server. Branches can be added as pre library need, branch categories also defined with the help of this module.
2	Book Funds	Book fund administration is done with this parameter. Different budget heads can be added and managed by this parameter. Book fund administration remembers to edit your book funds before you start editing the budgets.
3	Currencies	In this module the currencies from different countries and their exchange rates can be converted. This parameter help in acquisition, system automatically convert the currency rate.
4	Item Types	Different types of reading material can be defined in this parameter
	Borrower categories	Various categories of borrowers, their enrollment period, age, enrollment fee, overdue notice, reservation charges
	Issuing rules	Define issuing rules for branches / borrowers / item types (no of issues, duration, cost...)
	Authorized values	Define categories and authorized values. Authorized values are used in MARC form to limit and help editing
	Thesaurus Structure	Define categories, thesaurus/authority in Structure MARC
5	Bibliographic framework	(MARC structure): The frameworks defined for the MARC editor. Create frameworks then define the MARC structure (fields & subfields)
6	Links Koha	MARC Data Base: Define links between the Koha standard DB and the MARC one. Note those links can be defined through MARC structure. This tool is just a shortcut to speed up linkage.
7	MARC Check	Checks the MARC structure, it shows mistakes that can break Koha's database
8	Printers	Various types of printer properties can be added to this parameter. It helps system when the print out is being
9	Stop Words	Words deleted during searches like a, and, the, of, and more words can be added to this parameter
10	Z39.50 Servers	Servers to query: for MARC Data
11	System Preferences	System preferences can be added and modified
12	Patron Picture Import	Photo of the member can be added to the system
13	MARC records export	Database can be exported in MARC format

Sr.	About Koha Module	Short Information
14	Upload MARC Data in Reservoir	MARC format Data can be imported in the database with the facility of this parameter.
15	Barcode Generator	Barcode facility is provided by this system, these parameters generate barcode

3.8.2 NewGenLib: (http://www.newgenlib.com)

NewGenLib (New Generation Library) software is developed by, The Kesavan Institute of Information and Knowledge Management and Verus Solutions Pvt Ltd. Hyderabad, India. In March 2005, NewGenLib version 1.0 was released and then 2.0 and 2.1 have come up, now 3.0.4 NewGenLib has been installed in several libraries in India. NewGenLib has been declared open source software on 9th January 2008 under GNU, GPL Licence by the Verus Solutions Pvt Ltd. NewGenLib is able to manage the entire library house-keeping operations, like acquisition of books and other materials, creation and maintenance of its catalogue database, circulation of its holdings, etc. NewGenLib allows a library to define its own network of libraries. One library in the network called the host library installs the software on its public-domain server and then configures other libraries as Associate libraries on its network. NewGenLib is a Web-based application. Databases created with it reside on web servers and can therefore be accessed by any client machine connected to the Internet. However, there are versions of NewGenLib which do not need to run as applications requiring access to the web. In such versions, the databases reside on local area network (LAN) or Intranet servers. NewGenLib uses Relational Database technology to manage databases created with it. Databases under NewGenLib can be hosted under much commercially available Relational Database Management Systems (RDBMS) Server software such as Oracle, MS SQL Server. However, NewGenLib can also be used under open source RDBMS such as PostgreSQL and Firebird. NewGenLib uses well-known and proven international standards: MARC 21, UNICODE, XML and the Dublin Core Metadata Standard. NewGenLib allows metadata records to have digital attachments and so users have access to these via the searchable online public access catalogue (OPAC). NewGenLib runs under Linux or Windows OS and using Java, and MySQL advanced technologies. It currently boosts a fully developed OPAC, circulation module with reserves support, and original cataloging with MARC 21 support. NewGenLib system runs on both stand alone as

well as in network and able to communicate with other libraries in the campus. In this system entire client server architecture protocol has been used.

NewGenLib is a metadata content management as well as library management software solution. Metadata is structured data about data. Content, means any carrier of information: textual materials (e.g. books, periodical articles, sound files, web pages, full text, CD-ROMs, training materials, PowerPoint presentations, video clips, images, etc.). NewGenLib is able to manage the entire library house-keeping operations, like acquisition of books and other materials, creation and maintenance of its catalogue database, circulation of its holdings, etc. At the time of developing this system the web based Java and J2EE programming languages are used in front end and MySQL database is used as backend to store the data. This system supports for Unicode 3.0 and UTF-8 and ready to handle English as well as other languages. In this system there is provision of online submission of suggestions and support for RFID system. This system generates the index database as per international standards like MARC 21, AACR- 2R, MARC- XML etc.

1. Acquisition:

The NewGenLib, Acquisitions module has all the features that are typically required in libraries of all kinds. The screen below shows the main menu options that are available in this module. Each of these menu options and sub-options, their purpose and how to accomplish acquisitions related tasks using these functions are explained in detail as follows.

Sr.	Acquisition Modules	Short Information
1	Search by Title	With the help of this sub module user can search title from the database
2	Process Request	Record the details of one or more requests received, refine the requests received, print requests for approvals to approving authorities …..
3	Process Approval-Supplies	Book demands on approval, print intimation to the approving authority, maintain records of approval reading material.
4	Firm orders	Generate purchase orders for, items requested, refined, received and approved, or on-approval items supplied, received, and approved etc.

5	Receive orders	Supplied have been received from one or more vendors
6	Delete Invoice	Cancellation or Revert Order
7	Gifts	Allows the library to actively seek gifts and also process unsolicited gifts.
8	Accession received items	The items received and paid for assign a unique barcode
9	Delete Accession number	Able to delete against wrong entry
10	Process Payment (Invoice received)	This function is invoked after items and invoices are received and the items are accessioned. With the help of this sub module payment process can be done.
11	Invoice payment details	Libraries require entering details of payments made against invoices received from vendors for the acquisition of items. This menu gives details of payment.
12	Claims for unsupplied Items	Claims for unsupplied, Unfulfilled Orders through letters.

- **Process Request:**

With the help of this sub-module the following tasks can be accomplished, record the details of one or more requests received, refine the requests received, print requests for approvals to approving authorities, record approvals/rejections of requests received, and search requests received.

- **Process Approval Supplies:**

The following tasks can be done with this sub module it does book demands on approval, print intimation to the approving authority, maintain records of approval reading material.

- **Firm Order:**

The firm orders function provides feature rich capabilities to generate purchase orders for, items requested, refined, received and approved, or on-approval items supplied, received, and approved, or new items for which orders are required to be directly raised.

- **Receive Order:**

This function enables library staff to locate the orders against which items supplied have been received from one or more vendors and then to record the receipt of items supplied against these orders.

- **Delete Invoice:**

Occasionally, it may be necessary to cancel an invoice that was received from a vendor. The invoice may have been recorded as received against items that were supplied. The need to cancel the invoice is accomplished by this menu option.

- **Gifts:**

Many libraries solicit gifts from institutions, societies and professional bodies for their publications which may be useful to library patrons. NewGenLib allows the library to actively seek gifts and also process unsolicited gifts.

- **Accession Received Item:**

The Accession received items function enables library staff to quickly and accurately record information about the items received and paid for or otherwise, assign a unique barcode to items so that these become ready for technical processing and later for circulation to library patrons.

- **Delete Accession Number:**

When entering accession numbers manually, library staff may make transposition errors, e.g. instead of entering 98361 they may enter the accession number as 98316. Other errors may also occur, e.g. one book's accession number is assigned to another and the error is noticed at a later date. In such a case, it may be necessary to delete the accession number of an item so that the right number could be assigned to it. The delete accession number allows this.

- **Claims for Unfulfilled Orders:**

The Claims function enables library staff to produce the following types of outputs. Claim letters to vendors for un-supplied items between two selected order dates, requester, title, vendor, or budget head, listings by request, or budget head.

2. Technical Processing: (Cataloguing) :

This module has several features which are important for the user. With this module catalogue of documentary materials (books, serials, theses, etc.) and non-book material like CD-ROMs, Web pages and audio as well as video materials can be done. This module basically allows one to-input cataloguing details into the

records created in acquisition, cataloguing is done in MARC 21 format. For cataloguing data can be imported through Library of Congress database. Technical processing module works with following sub modules,

Sr.	Cataloguing Module: Technical Processing	Short Information
1	Item ready for technical processing	Items acquired via the acquisitions module and are ready for technical processing accessed through this menu option.
2	Import catalogue records	Facility to import into one or other template/ format
3	Primary cataloguing	It is basically related to MARC 21 format & other….
4	Modify catalogue records	Allow for editing, correction or delete records as per need. (created or imported during an earlier session)
5	Search catalogue	Functionality that is available in the online public access catalogue
6	Harvest OAI-PMH achieves	

- **Import Bibliographic Data:**

An important feature of NewGenLib software is technical processing in this library staff has a facility to import into one or other template, cataloguing data directly from a MARC 21 data source such as the LOC, National Agricultural Library, etc. In fact the library can configure one or more MARC data sources from where they plan to import catalogue records. The only requirement is that the source must export their MARC 21 data in ISO 2709 format.

- **Primary Cataloging:**

Sr.	Cataloguing Module : (Primary Cataloging) Short Information
1	Provides three different templates to cataloging as simple, General & as MARC 21 templates.
2	Compliant to MARC 21 for Bibliographic, Authority and Holdings Data
3	Supports all material types (By MARC 21)
4	Open Archive support (OAI-PMH protocol compliant)
5	Attach digital content along with catalog record
6	Customizable MARC 21 templates and Search indexes
7	Provides 3 different templates for Cataloging: Simple, General and MARC 21

- **Modify Catalogue Records:**

At times it becomes necessary for cataloguers to modify (edit, correct, delete) records created or imported during an earlier session. The Modify Catalogue records option allows this.

- **Search Catalogue Functionality:**

The next key function of the technical processing module is the Search catalogue function. This is the librarian's search interface and complements the search functionality that is available in the online public access catalogue.

Sr.	Cataloguing Module : (Search Catalogue): Short Information
1	Search catalog through various system defined Indexes
2	Library can also define custom indexes

- Cross walks available meta data standards like MODS 3.0 and Dublin Core
- Technical Processing of items received through Acquisitions and Serials Management

3. Circulations:

The circulation control module in NewGenLib has all the commonly used functions in this area of library work that most libraries, big and small provide. In addition, the module has many built-in controls and settable parameters to enable a library to ensure that library patrons are provided equitable access to the collections and that the library has reports that will enable it to take meaningful decisions about collection building, maintenance, weeding and use of its collection. Support for the Radio Frequency ID (RFID) protocol is also available with NewGenLib, but is provided specifically on payment to those libraries that need this. The figure shown below shows the menu options that are available in this module. This module works with following sub-modules.

Sr.	Circulation Module	Short Information
1	Check out	Circulation control module / Issue of Items
2	Check in	Return of items
3	Reserve items	Library to administer reservations made by patrons, at various Levels, Members can allowed reserve items through OPAC
4	Recall items on loan	Useful for library staff to send out recall notices to the borrower.
5	Renew items on loan	Users can able to renewal online library items
6	Inter Library Loans management	Inter Library loan of the items is provided by the system.

7	Process items lost	Processing of lost items through payments or fine as per policy to users instead of lost items.
8	Weed out process	It is applicable to irrelevant, unwanted items.
9	Binding management	Related to repair of items held generally in Circulation section
10	Automatic overdue notices and reminder for renewals	Possible to contact users through notices & reminders or renewals.

- **Check-out or issue of items:**

The check-out function is a basic one in any circulation control module and is to ensure that items held by the library are securely and accurately checked out or issued out to library patrons. The check-out ensures that the patron's privileges in respect of different types of library materials are respected, e.g. that user entitled to borrow the material. User has brought to the circulation desk that the borrower's loan limits are not over drawn, etc.

- **Check-in or return of items:**

The check-in function enables the library to accurately record the return of items previously loaned to patrons. The function discharges the patron of the loan of the item but maintains useful statistics that is later possible to be analyzed in making decisions concerning acquisitions, weeding out of stock, loss of books etc.

- **Reservations of items:**

The Reservations function is important in academic environments. NewGenLib provides many features that allow a library to administer reservations made by patrons. Patrons can place reservations from the OPAC. However, it is also possible for circulation staff to place reservations on behalf of patrons.

- **Renewal of loans:**

Patrons need not present themselves and items for which loan are to be renewed to the library to renew their loans. They can either renew loans via the OPAC or and request the library (via email, telephone) to renew a given item's loan. The library staff then invokes the Renew loan option in the Circulation module of NewGenLib.

- **Binding Management:**

The binding and repair of items held generally in Circulation section of the library. This function provides the following options. Separate item for binding, Check out items for binding and check in for binders.

- **Recall Document:**

Sometimes it is necessary for the library to recall an item on loan before the expiry of the loan period. The Recall document function enables library staff to send out recall notices to the borrower.

- **Collect Overdue:**

The collect overdue function enables library staff to accept partial or full overdue payments from a member and ensure that all such recoveries made and balances due are properly recorded for reference whenever needed, e.g. when the member requires a no-dues certificate.

- **Process Reported Loss of Item:**

It is quite common for members to loose books or other items borrowed by them. Such losses when reported need to be handled, i.e. information about the item's loss should be reflected in the library's catalogue database, and depending on the policy of the library, the member should be charged the cost of the item, over dues on the borrowed item, and any service charges that accrue because the library has to replace the lost item.

4. Serial Management:

The functionality in this module requires that the software must deal with several idiosyncrasies of the serial as a form of publication. Equally there are issues related to the cataloguing of newly subscribed serial titles, registration, display of serials holdings in the online public access catalogue (OPAC) and the prediction of the receipt of regular serials issues as well as that of supplements and indexes. Managing the subscriptions to serial titles in such a way that there is no interruption in the supplies is another important requirement. The binding of serials issues when the volume for a particular serial title has been fully received and ensuring that these are sent to binder are other tasks that the module must help

library staff to accomplish. Serial management module works with the following Sub-Modules.

Sr.	Serial Management Module	Short Information
1	Process New Subscription	This involves the addition of new titles
2	Order Subscription	Provides facility to place firm order
3	Receiving Invoice	Gives information about received subscription invoice and payment details
4	Register Serial issue	Issues can be registered in this sub module
5	Serial binding management	Binding management
6	Renewal Subscription	Renewing subscription of serials
7	Auto Generation Reminder:	For not issued issues to library
8	Preparation of Logical lists and Physical lists	Various types of lists related to members, library material etc.
9	Raising binding orders	To the determined vendor
10	Accessioning Bound Volumes	Processing / Data entry of bounds ….

- **Process New Subscription :**

This involves the addition of new titles to an existing list of subscriptions, ordering these with vendors, processing subscription invoices, receiving and registering issues, and binding these into suitable physical volumes.

- **Serial Binding Management:**

The serial binding management can be done by this section. It is a total solution for serials bindings it provides facility like list of binding materials, binding order, bound item receiving, accessioning of bound items.

5. Administration:

The administration module of NewGenLib allows librarians/system administrators to configure the software to suit the application environment of the library and so that it reflects the policies of the library in respect of its various operations, e.g., circulation policies, acquisitions modes, etc. This is the first module that requires to be invoked before other functional modules such as Acquisitions, Technical Processing and circulation etc. are automated. The definition of various parameters is done only by authorized personnel, usually the system administrator. The figure shown below shows the menu options that are available in Administration menu option.

Sr.	Administrative Module	Short Information
1	Configure System	Setting up of various parameters
2	Configure end of day	Related to admin work
3	View process form letters	Various types letters can be printed by this sub module
4	View/Edit proxy server setting	it facilities to change user name and password etc.

- **Configure System:**

This is the menu option that allows the setting up of various parameters, like authority files, patron (Member files), budget sources, budget heads, budget allocation, vendor etc.

6. Reports:

The report module provides facility to generate reports; the module is divided in four major sub modules, acquisition reports, technical processing, circulation and serial management.

- **Acquisition Reports**:

This sub module generate acquisition reports, it works with following module.

Sr.	Acquisition Reports	Relevant work
1	Generate Accession Register	Generate accession register
2	Generate Budget Expenditure	Generate budget expenditure reports
3	Generate Vendor: Performance Report	Administrator can see, vendor performance with the help of this sub module

- **Generate Accession Register:**

This facility enable to generate accession register, the four option are given date wise, accession number, budget head, and budget allocation with any of these condition user can generate accession register.

- **Technical Processing:**

This section covers various reports which are needed in catalogue section.

Sr.	Technical Processing Reports	Relevant work
1	Prepare customized list	Customized list of classification number, department, course etc.
2	List of addition	List of new additions in a time period can be generated

3	Documentation List	Enable user to see documentation list of various subject heads in a time period.

- **Prepare customized list:**

The customized list of classification number, department, course, budget, authority files and statistics can be generated through this module.

- **Circulation:**

This section basically provides reports on aspect of activity carried under circulation section.

Sr.	Circulation Reports	Relevant work
1	Stock verification	Various stock verification reports.
2	Issued material details	This facility enable user to see issued item
3	Current reservations	This facility enable user to see current position report.
4	Detailed Circulation Transaction	It gives detailed information about transaction.
5	Overdue material	Details of outstanding dues against a member or department
6	Patron List (Users List)	Provides reports of borrowers
7	Items reported lost	Enable user to see list of lost items in a time period
8	Daily Circulation Transaction	Enable user to generate daily transaction report
9	Items under binding	Information of binding material and list of
10	Heavily Used Material Report	Facility enable user to see reports of most issued items in a time period.

- **Stock verification report:**

This section helps user to do stock verification of the library, it provide facility to complete stock verification and sectional stock verification. It gives various stock verification reports.

- **Detailed Circulation Transaction Report:**

This sub module provides information about circulation report. It gives detailed information about transaction.

- **Serial Management Reports:**

This sub module generates serial control reports; it works with following modules,

Sr.	Serial Management Reports	Relevant work
1	Current subscription report	Current subscription report shows current status of subscription in a library.
2	Duplicate issue report	Duplicate issue report generates list of duplicate issues
3	Missing issue report	List of missing report facility generates missing issues in a time period.
4	Unfulfilled subscription report	Generates list of unfulfilled subscription.
5	Current arrivals report	Generates report of current issues in a time period.
6	Budget expenditure report	Generates report of expenses for subscription, in the year.
7	List of subscription	Generates the list of subscription publisher wise, topical term wise and vendor wise.

- **Utilities Related Reports:**

Utility facility is provided by NewGenLib it works with the following sub modules.

Sr.	Utilities Reports	Relevant work
1	Print catalogue cards	With the help of this sub-module printout of catalogue cards can be taken
2	Built custom index	This sub-module provides a facility to create indexes
3	Built union catalogue	Software user can be able to create the records of union catalogue can be uploaded.
4	Database backup	User can take regular backup of the database

7. OPAC:

In multi user environment, a terminal could be dedicated to the public so that they could interact with the system themselves. NewGenLib provides suitable and sufficient security to ensure that user is given only read-only access to the database. The database can be searched virtually by any field. This OPAC (Online Public Access Catalogue) module functions as follows; NewGenLib has powerful web based and user friendly OPAC. The main sub modules are as follows:

Sr.	OPAC Modules	Short Information
1	Search Options	Free text (Google like search), Basic Search, Advanced search, Expert Search
2	Reservations on line	Reserve items on line and Cancel
3	Renewal literature	Renewal items on line
4	View circulation Data	Transacted and user privileges by the user on line
5	RSS feed Service	View headlines through RSS feeds configured
6	Define SDI	Selective Dissemination of Information Profile

7	List of new arrivals	List of new arrivals in a time period can be generated
8	Suggest new books	To be acquired on line
9	View special collections	With the help of this facility user can search the data of digital records
10	Supports Vu-find OPAC system	

- **Search Options:**

This facility enables users to free text search, basic search, advance search and expert search. With free search facility user can search with any word of phrase, whereas basic search facility provides user to search with author, title, publisher, Editor etc. Advance search facility provides user to use billion operations for search, and expert search can be searched by a query.

- **Reservation items on loan and cancel reservation:**

Online reservation can be made by using this facility. An authentic user can only use this facility He or She (User) must have user Id and password. Reservation can be cancelled by using this facility. An authentic user can only use this facility by providing Id and password.

- **Request renewal of loan:**

Online request for renew of loan can be made with this facility. A genuine user can only use this facility for this He or she must have user Id and password.

- **Circulation Data:**

This facility enables user to see his/her circulation history. A genuine member can only use this facility He or She (User) must have user Id and password.

- **list of new arrivals:**

List of new arrivals in a time period can be generated through this facility. A genuine user can only use this facility for this He or she must have user Id and password.

- **Request addition of new publication:**

On line suggestion can be made by a user. A genuine user can only use this facility for this He or she must have user Id and password.

- **Statistics:**

A report of use of OPAC in time period is made by this module.

8. NewGenLib: Android Applications

It is computable with Android application mobile application and tablets for following functions,

Sr.	NewGenLib on Andrioid Applications in Short
1	Search the collection
2	See the details of the records as well as their availability
3	Reserve items
4	Request for check-out
5	View their transaction history
6	View their current check outs and also renew them
7	View their current reservations and also cancel them
8	View their current requests for check-out and also cancel them
9	List of new arrivals
10	Login using their Library card number/Email id
Source : http://www.verussolutions.biz,	

9. NewGenLib Supports Many Standards

Sr.	NewGenLib Supports Many Standards
1	MARC 21 for Bibliographic data: The database schema design of NewGenLib is based on MARC 21 for bibliographic data. Import/export of MARC 21 records is possible. These records are in MARC Communication Format, MARCXML or MARC Tagged View,
2	MARC 21 for Authority data: Import of MARC 21 for authority data is available. The database schema design of authority data is based on MARC 21.
3	MARC 21 for Holdings data: Database schema design of holdings data is based on MARC 21.
4	MODS 3.0: Export of data is available in MODS 3.0. In OAI-PMH and SRU/W records are available in MODS 3.0.
5	Z39.71: Holdings statement displays are based on this standard
6	ISBD: Bibliographic record displays are based on this standard
7	OAI-PMH: Allows harvesting (manual) from external repositories, Create Open archive collections, and items, search the repositories and also act as data provider, Metadata formats: MARC XML, DUBLIN CORE, MODS 3.0 and AGRIS AP
8	SRU/W: Federated search engines can search bibliographic databases using this protocol, Query language: CQL (Common Query Language), bench marking

9	Level 1 compliance, Profiles used: BATH, and DUBLIN CORE, Metadata standards: MARC XML and MODS 3.0
Source: http://www.verussolutions.biz	

10. Data Migration in NewGenLib:

This system supports for data migration you can get all your data imported into NewGenLib database from excel sheet of any in house library software or any commercial as well as local software. All new updates, upgrades, versions, and bug fixes of NewGenLib software are available in free of cost for life time.
(http://www.verussolutions.biz)

3.8.3 e-Granthalaya: (http://www.egranthalaya.nic.in)

General Information: e-Granthalaya is the popular library management software developed by National Informatics Centre, (NIC) Department of Electronics & Information Technology, Ministry of Communications and Information Technology, Bangalore, Government of India**.** The software has been designed and developed by a team of experts from software as well as Library and Information Science discipline. The e-Granthalaya LMS can automate all the in-house library operations and library user services. The software can be implemented in stand-alone or in client-server mode whereas database and Web-OPAC are installed on the server PC while the data entry program is installed on client computer terminals. The software provides LOCAL/LAN/WAN based data entry solutions for a cluster of libraries where a centralized database can be created with Union Catalog output. The software provides Web OPAC interface to publish the library catalog over Internet/Intranet. The software runs on Windows platform Only, UNICODE Compliant, thus, supports data entry in local language. At initial e-Granthalaya was developed for the Public Libraries in the Karnataka State. Later, NIC HQs 'Library and Informatics Services Division' took over the designing of the software where library professionals were involved in the designing process and, thus, improved the software with enhanced user interface and simplify the work-flow of library functions so that it can suit all kinds of libraries, following table shows main modules of e-Granthalaya LMS.

- **Main Modules of e-Granthalaya LMS :**

Sr.	Main Modules of e-Granthalaya	Short Information
1	Book Acquisition	Purchasing related work
2	Cataloguing Module	Cataloguing as per Standard: Generating the full catalog entry of the books.
3	Circulation Module	Control on issue return
4	Serials Module	Control on serials: Subscription & Other
5	Micro Documents Module	Work related to Micro document management, articles & indexing.
6	Budget Module	Financial control & bill processing work,
7	Search Module	Library material search in OPAC
8	Admin Module	Administrative work like, making users & Entering the default values.

Explanation: The main modules of e-Granthalaya includes, book acquisition, cataloguing module, circulation module, serials module, micro documents module, budget module, search module and admin module.

1. Sub Modules in Acquisition:

Sr.	Sub Modules in Acquisition
1	Authors Directory, Sub-Module of Books and Acquisition:
2	Check duplication title, sub-module of books and acquisition:
3	Add new title, sub-module of books and acquisition:
4	Add acquisition records
5	Generate approvals
6	Update approval
7	Add order details
8	Generate order
9	Receive documents
10	Accessioning
	Add bill details
	Add payment details

Explanation: Basically this module covers the activities related to new book purchasing. It controls works like, check duplication title, add new title, generate approvals, update approvals, Add order details, generate order, receive documents, accessioning, add bill details, add payment details etc.

- **Details of Cataloguing Module of e-Granthalaya:**

Sr.	Cataloguing Module	Short Information
1	Retro Conversion	Able to enter book records direct in existing collection of books, as well as from purchasing and copy details.
2	Full Catalogue Change Copy Status	Add additional data elements in the catalog records
3	Update Holdings	It enables to update/modify the holding records
4	Status wise collection	It enables to view the status wise collection of the library
5	Stock Verification	
6	Generate Barcode Labels	

Explanation: This cataloguing module basically helping for maintain cataloguing standard in database along with the activities like, retro conversion, full catalogue change copy status, update holdings, status wise collection, stack verification and generate bar codes etc.

- **Details of Circulation Module of e-Granthalaya:**

Sr.	Circulation Module
1	Member Categories
2	Sub Categories
3	Member Registration
4	Issue and Reverse
5	Return and Renewal
6	Circulation Transitions
7	Generate Overdue Notice

Explanation: this circulation module basically designed for issue / return of the library material. It maintains all these activities related to circulation, in which member registration, issue and reverse, return and renewal, circulation transitions, generate overdue notice etc. are included.

- **Details of Serials Module of e-Granthalaya:**

Sr.	Serials Module
1	Check Duplicate Title
2	Add New Serials
3	Serial Start Details
4	Subscription Start Details
5	Add Acquisition Record

6	Generate Approval
7	Update Approval
8	Add Order Details
9	Generate Order
10	Subscription Maintenances
11	Schedule Maintenances
12	Receive Loose Issues
13	Generate Reminders
14	Add Bill Details
15	Add Payment Details
16	Update Journal History
17	Add Bound Volume Journals

Explanation: in which serial management related works are doing i.e. starting from check duplicate title to add bound volume journals. It serially contains work like, check duplicate title, add new serials, serial start details, subscription start details, add acquisition record, generate approval, update approval, add order details, generate order, subscription maintenances, schedule maintenances, receive loose issues, generate reminders, add bill details, add payment details, update journal history, add bound volume journals etc.

- **Details of Micro Documents Module of e-Granthalaya:**

Sr.	Micro Document Module	Short Information
1	Add Micro Documents	Addition of Micro Documents
2	Search Micro Documents	Able to Search Micro Documents
3	News clipping Manager	Search News clippings

Explanation: this module is used for articles, chapter and news. This module contains work like, add micro documents, search micro documents, news clipping manager, etc.

- **Details of Budget Module of e-Granthalaya:**

Sr.	Budget Module	Short Information
1	Library Budgets	Determine Library budgets
2	Invoice Details	Entering Invoice details
3	Generate Payment Request	Letters, regarding payment request
4	Update Payment Request	Follow-up.. Payment request
5	Cheque delivery form	Letter, regarding mode of payment
6	Budget Analysis	Evaluation of budget analysis.

Explanation: This module is used for budget control and bill processing, in which allocation of library budgets, invoice details, payment release and budget analysis are main concern.

- **Details of Search Module of e-Granthalaya:**

Sr.	Search Module
1	Basic Search
2	Advance Search
3	Authority Based Search
4	View Index
5	Catalogue Quires
6	Acquisition
7	Approval Queries
8	Vender Queries
9	Invoice Queries
10	Current Awareness
11	SDI, Sub-Module of Search:
12	Holding Search
13	Current Journals
14	Search Serials:
15	Search Z 39.50 server, Sub-Module of Search:
16	Accession Register
17	Documentation Bulletin

Explanation: It contains the facilities like, basic search, advance search, authority based, view index, catalogue quires, acquisition, approval queries, vender queries, invoice queries, CAS and SDI sub-module of search, holding search, current journals, search serials, search Z39.50 server, sub-module of search, accession register and documentation bulletin.

- **OPAC Module of e-Granthalaya:**

Sr.	OPAC Module
1	Various types of searches: i.e. Basic search, Advanced search etc.
2	Free text (Google like search) Basic, Advanced and Expert
3	Reserve items on-line and cancel
4	View circulation transactions
5	Top stories i.e. View headlines through RSS feeds configured
6	Define SDI : Selective Dissemination of Information (SDI) profile
7	List of new arrivals
8	Suggest new books on line
9	View special collections in the library.

Explanation: The OPAC module of this software provides internet search services, which involves links to various electronic journals and the reports like research articles, technical reports are made available in the search along with the transaction information of the borrower is also provided. It also contains, reserve items on line and cancel, renew literature/ items on-line, view circulation transactions, list of new arrivals, suggest new books on line, view special collections in the library.

- **Details of Admin Module:**

Sr.	Admin Module
1	System Data
2	Sub-Module of Admin: Generates, user and library accounts, create letter text for letters, reminders, create subject, publisher, vendor directory.
3	Master Data
4	Database Utilities

Explanation: The admin module is basically used for setting user's authorities and permissions, making entry of the default values in the master tables and then using such values in the subsequent modules. This module contains of the system data and master data sub modules. It gives users to add, edit, and delete records as per need, who will operates the software, it contains works like, bibliographic level/document type, acquisition modes / copy status, countries / types of binding, currency codes, publishers details / vendor details, journal frequencies / languages, messages and text for reports/letter, sections/subjects/library committee, etc.

3.8.4 PMB:

This software is also popular open source software originated from France in 2002 by Francois Lemarchand. Majority of documentation of this software interface and web site are in French language. PBM has modules of circulation, OPAC, cataloguing, with UNIMARC supports to serial control and an SDI system. Installation and maintenance of PBM is easy to use in Window and Linux compared to the installation of other open source ILS. It is an easy to use graphical interface for database back up, maintenance, import and export of bibliographic records is available with PBM. Using these applications librarians can maintain the daily database back up without the help of computer administrator. Other key

features are user friendly web interface for librarian and users, UNIMARC, Z39.50, in-built barcode generator, multi-language support (French, English, Spanish, Italian and Portuguese), import and export of bibliographic records in different formats, detailed documentation for user and administrator (Kumar, 2005).

3.8.5 OpenBiblio:

This open source software has been consistently developed since 2002 to be the most user friendly, intuitive open source ILS available on the free market. Like some of its open sources counterparts, it makes use of CSS and PHP templates to assist content management for unskilled librarians in college of web maintenance. Although no pilot libraries have expressed interest in adopting it, the number of active developers has grown and functionality has improved proportionally. Its target audiences are "Private collections, clubs, churches, school or public libraries", but it has the potential to be universal if enough work it put into it over time. Unfortunately at the present time, the circulation module can only handle U.S. postal codes so internationalization is limited to multilingual templates. OpenBiblio runs under Linux or Windows, any web server, PHP, and MySQL. It currently boasts a fully developed OPAC, circulation module with reserves support, and original cataloging with USMARC support (Sasikala, 2005).

3.8.6 Emilda:

This open source software which is another well designed for integrated library management system, which suits libraries of all sizes and is developed by Real Node Ltd. Features of Emilda are OPAC, MARC support, extensive configuration and full customization. Development of Emilda seems to have been stopped; no updates or new versions have been published since June / mid 2005 (Kumar, 2005).

3.8.7 PhyMyLibrary:

This open source software project started in 2001 as the hobby of a single developer in the Philippines as a means of providing a low-cost solution to library automation in that country. Its progress has gathered momentum gradually since then with many localized public, academic and special pilot libraries. Its target audience is "small academic and special libraries". Although offered in English,

the feature set and development roadmap seem to indicate localization rather than internationalization in mind. The development model is highly centralized with ultimate control of the source code solely in the hands of the projects founder, however a CVS repository databases exist which should be collaborative in coding for adopting later. To make matter worse, documentation is poor however technical support is available via email of mailing list. PhyMyLibrary runs on Linux and Windows operating system. It supports PHP, and MySQL Database system, phpMyAdmin, and python (optional). Its catalogue (original only), circulation (including reserve), and OPAC modules are fully implemented with USMARC support and CDS/ISIS conversion (Babao, 2006).

3.8.8 Learning Access ILS:

This is also one of the popular open source software was discovered by Nonprofit Foundation relying on patronage and donation from individual as well as the government of Washington State. In 2000, J. G. Bell "forked" programming code form the Koha project hardly resemble one another in source code or visual look. Despite bankruptcy setbacks, the same developers have done hard work on improving Learning Access ILS for the North America library market. They have four pilot public libraries that have undergone retrospective conversion using their Open Recon tool under a state sponsorship program. Its intended audience is "small to medium public and school libraries" which makes sense given that it was designed to handle small collections up to 25,000 items. Like Koha, it has the potential to become a universal ILS so long as it can make a name for itself in the public librarian first. One core advantage is its Unicode support, which demonstrates an international scope. In spite of the above issue, it remains the most viable solution next to Koha for libraries to adopt as a next generation ILS. System requirements are as follows: Linux or Windows, Apache, PHP, YAZ, and MySQL. Learning Access ILS boasts fully implemented OPAC, cataloguing (Original and copy of full MARC 21), and 39.50 client/server and circulation module (Sasikala, 2005).

3.8.9 Gnuteca:

This is also a small project of open source software was first started by three Brazilian programmers in 2001 and has become highly popular among public,

academic, and governmental special libraries in that country. Form what can be gathered on its web site. Gnuteca targets “small academic and special libraries”. One of its greatest libraries is that the software itself and the accompanying documentation have not been translated from Brazilian Portuguese for international use. The language barrier made effective testing of this software package difficult, if not impossible in certain areas. The good news is that the number of developer had grown since its release, it is an academic subsidized project, and it contains a CVS repository to encourage contribution from outside programmers. Official releases are made at periodic intervals, but modification in CVS indicates active development. Despite its young age, it has achieved national coverage with full implementation of OPAC, original cataloguing with MARC 21 support, circulation with reserves/booking support and CDS/ISIS conversion. It is assumed that acquisition, serials, interlibrary loans, and report generator module have been implemented since academic libraries have adopted the software in production use. Gnuteca only runs under Linux, Apache, PHP and PostgreSQL. It also runs on a homegrown database component called MIOLO which is only native to the Portuguese open source community. Optional support for GTK-based X-Windows staff client is provided through PHP-GTK, however the primary means of access for patron and staff is through their web browser (Sasikala, 2005).

3.8.10 PhpMyBibli:

In 2002, PhpMyBibli was the most recent open source integrated library management software. Most of the underlying programming has been done by the first programmer with recent developers joining the project to assist in translation efforts such as English and Spanish, giving it international appeal. This kind of cooperation has been facilitated through the use of mailing lists and CVS repository. The project is still in the planning stages and issues frequent without version numbering, however has accomplished a considerable amount of work in areas like OPAC, circulation with reserves support, original cataloguing with UNIMARK support, and serials. USMARC of MARC 21 support is the next logical step if the project heads want to captivate the North America library market. Barcode input is conveniently included as well. It runs under Linux of Windows using any web server, PHP, and MySQL. The standard approach in terms of a flexible SQL-based relational database and web-based staff client model have

potentially put this project on the cutting edge of IT software trends, as well as being in good company with similar approaches undertaken by production/stable projects like Koha and Learning Access ILS. One of the best features of this package is its intuitive, user friendly interface especially module. Unfortunately, some of the assisting popup menus utilize JavaScript which means older browsers need not apply (Sasikala, 2005).

3.8.11 Firefly:

Firefly is the latest effort to redefine the traditional ILS under an open source software process with its target audience being public libraries. There is very little to discuss given that the project is still in the early planning stages. Active participation is encouraged through a mailing list e-mail, online chat via IRC, and CVS repository. Nevertheless it is still documentation or a web site. A white paper is being drafted and the project administrator is seeking some means of funding. The major problem with this project is the software dependencies on which the system will eventually be built: Perl and Python. Although subject to change the developers are not well versed in librarianship practices or ILS fundamentals. Another issue is a lack of willingness to plan before programming which leads to redundancy on the development roadmap later. For instance, the decision to design a proprietary database which stores records as XML files in spite of the known risks associated with multiple concerned with relying on programming languages that reflects their skill base rather than considering more standardized cross-platform means used in other counterpart projects. Positive elements include: internationalization and web-based services that auto-update (Sasikala, 2005).

3.8.12 Evergreen ILS:

The Evergreen ILS developed and maintained by the Georgia Public Library Services for use by the Georgia Library PINES program, a consortium of 252 public libraries. Evergreen ILS is the open-source library automation system designed from scratch for large scale development in very large public library and state-wise consortium environments. The Evergreen ILS use Linux, MySQL, Mozilla and jabber (Kumar, 2005). Evergreen ILS is developed by Equinox Software, Evergreen is a robust, enterprise level ILS solution developed to be capable of supporting the workload of large libraries in a fault-tolerant system. It

too is standards compliant and uses the OPAC interface, and offers many features including flexible administration, work-flow customization, adaptable programming interfaces, and because its open source, cannot be locked away and can benefit from any software (Randhawa, 2013).

3.9 Comparative analysis of open source and free LMS:

The following tables show the information about comparative analysis of open source/ free LMS in terms of their features. Researcher has already determined **three** open source / free softwares to check out their features by comparison. The table consist the information about availability of the function in the module / software, if function is available digit 1 is stated and digit 0 stated for non-availability of the function.

Table No. 3.1: General considerable aspects of LMS:

Sr. No.	General Considered Aspects	Open source/ Free LMS		
		Koha	NewGenLib	e-Granthalaya
1.1	System Popularity	1	1	1
1.2	Less hardware & software requirement	1	1	1
1.3	Latest Technology : Frontend & Backend	1	1	1
1.4	Web based system	1	1	1
1.5	Source code freely available	1	1	1
1.6	No Updating /Up gradations & AMC	1	1	1
1.7	Computable for Multi Operating System	1	1	0
1.8	Training Frequency	1	1	1
	Total Points	**8**	**8**	**7**

Observation: The above table number shows general availability of the features along with open source/ free LMS. The table information shows that library management systems like Koha and NewGenLib are scored better.

Table No. 3.2: Additional advanced features in LMS:

Sr. No.	Additional Advanced Features	Open source/ Free LMS		
		Koha	NewGenLib	e-Granthalaya
2.1	Access to Bibliographical Database	1	1	1
2.2	Support for Android applications	1	1	0
2.3	System supports: Library standards	1	1	1
2.4	Information about Due Date	1	1	1
2.5	Messaging by SMS	1	1	0
2.6	Messaging by e-mail	1	1	1

Sr. No.	Additional Advanced Features	Open source/ Free LMS		
		Koha	NewGenLib	e-Granthalaya
2.7	SMS alert in circulation	1	0	0
2.8	Claim Activation	1	1	1
2.9	Online/ Self Renewing (if there is no claim)	1	1	0
2.10	Circulation details browsing by ID	1	1	1
2.11	OPAC through Intranet	1	1	1
2.12	Web OPAC (Internet)	1	1	1
2.13	Web OPAC on Mobile / Tablet	1	1	0
2.14	Consortium (Central OPAC)	1	0	0
2.15	Web based CAS, SDI	1	1	1
2.16	Bulletin Board Service	0	0	0
2.17	Book Marking	0	0	0
2.18	Tagging	0	0	0
2.19	RSS feed for new Acquisition	0	0	0
2.20	Manage online & offline resources with same	1	0	0
2.21	Customize of the display of home page	1	0	0
2.22	Customization of the Reports	1	0	0
2.23	About Data migration	1	1	1
2.24	Multilingualism support	1	1	1
2.25	Compatible to Bar code technology	1	1	1
2.26	Compatible to RFID technology	1	1	1
2.27	Compatible for Cloud computing	1	0	0
2.28	Customization of various screens/ menus	1	0	0
2.29	User can define keywords for book	1	0	0
2.30	Show cover image of the books	1	1	0
2.31	Virtual display of book sequence	1	0	0
2.32	Able to withdraw Spine labels & Barcode	1	1	1
2.33	Able to withdraw Book card & Book labels	1	1	1
2.34	Link to accompanying material	1	0	0
2.35	LMS + DLS on one platform	0	0	0
2.36	Local trouble-shooting is possible?	1	0	0
2.37	E-mail group of the software users on web	1	1	0
2.38	Ask A Librarian/ Help	0	0	0
2.39	Provided User Manual	1	1	1
	Total Points	**33**	**22**	**16**

Observation: The above table shows additional and advance features availability along with open source/ free LMS. The information shows, Koha is scored more than NewGenLib and e-Granthalaya.

Table No. 3.3: Other required facilities from LMS:

Sr. No.	Other Required Facilities	Open source/ Free LMS		
		Koha	NewGenLib	e-Granthalaya
3.1	Centralize Budgetary Control	1	0	0

Sr. No.	Other Required Facilities	Open source/ Free LMS		
		Koha	NewGenLib	e-Granthalaya
3.2	Centralize Purchase	1	0	0
3.3	Centralize Acquisition (Editing/Entry)	1	0	0
3.4	Centralize Cataloguing / Classification	1	0	0
3.5	Inter Library Loan	1	1	1
3.6	Use of Web catalogue of other libraries	1	1	1
3.7	Use of Web OPAC of other libraries	1	1	1
3.8	Branch Management	1	1	1
3.9	Users Management	1	1	1
3.10	Newspaper Management	1	1	1
3.11	Project report Management	0	1	0
3.12	Information About software	1	1	1
3.13	Feedback	1	1	0
3.14	Integrated search OPAC for Book, Serials,	0	0	0
3.15	Link to Bibliographical details for showing	1	0	0
3.16	LMS : Information Transparency or Right to	0	0	0
3.17	Online Purchasing System :	0	0	0
3.18	Online Committee Suggestion Processing			
	Total Points	**13**	**9**	**7**

Observation: The above table shows other required features availability along with open source/ free LMS. The information shows, Koha is scored more than NewGenLib and e-Granthalaya LMS.

Table No. 3.4: Various Modules in LMS:

Sr. No.	Various Main Modules	Open source/ Free LMS		
		Koha	NewGenLib	e-Granthalaya
4.1	Acquisition	1	1	1
4.2	Budget / Purchase Module	1	1	1
4.3	Cataloguing	1	1	1
4.4	Serial controls	1	1	1
4.5	Circulation	1	1	1
4.6	Administration / Authorities	1	1	1
4.7	OPAC	1	1	1
4.8	Reports	1	1	1
	Total Points	**8**	**8**	**8**

Observation: The above table shows availability of various main modules along with open source/ free LMS. The information shows, Koha and NewGenLib scored more compared to e-Granthalaya LMS.

Table No. 3.5 Budget/ Purchase Module of LMS:

Sr. No.	Budget / Purchase Module	Open source/ Free LMS		
		Koha	NewGenLib	e-Granthalaya
5.1	Department wise/ subject wise/Year wise Budget	1	1	1
5.2	Processing of the Invoice	1	1	1
5.3	Generating Payment Request to be sent to the Accounts Section	1	1	1
5.4	Updating Payment Request / DD delivery to the Vendors, etc.	1	1	1
	Total Points	**4**	**4**	**4**

Observation: The above table shows availability of budget related features along with open source/ free LMS. The information shows, all the library management systems get equal score.

Table No. 3.6: Acquisition Module of LMS

Sr. No.	Acquisition Module	Open source/ Free LMS		
		Koha	NewGenLib	e-Granthalaya
6.1	Duplicating checking	1	1	1
6.2	Generating Acquisition Records from Parching	1	1	1
6.3	Generate Approval list from suggestions, stage file	1	1	1
6.4	Process on Approval list from Venders	1	1	1
6.5	Updating Approval List (selected/Rejected)	1	1	1
6.6	Addition of Order Information	1	1	1
6.7	Quotation Process	0	1	0
6.8	Order placing / cancelling / follow-up, etc.	1	1	1
6.9	Receiving Books / Documents	1	1	1
6.10	Book Entries / Data Entries/ Accessioning	1	1	1
6.11	Data editing	1	1	1
6.12	Approving invoice for payment	1	1	1
6.13	Adding Payment / Billing Information	1	1	1
6.14	Acquisition Reports	1	1	1
	Total Points	**13**	**14**	**13**

Observation: The above table shows availability of acquisition related features along with open source/ free LMS. The information shows, NewGenLib is scored more than Koha and e-Granthalaya. As well as NewGenLib open source software has done very well for acquisition module and then after Koha and e-Granthalaya is also good for acquisition.

Table No. 3.7: Cataloguing Module of LMS

Sr. No.	Cataloguing Module	Open source/ Free LMS		
		Koha	NewGenLib	e-Granthalaya
7.1	Duplicate checking	1	1	1
7.2	Record Creation/ Cataloguing New Entry	1	1	1
7.3	Record Editing	1	1	1
7.4	Delete Record	1	1	1
7.5	Authority control	1	1	0
7.6	Copy Catalogue & Z39.50 functionality	1	0	0
7.7	Bibliographic framework – MARC 21 Framework	1	1	0
7.8	Import - Export Data Cataloguing Data	1	0	1
7.9	Union Catalogue	1	1	1
7.10	Cataloging of different items	1	1	1
7.11	Cataloguing Reports	1	1	1
	Total Points	**11**	**9**	**8**

Observation: The above table shows availability of cataloguing related features along with open source/ free LMS. The information shows, Koha has got more score compare to NewGenLib and e- Granthalaya LMS.

Table No. 3.8: Serial Control Module of LMS

Sr. No.	Serial Control Module	Open source/ Free LMS		
		Koha	NewGenLib	e-Granthalaya
8.1	Suggestions	1	0	0
8.2	Check Duplicate Title	1	1	1
8.3	Add New Journal	1	1	1
8.4	Subscription Start Details	1	1	1
8.5	Add Acquisition Information	1	1	1
8.6	Generate Approval	1	1	0
8.7	Update Approval	1	1	0
8.8	Add Order Information	1	1	0
8.9	Generate Order form / Ordering	1	1	1
8.10	Subscription maintenance	1	1	1
8.11	Schedule maintenance	1	1	0
8.12	Receive Loose Issues	1	1	1
8.13	Generate Reminder	1	1	1
8.14	Add Billing Information	1	1	1
8.15	Add Payment Information	1	1	1
8.16	Update Journal History	1	1	0
8.17	Payment Processing	1	1	0
8.18	Reminder through email (Non receiving)	1	1	1
8.19	Binding / Bound Volumes	1	1	1
8.20	Import / Export	1	1	1
8.21	Serials Reports	1	1	1
	Total Points	**21**	**20**	**14**

Observation: The above table shows availability of serial control related features along with open source/ free LMS. The information shows, Koha is scored more than NewGenLib and e-Granthalaya LMS.

Table No. 3.9: Circulation Module of LMS

Sr. No.	Circulation Module	Open source/ Free LMS		
		Koha	NewGenLib	e-Granthalaya
9.1	Member Details	1	1	1
9.2	Member / User categories	1	1	1
9.3	Setting Preferences	1	1	1
9.4	Issue / Return / Renewal Transactions	1	1	1
9.5	Fines and over dues notices	1	1	1
9.6	Book Reservations	1	1	1
9.7	Users - Renewal of Items Physically	1	1	1
9.8	Users - Renewal of Items: Online	1	1	1
9.9	Over Due Charges	1	1	1
9.10	Inter Library Loans (ILL)	1	1	1
9.11	Facility to Weed Out	1	1	1
9.12	Circulation Statistics / Reports	1	1	1
	Total Points	**12**	**12**	**12**

Observation: The above table shows availability of circulation related features along with open source/ free LMS. The information shows, all the selected library management systems get equal score.

Table No. 3.10: Administration Module of LMS:

Sr. No.	Administration Module	Open source/ Free LMS		
		Koha	NewGenLib	e-Granthalaya
10.1	User Rights	1	1	1
10.2	Various Codes Control (Acc. No. Bar Code)	1	1	1
10.3	Update database	1	1	1
10.4	Bulk Updating	1	1	1
10.5	Data Migration	1	1	1
10.6	Stock Verification	1	1	1
10.7	Back Up	1	1	1
10.8	Administrative Reports	1	1	1
	Total Points	**8**	**8**	**8**

Observation: The above table shows availability of administration related features along with open source/ free LMS. The information shows, all the selected library management systems get equal score.

Table No. 3.11: OPAC Module of LMS

Sr.	OPAC Module	Open source/ Free LMS		
		Koha	NewGenLib	e-Granthalaya
	Books and Periodicals			
11.1	Easy / Simple Search: Title/ Author/Call No./ Accession No./ Subject etc.	1	1	1
11.2	Advance search: Corporate Author / Keyword/ Sub-Subject/ ISBN/ Language/ Publisher/ Book Published in Specific Period/ Specific Country etc.	1	1	1
11.3	Advance search: Subject Keywords/ ISSN/ Language/ Publisher/ Serial Published in Specific Period/ Issue Date/Specific Country etc.	1	1	1
11.4	**Non - Book Material** Easy / Simple Search: Title/ Organization Name/ Author/Call No./ Standard No./ Patent No./Report No.	1	1	0
11.5	Advance search: Subject Keywords/ ISSN/ Language/ Publisher/ Serial Published in Specific Period/ Specific Country etc.	1	1	0
11.6	Boolean Search : by using AND/OR/NOT	1	1	1
11.7	Z39.50 search	1	1	0
11.8	Stop word Generation	1	1	1
11.9	Availability of OPAC on Web	1	1	1
11.10	Circulation Status on OPAC	1	1	0
11.11	Reservation through OPAC	1	1	1
11.12	OPAC customization by end-user	1	0	0
11.13	Mobile Compatible OPAC	1	1	0
11.14	Display of Search History	1	1	0
11.15	Save Search Results	1	0	0
11.16	Access to Multimedia materials	1	1	0
11.17	Print OPAC results	1	1	1
11.18	Virtual shelve of books	1	0	0
11.19	End User Book Suggestions	1	0	0
	Total Points	**19**	**15**	**8**

Observation: The above table shows availability of OPAC related features along with open source/ free LMS. The information shows, Koha is scored more than NewGenLib and e-Granthalaya.

Table No. 3.12: Various Types of Reports:

Sr. No.	Types of Reports	Open Source/ Free LMS		
		Koha	NewGenLib	e-Granthalaya
12.1	Member list	1	1	1
12.2	Batch wise Member list	1	0	1
12.3	Acquisition Reports	1	1	1
12.4	Accession Register	1	1	1
12.5	Accession Registers with selected fields	1	0	0
12.6	Book Title list	1	1	1
12.7	Periodical/ Journal Subscription list	1	1	1
12.8	Missing Issue Report	1	1	1
12.9	Circulation Statistics	1	1	1
12.10	Borrower list	1	1	1
12.11	Reservations	1	1	1
12.12	Overdue report of member	1	1	1
12.13	Stack Verification Report	1	1	1
12.14	Email Reminders	1	1	1
12.15	Catalogue cards printing	1	1	1
12.16	No Dues Certificate	1	1	1
12.17	Batch wise No dues Certificate	1	0	0
12.18	Book sent for Binding list	1	1	1
12.19	**Customization of Reports**	1	0	0
	Total Points	**19**	**15**	**16**

Observation; The above table shows availability of reports related features along with open source/ free LMS. The information shows, Koha is scored more than NewGenLib and e-Granthalaya LMS.

3.10 OSS for developing prototype model of centralized LMS:

Development a prototype model is main aspect of this research so that, it was necessary to study and compare the features of open source library management software with help of literature, to understand which software features are suitable to develop a model for centralized LMS, and understood the following features observed in Koha open source LMS, which are given below,

- Generally we have handled one automatized library with adopting one LMS; Koha open source software facilitates to automatize many libraries with one application software.
- Koha runs on OSS licenses (availability of Source code with Apache)
- It is suitable for Intranet and Internet.
- It is compatible for Linux, Windows and Mac operating system

- It is able to create profile for group of libraries.
- It is able to add libraries participating in integration.
- It is able to create types of material.
- Koha able to create types of patrons.
- Creating attributes for patrons.
- Providing borrowing privileges.
- Able to add circulation rules for respective libraries.
- Able to add patron bulk, import and individuals.
- It has a facility to select MARC frame work and having MARC tags for different types of materials.
- It has a facility to add books and other materials by bulk or individual.
- Creating OPAC for group
- It has a facility to provide search facility by individual library or whole group.
- Having circulation for respective library.
- Marinating systems by saving back-up.
- Adding recurring data of collection and patrons.
- It has a facility to give no-dues for whole passing out batch of students.
- Local trouble shooting possible.

The above situation is prominently available with Koha open source library management system, so researcher has selected Koha LMS to develop centralized library system, which has been further discussed in chapter number Seven.

3.11 Conclusion:

Library automation is the process in which proper planning, timely implementation and evaluation is more important. The librarian who has the good administrator has to set the working tasks and give priorities after analyzing the present situation for the future. The librarian's role is important in the selection of the suitable integrated library management system according to the requirements of the users. Emergence of open source software is a new ray of hope in the field of library automation. It offers many opportunities for government organizations, private sector, and educational institutions. Organizations in developing nations that take advantage of free and open source software by implementing them appropriately stand to gain much, while those that fail to take the advantage of this opportunity may find their Information and

Communication Technology (ICT) development lagging behind comparable organizations.

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Chapter-IV

Sinhgad Group of Institutes

4.1 Introduction:

Over the years, education has been viewed in India as an activity that leads to broadening of the mind, inculcation of values and building of character. Education is an important index of human development. Along with economic growth and empowerment, it forms the core of every social and human development plan. Among various levels of education, higher education is at the apex of the educational pyramid and has a persistent and influential impact on development. Higher education is a crucial factor for survival, proving an important task for preparing good citizens and leaders for different walks of life. The impact of globalization in education sector there are tremendous changes in KG to PG education. Broader scope for education system completely depends on the level of quality and quantity education in urban and rural areas. Commercial education has replaced traditional education. Higher education in India is rapidly proliferating. Increasing number of higher education institutions is indicating the fast growth.

Sinhgad Institute is one of the premier Institutes in Maharashtra affiliated to Pune University, Mumbai University, and Solapur University respectively in various places of Maharashtra.

4.2 History and Growth of Sinhgad Institute:

The group of Sinhgad Institutions established with an objective to provide quality education from school to post graduation programmes. Sinhgad Technical Education Society, which is parent organization of other institutions grouped under umbrella of Sinhgad Institute, which was established on 12th August 1993 by Prof. M. N. Navale, founder of Sinhgad Institute. (Source: Various pamphlets and official website of Sinhgad Institutes)

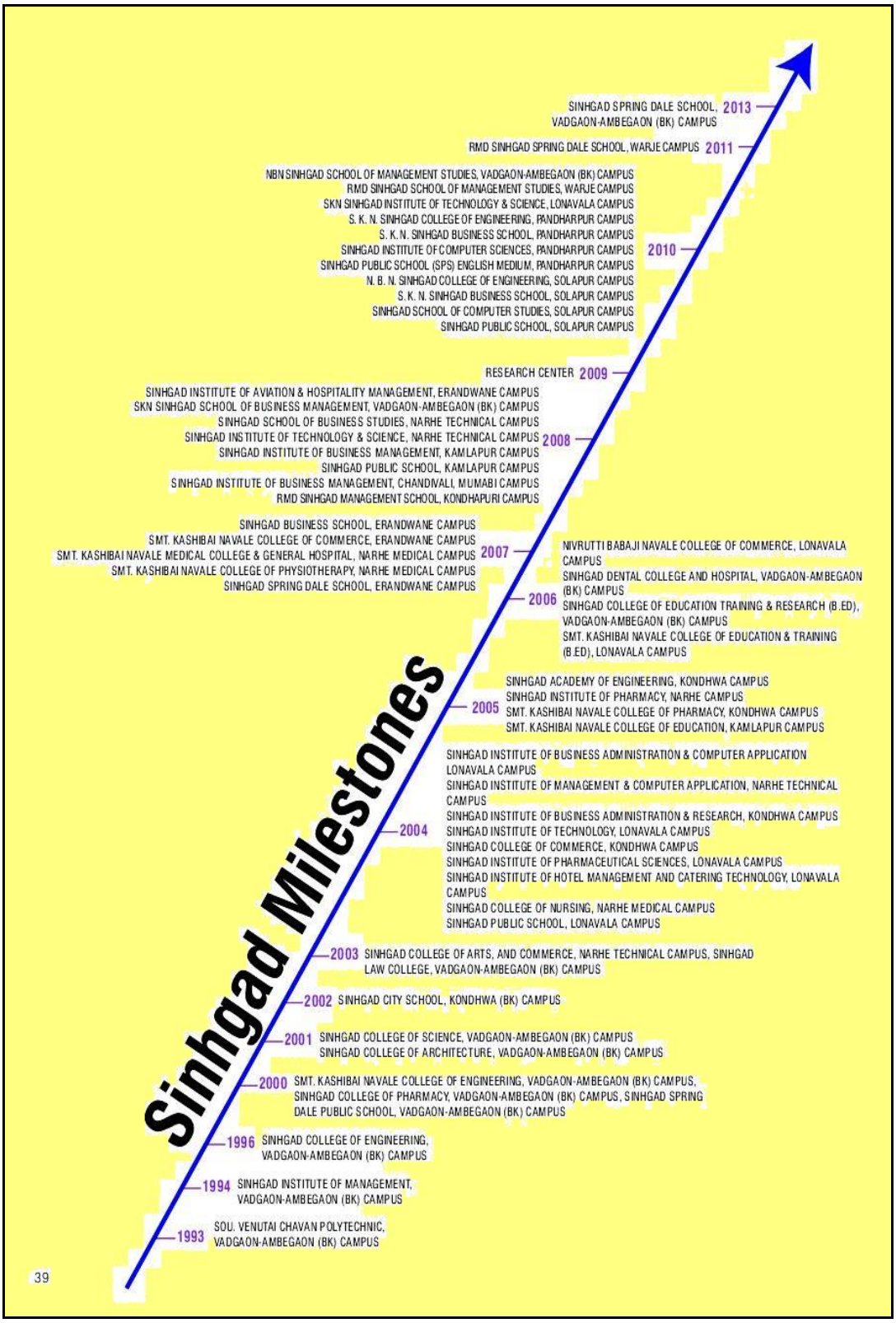
At initial stage of entering in education industry, Prof. M. N. Navale had taken Sou. Venutai Chavan Polytechnic College to run under his observation and simultaneously this little plant became a big tree with branches of institute

network in Maharashtra. The group of Sinhgad Institutes are divided under four organizations namely, Sinhgad Technical Education Society, Pune. Srinath Shikshan Prasarak Mandal, Nagar Road Pune. Savitribai Phule Shikshan Prasarak Mandal, Kamlapur and Shree Yashwantrao Chavan Shikshan Prasarak Mandal, Chandwali, Mumbai and is all these are integrated under Sinhgad Technical Education Society as a parent organization. Prof. M. N. Navale is the founder president of Sinhgad Institutes (http://Sinhgad.edu).

Sinhgad Institute has achieved a great measure of success by creating 12 campuses including total 117 educational school and colleges within Maharashtra. Out of them 109 institutes are providing higher education to 75000 - 80000 (approx.) students in the field of Management, Engineering, Pharmacy, Information Technology, Medical, Dental, Nursing, Law, Arts, Commerce, Science, besides day schools and residential school programmes kindergarten onwards (Chatterjee, 2013).

The following figure shows the milestones of Sinhgad Institutes and growth among the organization of the institutions. In 2014 Sinhgad Institute was celebrated its 21^{th} glorious years by awarding senior faculties, who have contributed their valuable efforts in growth of Sinhgad Institutes.

Figure: - 4.1 – Growth of Sinhgad Institutes



Source: https://www.facebook.com/SinhgadInstitutes

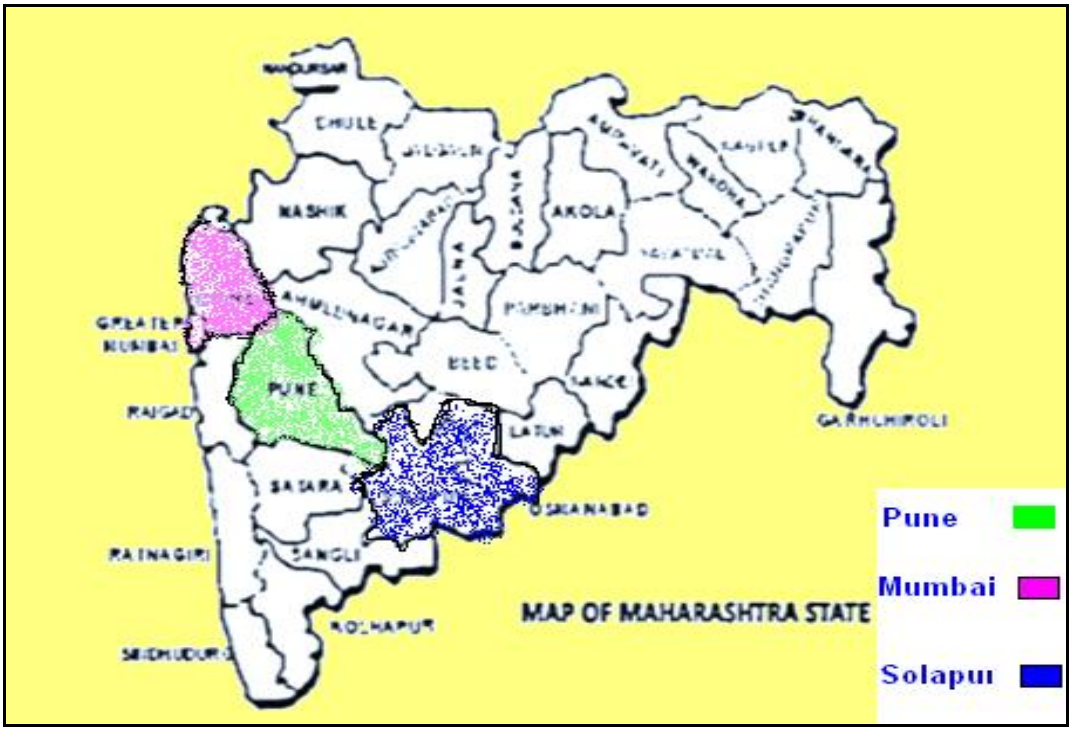
4.2.1 Mission Statement of the Organization

Holistic development of students and teachers is what we believe in and work for. We strive to achieve this by imbibing a unique value system, transparent work culture, excellent academic and physical environment conducive to learning, creativity and technology transfer. Our mandate is to generate, preserve and share knowledge for developing a vibrant Society (http://Sinhgad.edu).

4.2.2 Sinhgad Institute Campus Locations

The locations of these campuses are in pollution-free, lush green environment conducive to learning. Pune, Mumbai and Solapur are the places where Sinhgad Institute has spread its branches. It is observed that most of colleges and schools are non-grantable. Sinhgad Institutes also have a select array of vocational courses like Nursing, Hospitality and Aviation, Gemology to name a few. Sinhgad Institutes are spread over 12 fully equipped sprawling, aesthetically landscaped campuses. Every constituent Institute of the Sinhgad Institutes Education conglomerate is a competitive independent entity and yet connected, having an Event Calendar of its own. Intensive planning of Initiatives is ongoing to make the Sinhgad Institutes an incomparable force to reckon with (http://Sinhgad.edu).

Figure: - 4.2 - Locations of Sinhgad Institutes on Map of Maharashtra.



1. Sinhgad Institute Amenities:

All campuses have excellent hostel facilities and other student's amenities like well-equipped and automated libraries, e libraries, Wi-Fi Internet facilities, Auditoriums, seminar halls, open-air theatre, ATM Centers, clinics, market for essential commodities and Bank counters etc. shops , Laundry , Pizza Corner , separate Ladies and Gents parlor , Hostel , Mess , Canteens , Post office and many more (http://Sinhgad.edu).

2. Sinhgad Institute in Medical Education

Smt. Kashibai Navale Medical College and General hospital: The hospital complex started in 2006 with only outpatient department and 300 bedded inpatient departments was added on 1st January 2007. Presently Smt. Kashibai Navale, Medical College and General hospital has 705 beds which include 34 ICU, 648 general teaching beds, 20 casualty and 3 Hemodialysis beds. Smt. Kashibai Navale Medical College and General hospital started MBBS course in 1st January 2007. The MBBS degree has been duly recognized by medical council of India and also by Ministry of Health and Family Welfare, Govt. of India, New Delhi. The Hospital has attached to college located at Narhe and Ambegaon, Pune. The Dental College and hospital is located at Vadgaon (BK) Pune. The Hospital provides free medical treatment to all in-door and out -door patients including free stay, medicines and meals, whereas the dental hospital offers free treatment to out-door patients. It is observed that from case paper record of till 2013 Smt. Kashibai Navale Medical College and General Hospital provided services to 548422 patients in OPD with 31558 patients hospitalized which shows the Hospital has been performing very well. Since Smt. Kashibai Navale Medical College and General hospital has 361 teaching and 1153 non-teaching staff including clinical, Administrative, Technical, Nursing, Supportive and security staff. Smt. Kashibai Navale Medical College and General Hospital has 36 departments including central library, along with Anatomy, Physiology, Biochemistry, Pathology, Microbiology, Pharmacology, Pharmacy, Animal house, Forensic Medicine, Medical Education Technology Unit, Central Photography Unit, Hospital introduction Unit, OPD Services, Casualty department, Inpatient Services department, General Medicine Department, Pediatrics, Pulmonary Medicine department, Psychiatry, Dermatology, General Surgery, Orthopedics,

Ophthalmology, Oto-Rhino Laryngological, Dental, ICU Complex, Anesthesia, Operation Theatre Complex, CSSD, Obsentrics and Gynecology, Central Clinical laboratory, Radio Diagnosis, Blood bank, Nuclear Medicine, Physiotherapy Department and Nursing Services department (Balsaraf, 2010).

4.2.3 Activity Profile of Sinhgad Institutes in Various Sectors:

It is observed that, in social, cultural, academics and in research, all these various sectors are focused by group of Sinhgad Institutes from the beginning the institutes, some of the activities are explained below with the help of information provided by official website of the institute.

1. Social Work Activities:

As a social responsibility, Sinhgad institute is arranging Blood Donation camps in some institutes every year. The Sinhgad hospital and Medical College has also arranging these types of activities for the society. Tree Plantation, Pulse Polio, Street plays, NSS camps (National Service Scheme) and sport related activities are observed interesting areas of the management.

2. Academic Activities:

Sinhgad Institutes also signed a memorandum of understanding (MOU) with Aalborg University, Denmark for faculty mobility where our faculty and students are pursuing their Post graduate and Doctorate programmes. The faculty development programmes are organized on regular basis in all campuses with the collaboration of renowned worldwide institutions. National and International Seminars are frequently organized at various campuses to explore new ideas and researches in Management, Information Technology and Engineering, and Medical field. Educational tie-up with some of the renowned Foreign Universities and institutions for academic and research collaborations in respect of faculty exchange and faculty development programmes. The student development programmes too are organized to provide multi-faceted skills and leadership qualities to our promising students. Sinhgad Institute has also established a Central Placement Cell which organizes the active training and placement programmes that provide assistance and guidance to the students of Management

and Technical Institutes. The industry experts are invited to give an insight to the expectations of professional world to the students. Institutes have been maintaining a track record of over 90% placements since inception and a very high percentage of this has been with corporate and multi-national companies. In keeping with its legacy of continuous up-gradations and betterment Sinhgad Technical Education Society collaborated with IIT Mumbai, and has established Distance Education Programme (DPE) center at its Vadgaon, Pune campus, offering post graduate diploma in Information technology (PGDIT). Sinhgad Institutes with its network of educational institutes has a marked presence abroad. It is working with 11 European Universities where 42 Indian scholars are being offered fellowships, 22 teachers of Sinhgad Institutes are pursuing their Ph.D. studies under this programme in the universities. Sinhgad institute has a partnership along with 19 Asian universities and some European Universities through the European commission and Sinhgad Institute is a member of "Global ICT standardization forum for (GISFI)" which functions through “Lonavala” Campus (http://Sinhgad.edu).

3. Research Center Activities:

Research Centre of SIOM aims at being ‘thinking intensive’ to generate a welter of different perspectives, to move from the known to the unknown. The Research activities undertaken are focused on reaching outcomes that result into benefits for the learning community and society at large. There are two full-fledged research cells. Sinhgad Institute of Management (SIOM) research unit is armed with 33 Ph.D. guides, guiding an impressive number of 164 Scholars pursuing doctorate at present. The various popular specializations available to researchers are: Computer Management, Finance Management, Human Resource Management, Marketing Management, Organization Management, Production and Operation Management. Additional spread of areas, for which guidance and expertise is available range from Biometrics to Environment issues including E-pollution. More than 15 number of researchers who have recently secured Ph.D. in various research areas. The research cell has also standardized procedures for administrative assistance at every step, to facilitate research activity leading to convincing completion. It also encourages, maintains, documents and updates the status of research conducted by faculty along with publications and presentations.

Furthermore, it publishes its research papers in bi-annual journal titled "Sinhgad International Business Review" (SIBR) every year. The frequency of research activity movements like seminars, conferences and workshops are routine practices of the Sinhgad Institutes. Each and every campus has a facility of decent and spacious seminar hall to conduct research activities as well as guest lectures (http://Sinhgad.edu).

4. Sinhgad International Students Center:

Sinhgad International student's center is located at Lonavala. Most of the Foreign Students prefer Sinhgad Institute for imparting excellent knowledge. It has presently more than 1000 foreign nationals from more than 38 countries like, Asian, African and Australian continents are pursuing Education in various streams like Science, Commerce, Arts, law, Engineering, Medicine, Architecture, Management etc. (http://Sinhgad.edu).

4.2.4 Founder President: Prof. M.N. Navale

Prof. M. N. Navale, founder of "Sinhgad Institutes" is basically from a farmer family background and he was born on 30 December 1950 at Ekathpur, Tal. Sangola, Dist. Solapur. Ekathpur is very small, hardly 2000-3000 people, a village in Solapur district. After birth of Maruti Navale, his father expired within one year, and his mother late. Smt. Kashibai Nivrutti Navale had taken care of him. His mother Kashibai Navale had taken hard efforts for making him educated and a gentleman. Late. Nivrutti Navale was also a freedom fighter, who had played important role as a freedom fighter. Maruti Navale completed his primary education in Servodaya Shikshan Kendra, near Ekathpur, after seventh standard he has completed his 8^{th} to 11^{th} standard from Latthe Education Society, Sangli. That time M. N. Navale was a merited scholar student of S.S.C. board after he had taken his higher education at Walchand Engineering College, Sangli and also he was awarded National Merit scholarship. From his childhood he was very much interested in technical education, so that he completed B.E. and M.E. in Electrical and Master of Business Administration (MBA) also. Prof. M. N. Navale is a career oriented person and was selected as lecturer in an educational field for some years he was Principal of an engineering college in Bharti Vidyapeeth, Pune, at that time his age was only thirty. At the time of working in Bharti Vidyapeeth,

Sir had a strong wish to do something unique in the education field, so that he left out Bharti Vidyapeeth and take over Sou. Venutai Chavan Polytechnic College, Phaltan (Satara) in 1991 then after on 12th Dec. 1993 he established "Sinhgad Technical Education Society" at Pune (http://Sinhgad.edu).

4.3 Libraries of Sinhgad Group of Institutes:

1. Vadgaon Campus:

Campus No.	Library No.	Programmes	College / Institute Name with Courses
1	**VADGAON CAMPUS**		
	1	**Sinhgad College of Engineering**	
		1	Bachelor of Engineering (B.E.)
		2	Master of Engineering (M.E.)
		3	Sinhgad College of Engineering (MBA)
		4	Ph.D. Programme
	2	5	**Smt. Kashibai Navale College of Engineering (MBA)**
	3	**Sinhgad College of Pharmacy**	
		6	Bachelor of Pharmacy (B. Pharm)
		7	Master of Pharmacy (M. Pharm)
		8	Ph.D. in Pharmacy
	4	**Sinhgad College of Architecture**	
		9	Bachelor of Architecture (5 Year)
		10	Bachelor of Architecture interior Design (5 Year)
		11	Bachelor of Architecture Construction Management (5 Year)
		12	Master of Architecture Conservation (2 Year)
		13	Master of Architecture Computer Application (2 Year)
		14	Ph.D. in Architecture (3 Year)
	5	**Sinhgad Dental College And Hospital**	
		15	Bachelor of Dental Surgery (BDS)
		16	Master of Dental Surgery (MDS)
	6	**Sinhgad Institute of Management**	

Campus No.	Library No.	Programmes	College / Institute Name with Courses
		17	Master of Business Administration (MBA)
		18	Master of Marketing Management (MMM)
		19	Master of Personnel Management (MPM)
	7	20	**Sinhgad Institute of Management (MCA)**

2. Ambegaon Campus:

Campus No.	Library No.	Programmes	College / Institute Name with Courses
2	**AMBEGAON CAMPUS**		
	8	**Sinhgad College of Science (Senior)**	
		21	Bachelor of Science (B.Sc.)
		22	Bachelor of Business Administration (BBA)
		23	Bachelor of Business Management - International Business (BBM-IB)
		24	Bachelor of Computer Application (BCA)
		25	Bachelor of Commerce (B.Com)
		26	Master of Science (M.Sc.)
	9	**Sinhgad Law College**	
		27	LLB. (5 Year)
		28	B.S.L. (5 Year)
		29	LLB. (3 Year)
	10	30	S.K.N. Sinhgad School of Business Management (MBA)
	11	**NBN Sinhgad Technical Institutes Campus**	
		31	NBN Sinhgad School Of Engineering (B.E.)
		32	NBN Sinhgad School Of Management Studies (MBA)
		33	NBN Sinhgad School of Computer Studies (MCA)

3. Kondhava Campus:

Campus No.	Library No.	Programmes	College / Institute Name with Courses
3	**KONDHAVA CAMPUS**		
	12	34	**Sinhgad Institute of Business Administration and Research - MBA**

Campus No.	Library No.	Programmes	College / Institute Name with Courses
	13	35	**Sinhgad Institute of Business Administration and Research - MCA**
	14	**Smt. Kashibai Navale College of Pharmacy**	
		36	Bachelor of Pharmacy (B. Pharm)
		37	Master of Pharmacy (M. Pharm)
	15	**Sinhgad College of Commerce**	
		38	Bachelor of Commerce (B.Com)
		39	Master of Commerce (M.Com)
		40	Bachelor of Business Administration (BBA)
		41	Bachelor of Computer Application (BCA)
	16	42	**Sinhgad Academy of Engineering (MBA)**

4. Narhe Campus:

Campus No.	Library No.	Programmes	College / Institute Name with Courses
4	**NARHE CAMPUS**		
	17	**Sinhgad Institute of Technology and Science**	
		43	Bachelor of Engineering (B.E.)
		44	Master of Business Administration (MBA)
	18	**Sinhgad College of Arts & Commerce**	
		45	Bachelor of Business Administration (BBA)
		46	Bachelor of Computer Application (BCA)
		47	Bachelor of Commerce (B.Com)
		48	Bachelor of Arts (B.A.)
		49	Master of Commerce (M.Com)
		50	Master of Arts (M.A.)
	19	51	**Smt. Kashibai Navale Medical College and General Hospital**
	20	52	Sinhgad College of Nursing
	21	53	Smt. Kashibai Navale College of Physiotherapy
	22	**Sinhgad School of Business Studies**	
		54	Master of Business Administration (MBA)
		55	Master of Marketing Management (MMM)

Campus No.	Library No.	Programmes	College / Institute Name with Courses
		56	Master of Personnel Management (MPM)
	23	57	Sinhgad Institute of Management & Computer Application – MBA
	24	58	Sinhgad Institute of Management & Computer Application - MCA
	25	**Sinhgad Institute of Pharmacy**	
		59	Bachelor of Pharmacy (B. Pharm)
		60	Master of Pharmacy (M. Pharm)

5. Warje Campus:

Campus No.	Library No.	Programmes	College / Institute Name with Courses
5	**WARJE CAMPUS**		
	26	**RMD Sinhgad Technical Institutes**	
		61	RMD Sinhgad School Of Engineering (B.E.)
		62	RMD Sinhgad School Of Computer Studies (MCA)
		63	RMD Sinhgad School Of Management Studies (MBA)

6. Erandwane Campus:

Campus No.	Library No.	Programmes	College / Institute Name with Courses
6	**ERANDWANE CAMPUS**		
	27	**Sinhgad Business School**	
		64	Master of Business Administration (MBA)
		65	Master of Marketing Management (MMM)
		66	Master of Personnel Management (MPM)
		67	Master of Computer Management (MCM)
	28	**Smt. Kashibai Navale college of Commerce**	
		68	Bachelor of Business Administrator (BBA)
		69	Bachelor of Computer Application (BCA)
		70	Bachelor of Business Management (IB) International Business (BBM)

Campus No.	Library No.	Programmes	College / Institute Name with Courses
		71	Bachelor of Commerce (B.Com.)

7. Lonavala Campus:

Campus No.	Library No.	Programmes	College / Institute Name with Courses
7	LONAVALA CAMPUS		
	29	**Sinhgad Institute of Technology**	
		72	Bachelor of Engineering (B.E.)
		73	Master of Engineering (M.E.)
		74	Master of Business Administration (MBA)
		75	Master of Computer Application (MCA)
	30	76	**Smt. Kashibai Navale College of Education and Training (B.Ed.)**
	31	**SKN Sinhgad Institute of Technology & Science**	
		77	Bachelor of Engineering (B.E.)
		78	Master of Engineering (M.E.)
	32	79	**Sinhgad Institute of Business Administration & Computer Application - MBA**
	33	80	**Sinhgad Institute of Business Administration & Computer Application - MCA**
	34	**Sinhgad Institute of Pharmaceutical Sciences**	
		81	Bachelor of Pharmacy (B. Pharm)
		82	Master of Pharmacy (M. Pharm)
	35	**Sinhgad Institute of Hotel Management and Catering Technology**	
		83	Bachelor of Science in Hospitality Studies (B.Sc.HS)
		84	Bachelor of Hotel Management and Catering Technology (BHMCT)
	36	**Nivrutti Babaji Navale College of Commerce**	
		85	Bachelor of Business Administrator (BBA)
		86	Bachelor of Computer Application (BCA)

		87	Bachelor of Business Management (IB) International Business (BBM)
		88	Bachelor of Commerce (B.Com.)
		89	Master of Commerce (M.Com)

8. Chandivali (Mumbai) Campus:

Campus No.	Library No.	Programmes	College / Institute Name with Courses
8	**CHANDIVALI (MUMBAI) CAMPUS**		
	37	90	**Sinhgad Institute of Business Management**
		91	Masters in Management Studies (MMS)
		92	Master in Marketing Management (MMM)
		93	Master in Financial Management (MFM)
	38	**Sinhgad College of Commerce**	
		94	Bachelor of Commerce (B.Com.)
		95	Bachelor of Management Studies (B.M.S.)

9. Kondhapuri Campus:

Campus No.	Library No.	Programmes	College / Institute Name with Courses
9	**KONDHAPURI CAMPUS**		
	39	**Sinhgad Management School**	
		96	Master of Business Administration (MBA)
		97	Master of Marketing Management (MMM)
		98	Master of Personnel Management (MPM)
		99	Master of Computer Management (MCM)

10. Kamlapur Campus :

Campus No.	Library No.	Programmes	College / Institute Name with Courses
10	**KAMLAPUR CAMPUS**		
	40	100	**Sinhgad Institute Of Business Management (MBA)**
		101	**Ph.D. Programme**

	41	102	**Sinhgad Institute Of Business Management (MCA)**
	42	103	**Smt. Kashibai Navale College Of Education (B.Ed)**

11. Pandharpur Campus:

Campus No.	Library No.	Programmes	College / Institute Name with Courses
11	**PANDHARPUR CAMPUS**		
	43	104	**S.K.N. Sinhgad Business School (MBA)**
	44	105	**Sinhgad Institute of Computer Sciences (MCA)**
	45	**S.K.N. Sinhgad College Of Engineering**	
		106	Bachelor of Engineering (B.E.)

12. Solapur Campus:

Campus No.	Library No.	Programmes	College / Institute Name with Courses
12	**SOLAPUR CAMPUS**		
	46	107	**Sinhgad Business School (MBA)**
	47	108	**Sinhgad School of Computer Studies (MCA)**
	48	**N. B. Navale Sinhgad College of Engineering**	
		109	Bachelor of Engineering (B.E.)

4.4 Library Automation: Current Scenario:

In higher education section of the organization, there are 109 higher education courses and there are 48 libraries providing library services to these academic programmes. In the library automation era, forty three, libraries are automated and five libraries are not automated. (Source: Primary data)

Most of the automated libraries are using commercial library management systems. SLIM21, AutoLib and EasyLib are the popular commercial LMS brands in the institute's libraries. Management has trying to focus to reduce the cost of library automation by developing 'Gems' in-house ILM software. Basically this software was developed for administrative purpose but one library management

module is developed for library management. This software is still under developing stage and only circulation module is developed for library. It has been observed management is positive to reduce the cost of library automation by exchanging old systems. Management is searching all the options to provide advanced services to the users at minimum cost. Most of the institutes are residential and available with hostel facility to the students, so organization has taken care of library readers to open the libraries as well as reading rooms till late night. The 24 hours library and reading room facility is provided by Vadgaon and Ambegaon campus central library in Pune. The library professional human resources are arranged by organization for twenty four hours to the students.

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1. Sinhgad Institutes. (2013). Organization Profile. Retrieved from http://www.sinhgad.edu Retrieved on 18.09.2013.
2. Chatterjee, S (2013, August 12). Celebrating 20 years of imparting education. *Times of India* in Pune Times, P. 2
3. Sinhgad Institutes. (2013). Organization Profile. Retrieved from http://www.sinhgad.edu Retrieved on 18.09.2013.
4. Ibid.
5. Ibid.
6. Balsaraf, D. (2010). Aadhunik Shikshanacha Mahameru. In Prof. M. N. Navale Gourav Sohala Samati (Eds.), *Navalai Sinhgadchi* (pp. 21-31). Pune: Neha Creations.
7. Sinhgad Institutes. (2013). Organization Profile. Retrieved from http://www.sinhgad.edu Retrieved on 18.09.2013.
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10. Balsaraf, D. (2010). Aadhunik Shikshanacha Mahameru. In Prof. M. N. Navale Gourav Sohala Samati (Eds.), *Navalai Sinhgadchi* (pp. 21-31). Pune: Neha Creations.
11. Sinhgad Institutes. (2013). Organization Profile. Retrieved from http://www.sinhgad.edu Retrieved on 18.09.2013.

Chapter-V
Data Presentation, Analysis and Interpretation

5.1 Introduction:

Data Analysis is a key phase in the research work. This chapter, incorporates the presentation, analysis and interpretation of data with the help of sorting of raw data, its codification, classification and tabulation, percentage calculations and drawing of inferences. This chapter is further subdivided into following eight sections; the details of each section are given below.

5.2 Data Presentation, Analysis and Interpretation:

Section 1: This section covers **general information** about Sinhgad Institutes and their libraries, with various disciplines and programmes that are running under the group of Sinhgad Institute. Researcher has also collected statistical information about library personnel, their computer literacy, collection details, new additions, library and reading room timings, circulation, services offered presently to the users, etc.

Section 2: This section consists of information about **IT infrastructure** of individual libraries, i.e. hardware and software used in Sinhgad Institute libraries.

Section 3: It covers the details of **library automation and the cost incurred** for different hardware and software like, the library management software, operating system, Antivirus, etc. Hardware like, UPS and barcode printer and its cost are also included. Other factors, like availability of internet connection and reasons for non-automation, etc.

Section 4: In this section information is collected on **existing Library Management Software (LMS)** on the basis of requirement of training, LMS updating, library standards support and backup techniques, etc. used by librarians.

Section 5: In this section a **comparative study of existing LMS packages** is being carried out to learn their features. This information is being summarized in

tabular format. It also consists of information about advance features in existing LMS.

Section 6: In this section researcher has collected information about various aspects related to **data migration and data proprietary**. It also consists of data export facility, agreements done with software vendor before installation, etc.

Section 7: It covers information about availability of resources and **resource sharing practices** among Sinhgad Institute higher education libraries like, inter library loan, centralized purchasing, centralized acquisition, centralized cataloguing, data editing, etc.

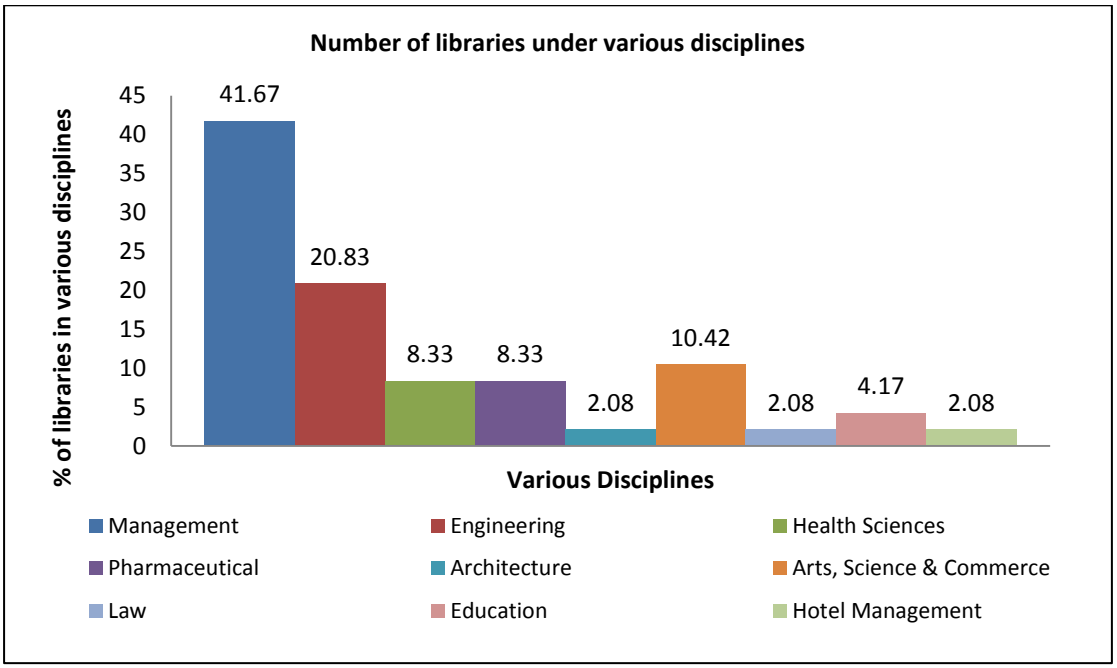
Section 8: It covers information about librarian's **knowledge, awareness** and IT literacy about **open source software** including interest in attending seminar, workshop, conferences, etc. and its use. This section also covered details of the expectations from the other library management systems.

5.2.1 General Information: Sinhgad Institutes & Libraries

Table No. 5.1: Number of libraries under various disciplines

Types of Disciplines	***No. of Libraries***	***%***
Management	20	41.67
Engineering	10	20.83
Health Sciences	04	08.33
Pharmaceutical	04	08.33
Architecture	01	02.08
Arts, Science & Commerce	05	10.42
Law	01	02.08
Education	02	04.17
Hotel Management	01	02.08
Total Respondents	***48***	***100***
Source : Primary Data		

Graph No. 5.1:- Number of libraries under various disciplines



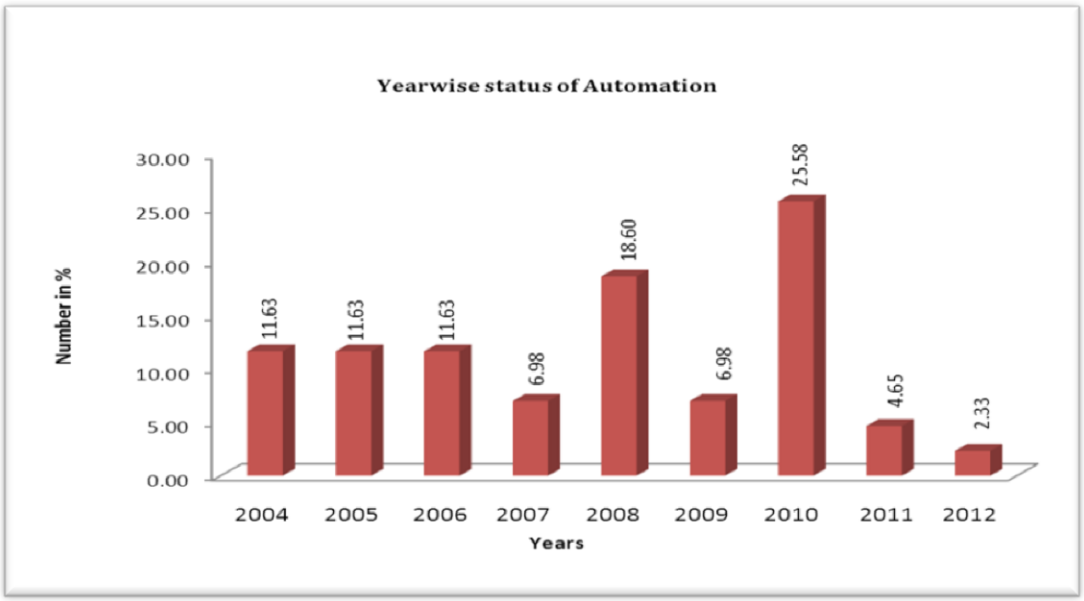
As already mentioned in the theory chapter, Sinhgad Institutes is having 48 number of institute libraries and these libraries are providing library services to the 109 higher education academic programmes. Above table and graph shows, these academic programmes are divided into 9 types of disciplines, i.e. Management, Engineering, Health Science, Pharmaceutical, Architecture, Arts, Science and Commerce, Law, Education and Hotel Management discipline.

Researcher has observed that 41.67% (20) libraries are under Management discipline, 20.83% (10) number of libraries are under Engineering discipline, 8.33% (4) number of libraries are under Health sciences and Pharmaceutical discipline respectively, 2.08% (1) library is under Architecture, law and Hotel Management discipline respectively, 10.42% (5) number of libraries are under Arts, Science and Commerce discipline and 4.17% (2) libraries are under Education discipline. From the data it is observed that, Sinhgad Institute has given priority to the management and engineering discipline.

Table No. 5.2:-Year wise statistical growth and automation status of Sinhgad Institute libraries

Sr. No.	*Year*	*No. of libraries*	*%*	*No. of libraries*	*%*
1	1994	02	04.17	00	00.00
2	1996	01	02.08	00	00.00
3	2000	03	06.25	00	00.00
4	2001	01	02.08	00	00.00
5	2003	04	08.33	00	00.00
6	2004	10	20.83	05	11.63
7	2005	04	08.33	05	11.63
8	2006	02	04.17	05	11.63
9	2007	04	08.33	03	06.98
10	2008	06	12.50	08	018.6
11	2009	08	16.67	03	06.98
12	2010	01	02.08	11	25.58
13	2011	02	04.17	02	04.65
14	2012	00	00.00	01	02.33
Total Respondents		***48***	***100***	***43***	***100***
Source: Primary Data					

Graph No. 5.2:-Year wise status of library automation

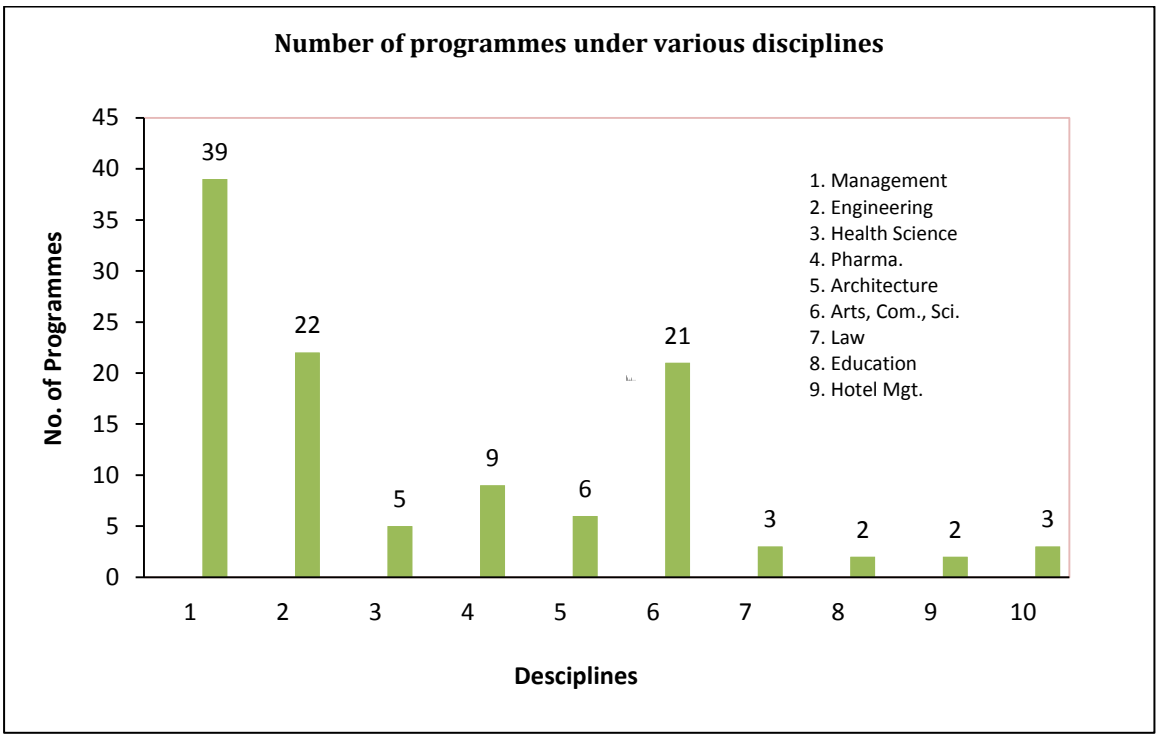


Sinhgad Institute was established in 1993 and entered in higher education from 1994. Above table and graph shows, total 48 libraries are opened in the years 1994 - 2012, and automatized in the years 2004 to 2012. The first library automation completed in 2004 by automating 11.63% (5) libraries. In the years 2005 and 2006, 11.63% (5) libraries were automated respectively. In the years 2007 and 2009, 06.98% (3) libraries were automated respectively. In 2008, 18.60% (8) libraries were automated. In 2010, 25.58% (11) libraries were automated. In 2011, 04.65% (2) libraries were automated. In 2012, only 02.33% (1) libraries were automated.

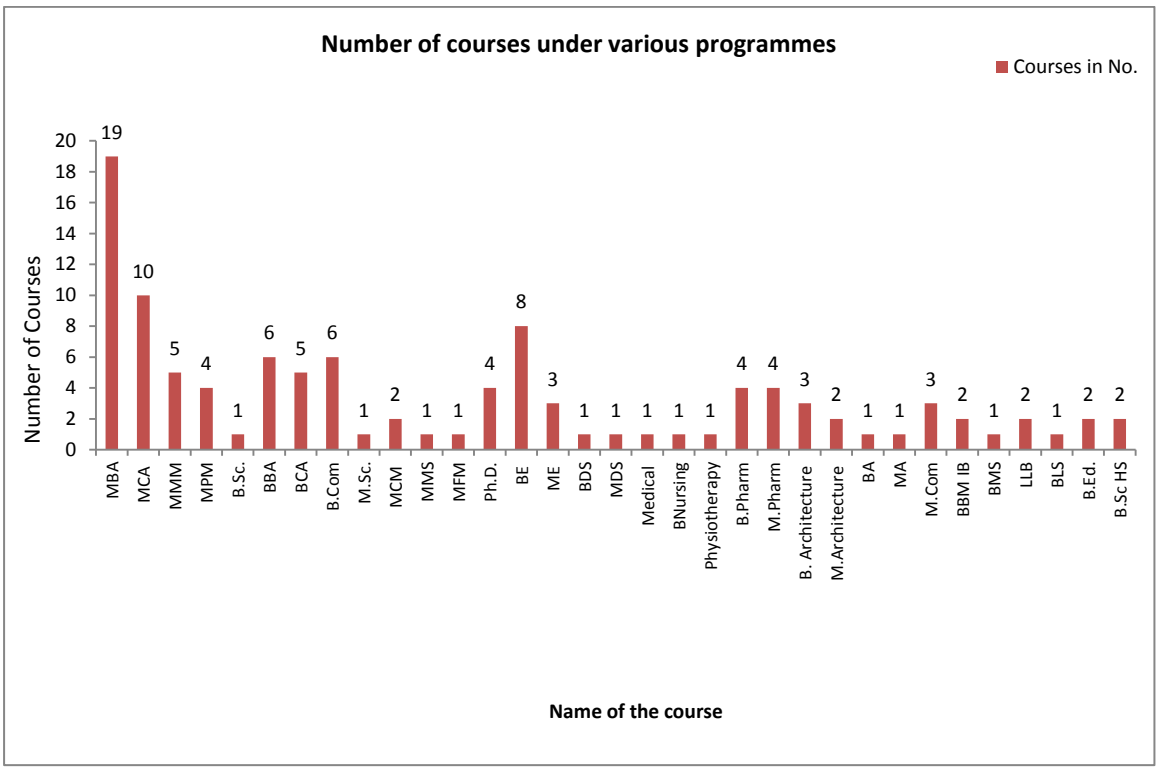
Table No. 5.3: Number of courses under various disciplines in Sinhgad Institutes

Sr. Number	Course Names	Types of Disciplines									
		Management	Engineering	Health Sci.	Pharamcy	Architecture	Arts, Sci.	Law	Education	Hotel Mgt.	Grant Total
1	MBA	12	7	0	0	0	0	0	0	0	19
2	MCA	7	3	0	0	0	0	0	0	0	10
3	MMM	5	0	0	0	0	0	0	0	0	5
4	MPM	4	0	0	0	0	0	0	0	0	4
5	B.Sc.	1	0	0	0	0	0	0	0	0	1
6	BBA	2	0	0	0	0	4	0	0	0	6
7	BCA	1	0	0	0	0	4	0	0	0	5
8	B.Com	1	0	0	0	0	5	0	0	0	6
9	M.Sc.	1	0	0	0	0	0	0	0	0	1
10	MCM	2	0	0	0	0	0	0	0	0	2
11	MMS	1	0	0	0	0	0	0	0	0	1
12	MFM	1	0	0	0	0	0	0	0	0	1
15	ME	0	3	0	0	0	0	0	0	0	3
16	BDS	0	0	1	0	0	0	0	0	0	1
17	MDS	0	0	1	0	0	0	0	0	0	1
18	Medical	0	0	1	0	0	0	0	0	0	1
19	B. Nursing	0	0	1	0	0	0	0	0	0	1
20	Physiotherapy	0	0	1	0	0	0	0	0	0	1
21	B. Pharm	0	0	0	4	0	0	0	0	0	4
22	M. Pharm	0	0	0	4	0	0	0	0	0	4
23	B. Architecture	0	0	0	0	3	0	0	0	0	3
24	M. Architecture	0	0	0	0	2	0	0	0	0	2
25	BA	0	0	0	0	0	1	0	0	0	1
26	MA	0	0	0	0	0	1	0	0	0	1
27	M.Com	0	0	0	0	0	3	0	0	0	3
28	BBM IB	0	0	0	0	0	2	0	0	0	2
29	BMS	0	0	0	0	0	1	0	0	0	1
30	LLB	0	0	0	0	0	0	2	0	0	2
31	BLS	0	0	0	0	0	0	1	0	0	1
32	B.Ed.	0	0	0	0	0	0	0	2	0	2
33	B.Sc. HS.	0	0	0	0	0	0	0	0	2	2
Total		*39*	*22*	*5*	*9*	*6*	*21*	*3*	*2*	*2*	***109***
Source : Primary data											

Graph No. 5.3:- Numbers of programmes in various disciplines in Sinhgad Institutes



Graph No. 5.4:- Number of courses under various programmes



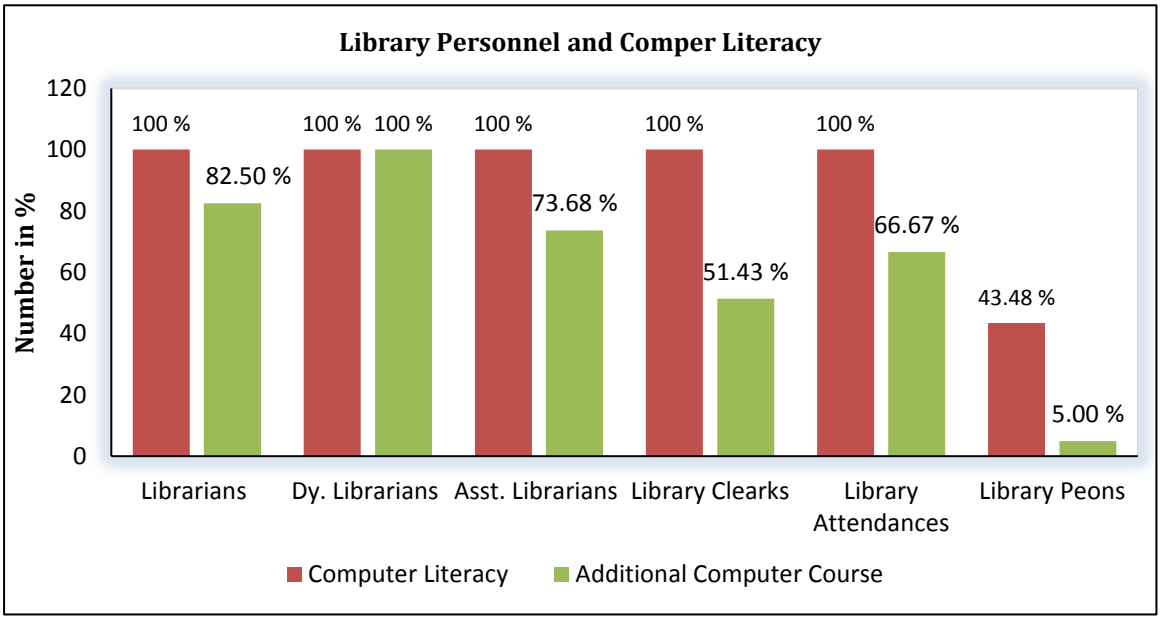
From table 5.3 and graph number 5.3, 5.4 depict the statistical information about number of programmes under various disciplines and their number of courses under various programmes respectively. There are 09 numbers of main disciplines which are carrying out 109 programmes integrated into 33 different types of courses. There are 39 programmes are under Management discipline, 22 programmes under Engineering, 05 programmes under Health Science, 09 programmes under Pharmaceutical discipline, 06 programmes under Architecture discipline, 21 programmes under Arts, Commerce and Science, 03 programmes under Law discipline, 02 programmes under Education discipline, 02 programmes under Hotel Management discipline and It is observed that 03 Graduation level education programmes are closed which were not taken under consideration.

There are 33 types of courses like MBA -19, MCA -10, MMM - 05, MPM -04, B.Sc. - 01, BBA - 06, BCA - 05, and B.com. - 06, M.Sc. - 01, MCM - 02, MMS-01, MFM - 01, Ph.D. - 04, B.E.- 08 , M.E. - 03, BDS - 01, MDS - 01, Medical - 01, B. Nursing - 01, Physiotherapy - 01, B. Pharm. - 04, M. Pharmacy - 4, B. Architecture,- 3,M. Architecture - 02, B.A. - 01, M.A. - 01 M.Com. - 03, BBM-IB - 02, BMS - 01, LLB. - 02, BLS. - 01, B.Ed. - 02, B.Sc. H.S. (Health Science) - 02, these are running under Sinhgad Institutes in various places of Maharashtra.

Table No. 5.4: Library personnel and their computer literacy

Designation	***Library Personnel***	***Computer Literate***		***Additional Computer Course***	
		Yes	***%***	***Yes***	***%***
Librarians	40	40	100.0	33	082.50
Dy. Librarians	01	01	100.0	01	100.00
Asst. Librarians	57	57	100.0	42	073.68
Library Clerk’s	35	35	100.0	18	051.43
Library Attendant	03	03	100.0	02	066.67
Library Peons	46	20	43.48	01	005.00
Total	***182***	***156***	***85.71***	***97***	***053.30***
Total Respondents	***48***				
Source : Primary data					

Graph No. 5.5:- Library personnel and their computer literacy



Above table and graph shows the statistical information about library personnel, and computer literacy of the staff. Institute having a total library staff of 182 it includes, 40 Librarians, 01 Dy. Librarian, 57 Asst. Librarians, 35 Library Clerks, 3 Library Attendants, and 46 Library Peons.

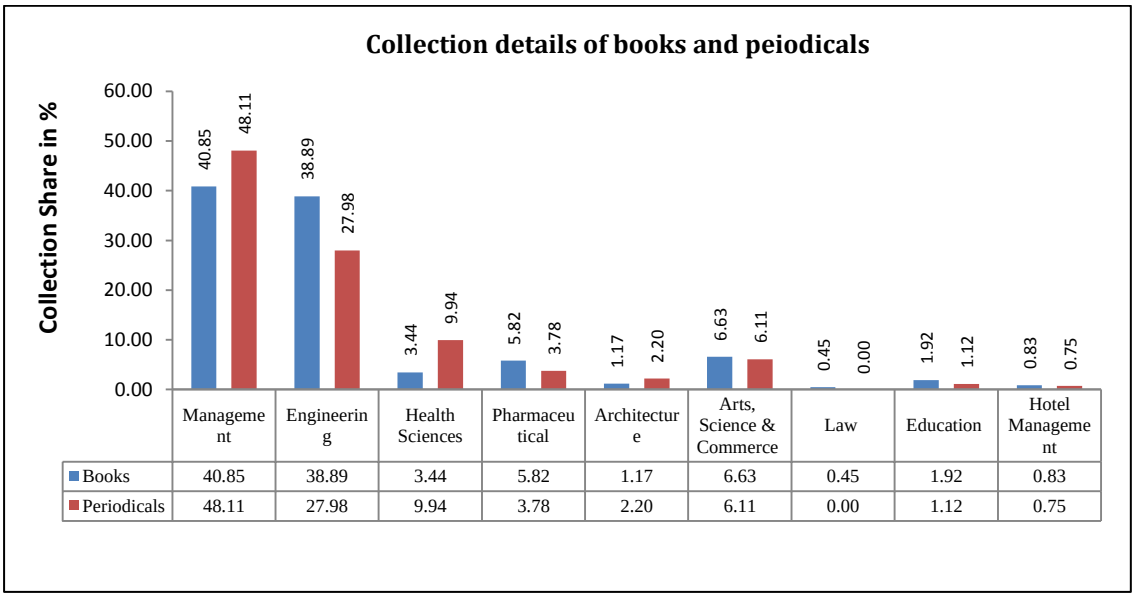
Out of 182 (100%) total library staff, 156 (85.71%) library staff is computer literate rest of peons. In the completion of any additional course 97 (53.30%) library staff (those who are computer literate) has been completed additional computer course. All the 40 (100%) librarians are computer literate and out of these, 33 (82.50%) librarians have completed additional computer course. One deputy librarian has completed additional computer course.

All the 57 (100%) Asst. librarians are computer literate and out of them 42 (73.38%) Asst. librarians has completed additional computer course. All 35 library clerks are computer literate and out of them 18 (51.43%) library clerks has completed additional computer course. All 3 (100%) library attendances are computer literate and out of these, 2 (66.67%) library attendances has completed additional computer course. Out of 46 number of library peon's, 20 (43.48%) library peon`s are computer literate and 1 (5%) library peon is completed additional computer course. Above table shows, most of the library staff is computer literate.

Table No. 5.5: Collection details of literature

Sr. No.	Disciplines	Books	%	Per/ Jour	%	E - Books	%	E - Database	%	CD/ DVD`s	%
1	Management	206463	40.85	1157	48.11	176	11.97	47	40.17	7222	43.53
2	Engineering	196554	38.89	673	27.98	520	35.37	56	47.86	5644	34.02
3	Health Sciences	17407	3.44	239	9.94	0	0	5	4.27	983	5.92
4	Pharmaceutical	29396	5.82	91	3.78	662	45.03	6	5.13	958	5.77
5	Architecture	5900	1.17	53	2.2	0	0	2	1.71	988	5.96
6	Arts, Science and Commerce	33491	6.63	147	6.11	42	2.86	0	0	753	4.54
7	Law	2268	0.45	0	0	0	0	0	0	0	0
8	Education	9694	1.92	27	1.12	0	0	0	0	43	0.26
9	Hotel Management	4209	0.83	18	0.75	70	4.76	1	0.85	0	0
Total		*505382*	*100*	*2405*	*100*	*1470*	*100*	*117*	*100*	*16591*	*100*
Total Respondent		*48*									
Source : Primary data											

Graph No. 5.6:- Collection details of books and periodicals



Above table depicts the collection details of various types of literature available in the library and the graph shows only the collection details of books and periodicals under various disciplines. There are 09 types of disciplines in Sinhgad Institute, the total collection details of the books (similar or different) are 505382 in institute libraries and 2405 periodical and journals, 1470 e-books, 117 e- databases, 16591 CD/ DVD`s.

Out of 100 % (505382) of the books (similar or different), 40.85% (206463) books are under Management discipline, 38.89% (196554) books are under Engineering, 3.44% (17407) books are under Health Science discipline, 5.82% (29396) books are under Pharmaceutical discipline, 1.17% (5900) books are under Architecture discipline, 6.63% (33491) books are under Arts , Commerce and science discipline, 0.45% (2268) books are under Law discipline, 1.92 % (9694) books are under Education discipline, 0.83% (4209) books are under Hotel Management discipline.

Out of 100% (2405) of the Periodical / Journals (similar or different) , 48.11% (1157) Periodicals/ Journals are under Management discipline, 27.98% (673) Periodicals/Journals are under Engineering, 9.94% (239) Periodicals/ Journals are under Health Science discipline, 3.78% (91) Periodicals/ Journals are under Pharmaceutical discipline, 2.20% (53) Periodicals/ Journals are under Architecture discipline, 6.11% (147) Periodicals/ Journals are under Arts , Commerce and science discipline, 1.12 % (27) Periodicals/ Journals are under Education discipline, 0.75% (18) Periodicals/ Journals are under Hotel Management discipline. There is no purchase of periodicals and journals for Law discipline.

Out of 100% (1470) of the e-books (similar or different), 11.97% (176) e-books are under Management discipline, 35.37% (520) e-books are under Engineering, 45.03% (662) e-books are under Pharmaceutical discipline, 2.86% (42) e-books are under Arts, Commerce and science discipline, 4.76% (70) e-books are under Hotel Management discipline. There is no purchase of e-books for Health Science, Architecture, Law and Education discipline.

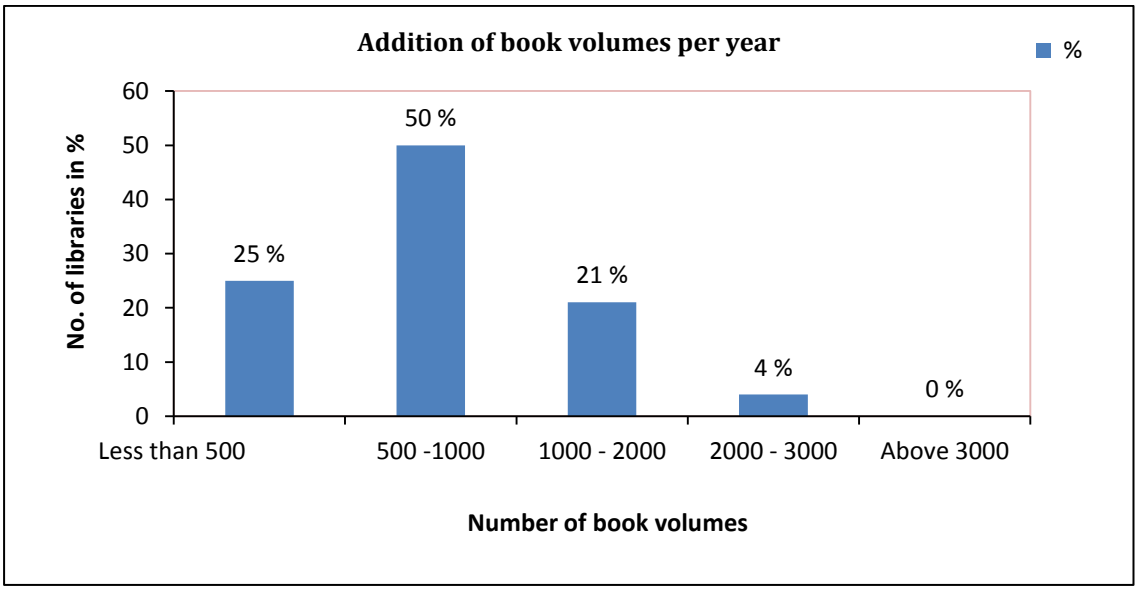
Out of 100% (117) of the e-databases (similar or different), 40.17% (47) e-databases are purchased by Management discipline, 47.86% (56) e-databases are purchased by Engineering, 4.27% (5) e-databases are purchased by Health Science discipline, 5.13% (6) e-databases are purchased by Pharmaceutical discipline, 1.71% (2) E databases are purchased by Architecture discipline, 0.85% (1) e-database are under Hotel-Management discipline. There is no purchase of e-databases for Arts, Commerce and Science discipline, Law discipline and Education discipline.

Out of 100% (16591) of the CD/DVD`s (similar or different), 43.53% (7222) CD/DVD`s are under Management discipline, 34.02% (5644) CD/DVD`s are under Engineering, 5.92% (983) CD/DVD`s are under Health Science discipline, 5.77% (958) CD/DVD`s are under Pharmaceutical discipline, 5.96% (988) CD/DVD`s are under Architecture discipline, 4.54% (753) CD/DVD`s are under Arts, Commerce and science discipline, 0.26 % (43) CD/DVD`s are under Education discipline. There is no availability of CD`s and DVD`s under Law, and Hotel Management discipline. From the data it is clear that, most of the collection is available with management and engineering discipline. All the various types of reading material may be includes same or duplicate titles of literature.

Table No. 5.6: Addition of book volumes per year

Response	***No. of libraries***	***%***
Less than 500	12	25
500 -1000	24	50
1000 - 2000	10	21
2000 - 3000	02	04
Above 3000	00	00
Total Respondents	***48***	***100***
Source : Primary data		

Graph No. 5.7:- Addition of book volumes per year

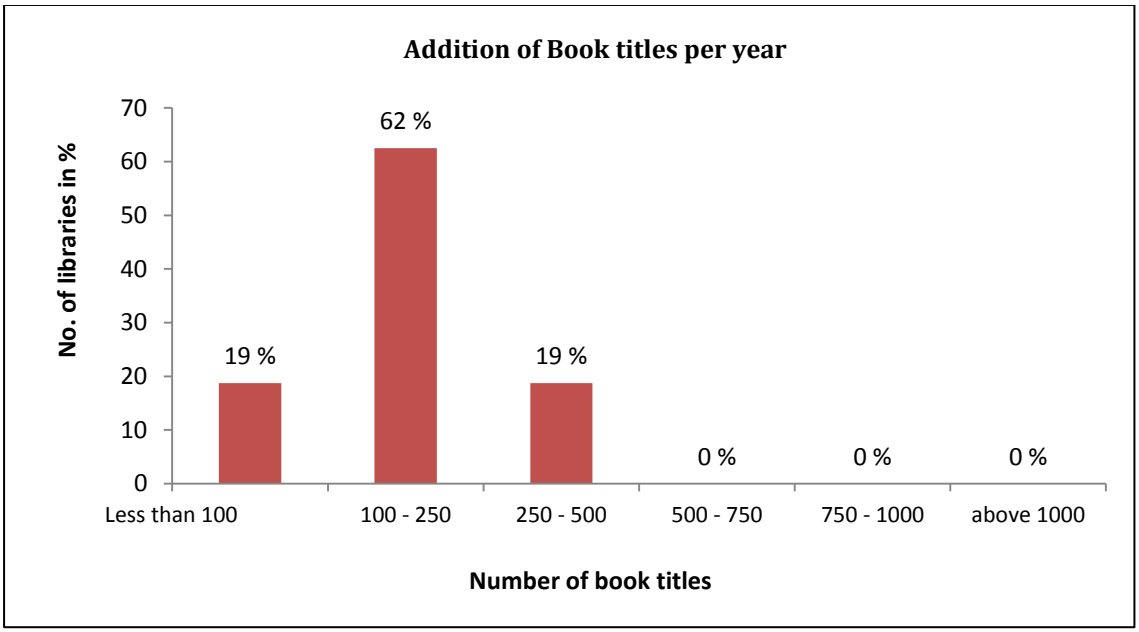


Above table and graph shows the approximate addition of book volumes per year in the institute libraries. Out of 100% (48) number of libraries, 25% (12) libraries are adding less than 500 book volumes per year, 50% (24) libraries are adding 500 -1000 book volumes per year, 21% (10) libraries are adding 1000 - 2000, book volumes per year, 4% (2) libraries are adding 2000 – 3000 book volumes per year and none of library has added above 3000 book volumes per year. From the data, natural growth is observed for growing the libraries and numbers of books are added as per guidelines given by the prescribed governing body.

Table No. 5.7: Addition of book titles per year

Number of book titles	***Number of libraries***	***%***
Less than 100	09	19
100 - 250	30	62
250 - 500	09	19
500 - 750	00	00
750 - 1000	00	00
above 1000	00	00
Total Respondents	***48***	***100***
Source : Primary data		

Graph No. 5.8:- Addition of book titles per year

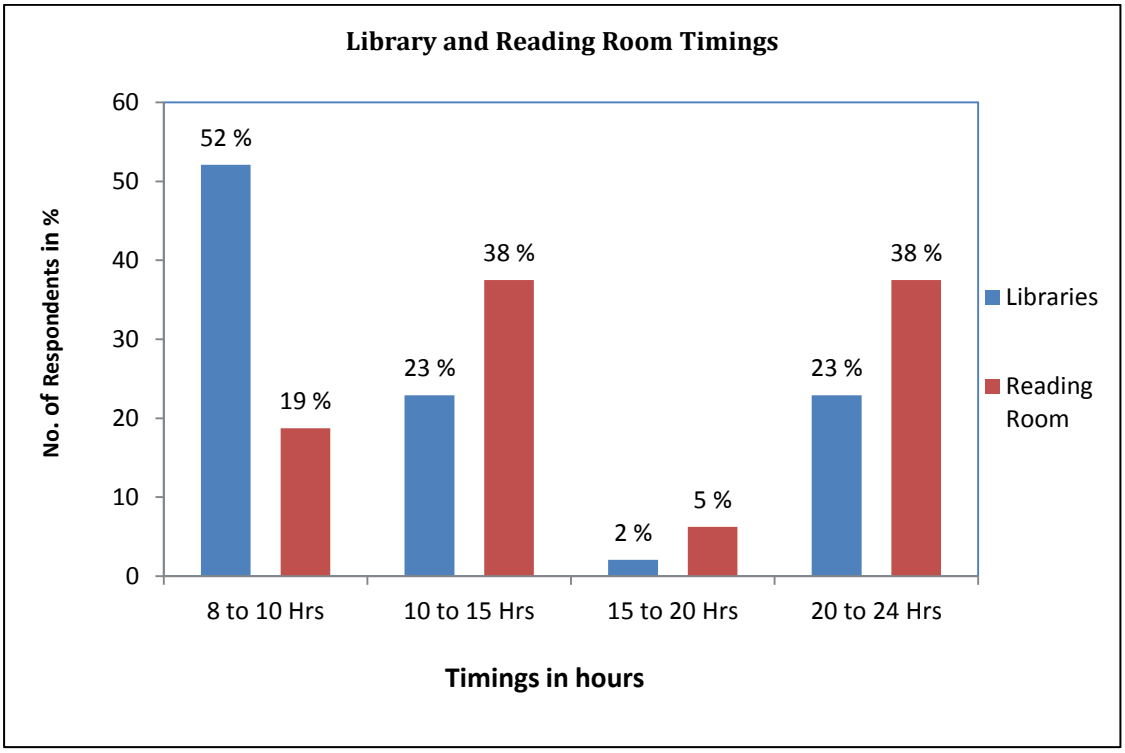


Above table and graph shows the approximately quantity of book titles added in the institute libraries per year. Out of 48 (100%) of libraries, 19% (09) libraries are adding less than 100 book titles per year, 62% (30) libraries are adding 100 - 250 book titles per year, 19% (9) libraries are adding 250 - 500, book titles per year, None of the libraries has added more than 500 – 750 book titles per year. From the data, it is observed that, numbers of books are added as per guidelines given by the prescribed governing body.

Table No. 5.8: Library and reading room timings

Library Timings	***No. of libraries***	***%***	***Reading Room***	***%***
8 to 10 Hrs.	25	52	09	19
10 to 15 Hrs.	11	23	18	38
15 to 20 Hrs.	01	02	03	05
20 to 24 Hrs.	11	23	18	38
Total Respondents	***48***	***100***	***48***	***100***
Source : Primary data				

Graph No. 5.9:- Library and reading room timings

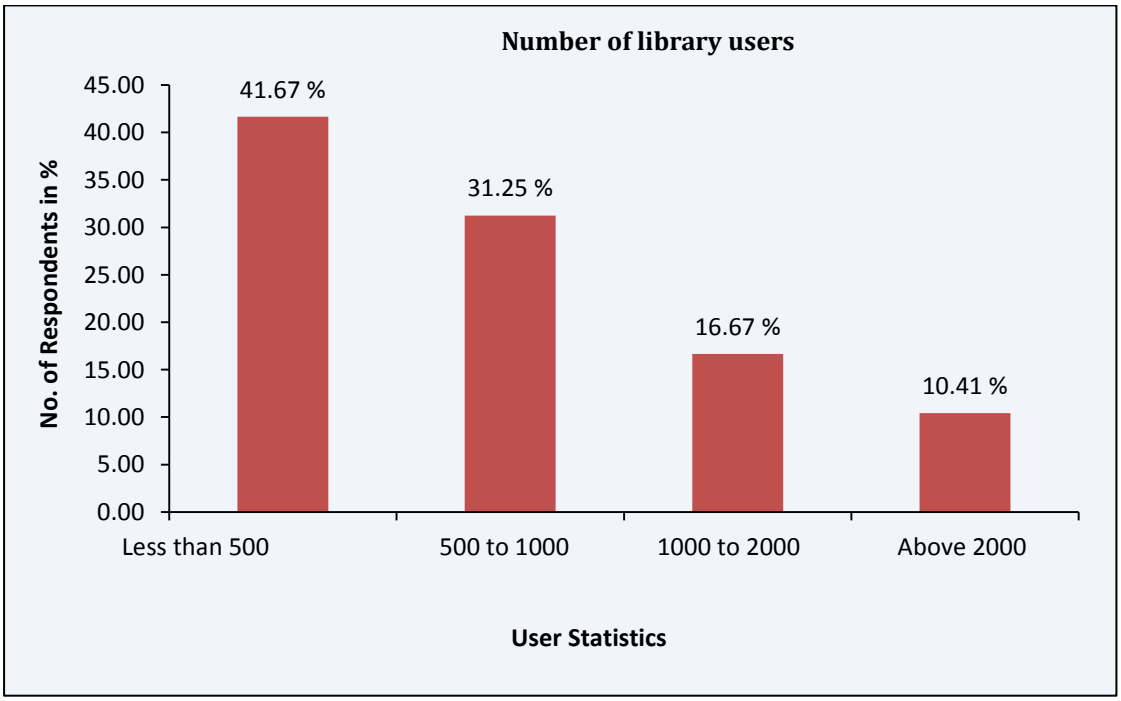


Above table and graph shows the library and reading room timings of the Sinhgad Institute libraries. Out of 100% (48) libraries, 52% (25) libraries and 19% (09) reading rooms are open up to 8 – 10 hours, 23% (11) libraries and 38% (18) reading rooms are open up to 10 – 15 hours, 2% (01) library and 05% (03) reading rooms are open up to 15 – 20 hours, and 23% (11) libraries and 38% (18) reading rooms are open up to 20 – 24 hours.

Table No. 5.9: Number of library users

Number of Users	***No. of Respondents***	***%***
Less than 500	20	41.67
500 to 1000	15	31.25
1000 to 2000	08	16.67
Above 2000	05	10.41
Total Respondents	***48***	***100***
Source : Primary data		

Graph No. 5.10:- Number of library users

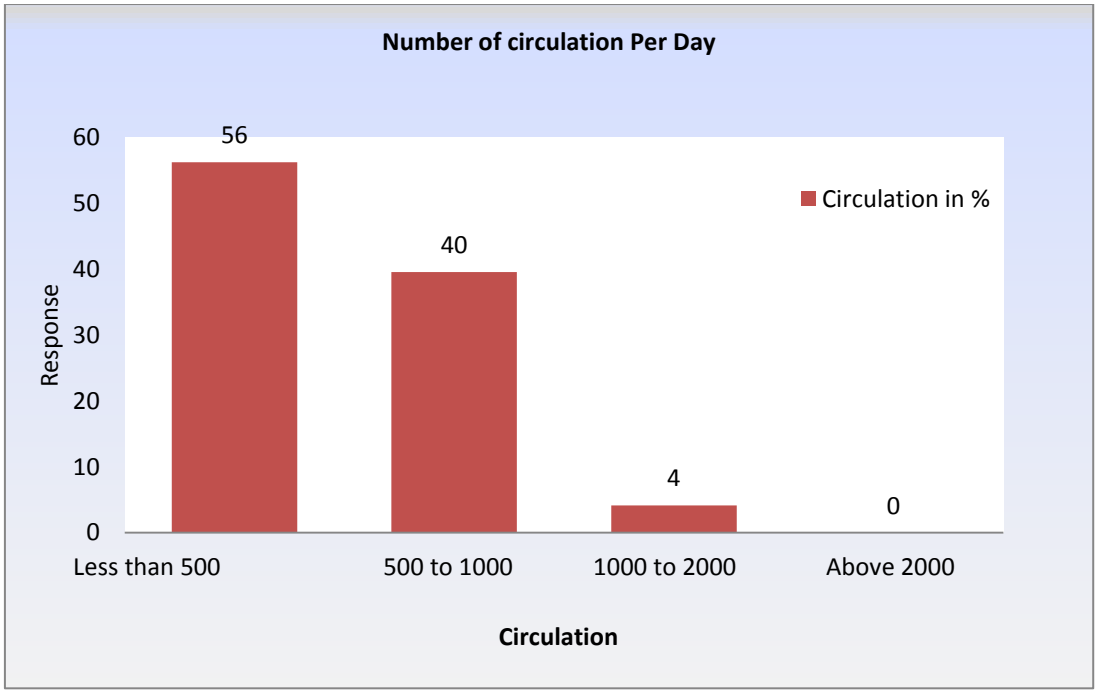


Above table and graph gives an information regarding number of library users of the institute libraries. There are 48 libraries under various disciplines. Out of 100% (48) libraries, 41.67% (20) libraries are having less than 500 users, 31.25% (15) libraries are having 500-1000 number of users, 16.67% (8) libraries having 1000- 2000 number of users and 10.41% (5) libraries are having above 2000 users. From the literature and data, it has been observed that approximately 45000 - 50000 students were learning higher education and all these students are the members of these libraries. Total 70000 – 80000 students were learning under group of Sinhgad Institute.

Table No. 5.10: Number of circulation per day

Circulation per Day	***No. of libraries***	***%***
Less than 500	27	56
500 to 1000	19	40
1000 to 2000	02	04
Above 2000	00	00
Total Respondents	***48***	***100***
Source : Primary data		

Graph No. 5.11:- Number of circulations per day

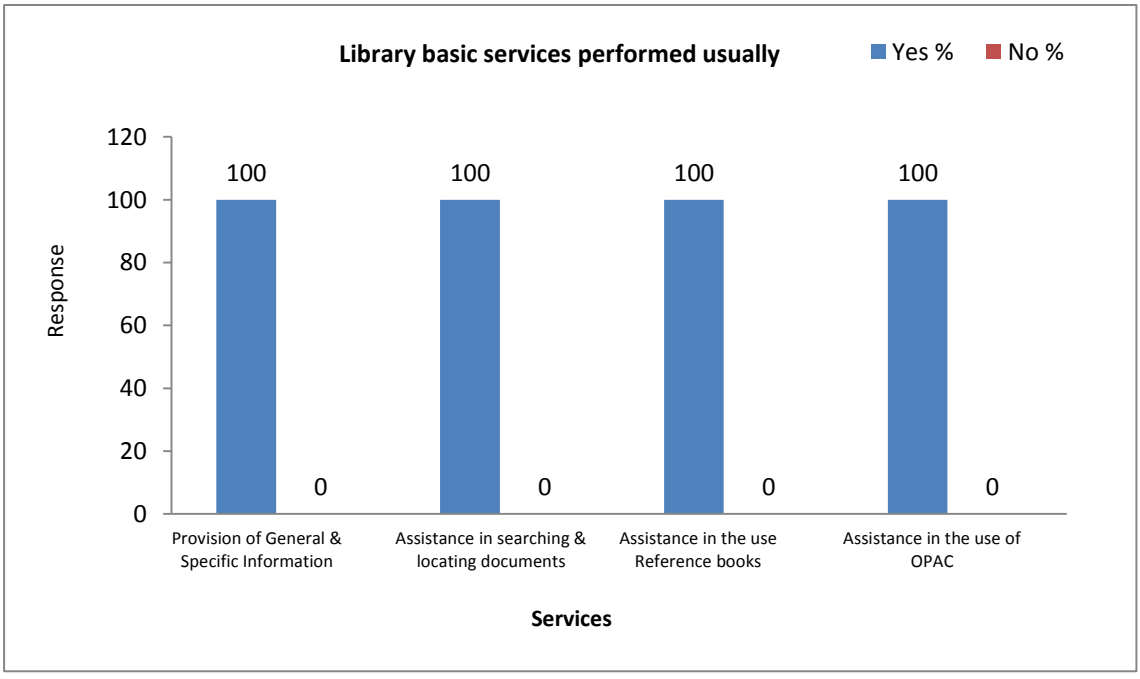


Above table and graph gives statistical information regarding circulation statistics per day of the institute libraries. Out of 100 % (48) libraries, 56 % (27) libraries have less than 500 circulations per day, 40% (19) libraries have 500-1000 number of circulations per day, 4% (2) libraries have 1000- 2000 circulation per day and none of the libraries have more than 2000 circulation per day.

Table No. 5.11: Library basic services: Performed usually

Library Services	***Yes***	***%***	***No***	***%***	***Total %***
Provision of general and specific information	43	100	0	0	100
Assistance in searching and locating documents	43	100	0	0	100
Assistance in the use reference books	43	100	0	0	100
Assistance in the use of OPAC	43	100	0	0	100
Total Respondents					***43***
Source : Primary data					

Graph No. 5.12:- Library basic services: Performed usually

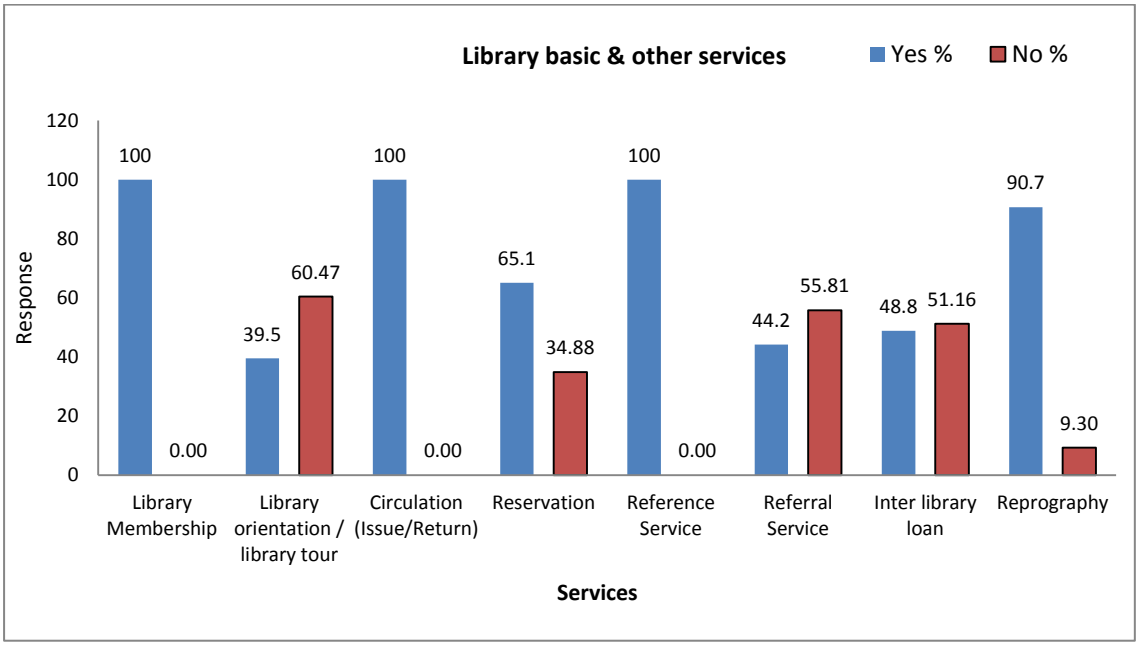


Above table and graph shows the information about interest of libraries for providing library basic services to the users and it is observed that, all the 100% (43) libraries are providing general and specific information to the users.

Table No. 5.12: Library basic and other services

Response	*Yes*	*%*	*No*	*%*	*Total %*
Library Membership	43	100.0	00	00.00	100
Library orientation / library tour	17	39.53	26	60.47	100
Circulation (Issue/Return)	43	100.0	00	00.00	100
Reservation	28	65.12	15	34.88	100
Reference service	43	100.0	00	00.00	100
Referral service	19	44.19	24	55.81	100
Inter-library loan	21	48.84	22	51.16	100
Reprography	39	90.70	04	09.30	100
Total Respondents					***43***
Source : Primary data					

Graph No. 5.13:- Library basic and other services



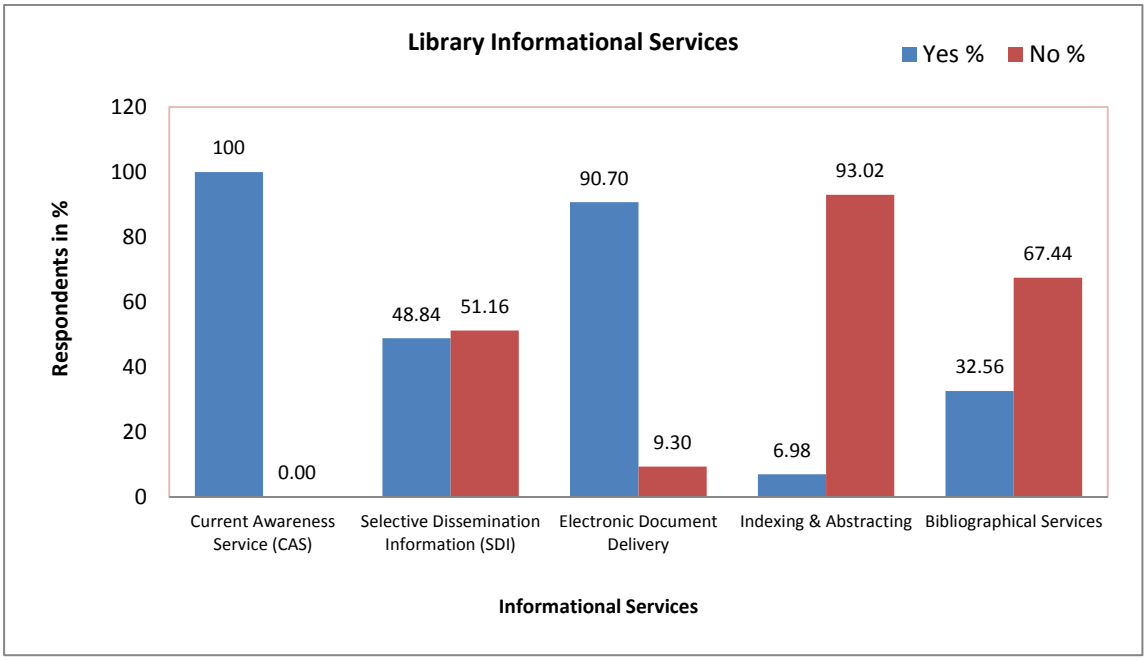
Above table and graph depict the statistical information regarding usual libraries services. All 100% (43) libraries are providing library membership, circulation and reference service to the users, 39.5 % (17) libraries are providing library orientation / library tour service to users, while 60.47% (26) libraries are not providing library orientation service to the users. 65.1% (28) libraries are providing reservation service to the users while 34.88% (15) libraries are not providing reservation service to the

users. 44.2% (19) libraries are providing referral service to the users, while 55.81% (24) libraries are not providing referral service to the users. 48.8% (21) libraries are giving inter-library loan service while 51.16 % (22) libraries are not providing inter library loan service to the users. 90.7% (39) libraries are providing reprography service, while 9.30% (4) libraries are not providing reprography service to the users. From the data it is analyzed that except library orientation all the services are provided commendably by the libraries.

Table No. 5.13: Library informational services

Informational Services	***Yes***	***%***	***No***	***%***	***Total %***
Current Awareness Service (CAS)	43	100.0	00	00.00	100
Selective Dissemination Information (SDI)	21	48.84	22	51.16	100
Electronic document delivery	39	90.70	04	09.30	100
Indexing and Abstracting	03	06.98	40	93.02	100
Bibliographical services	14	32.56	29	67.44	100
Total Respondents					***43***

Graph No. 5.14: - Library informational services

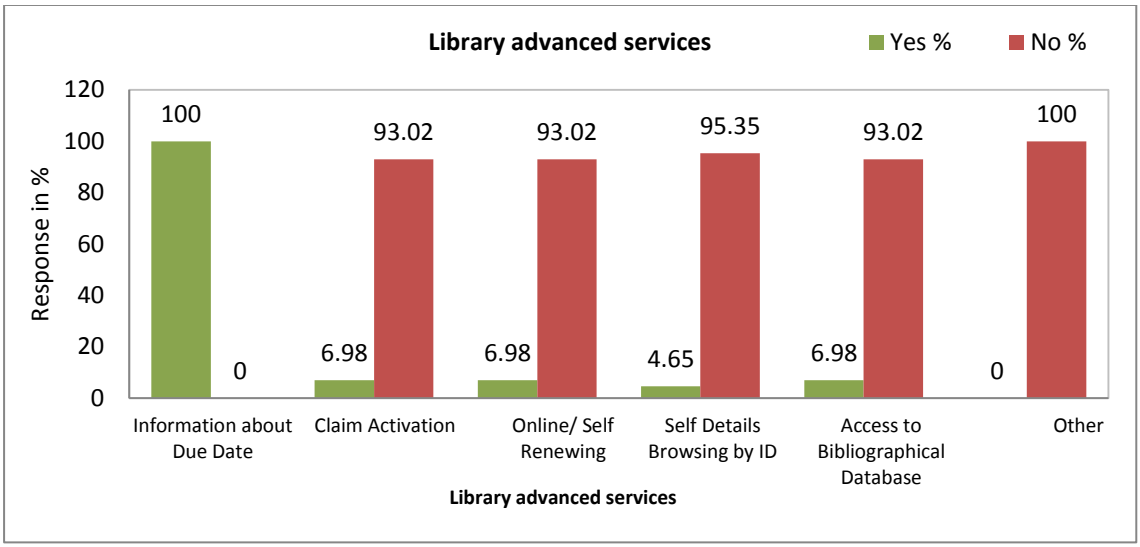


Above table and graph shows statistical information regarding the number of libraries providing informational services to the users. All the libraries manually are providing Current Awareness Service (CAS) to the users, 48.84% (21) libraries are providing Selective Dissemination Information (SDI) service to users, while 51.16% (22) libraries are not providing selective dissemination information (SDI) service to users, 90.70% (39) libraries are providing electronic document delivery service to the users while 9.30% (4) libraries are not providing electronic document delivery service to the users, 6.98% (3) libraries are providing indexing and abstracting service to the users while 93.02% (40) libraries are not providing indexing and abstracting service to the users, 32.56% (14) libraries are providing bibliographical database services, while 67.44% (29) libraries are not providing bibliographical database service. From the data it is analyzed that services like CAS and EDD are provided strongly while SDI, indexing, abstracting and bibliographical database service is not provided strongly from the libraries.

Table No. 5.14: Library advanced services

Advanced Services	***Yes***	***%***	***No***	***%***	***Total %***
Information about due date	43	100.0	00	00.00	100
Claim activation	03	06.98	40	93.02	100
Online/ self-renewing	03	06.98	40	93.02	100
Circulation details browsing by ID	02	04.65	41	95.35	100
Access to bibliographical database in library	03	06.98	40	93.02	100
Other	00	00.00	43	100.0	100
Total Respondents					***43***
Source : Primary data					

Graph No. 5.15: - Library advanced services



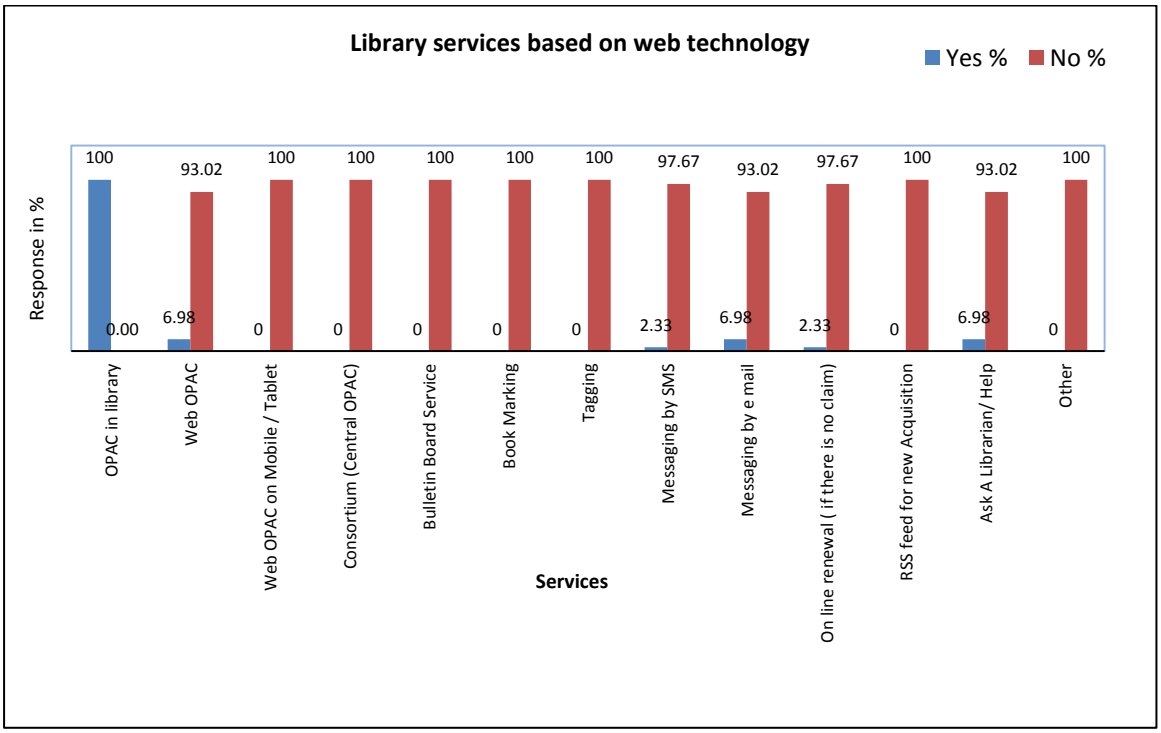
Above table and graph shows the statistical information regarding how many libraries are providing advanced services like on line self-renewal, self-details browsing by using ID and password and it is seen that 100% (43) libraries are providing information about due date, 6.98% (3) libraries are providing claim activation service, online self-renewing and access to bibliographical database to the users, while this services are not made available with 93.02% (40) libraries. 4.65% (2) libraries are providing service like self-details browsing by ID while 95.35% (41) libraries are not providing this service to the users. From data it is observed that, claim activation, online self-renewal, self-details browsing by ID and access to bibliographical database these services are not strongly performed.

Table No. 5.15: Library services based on web technology

Response	***Yes***	***%***	***No***	***%***	***Total %***
OPAC in library	43	100.0	00	00.00	100
Web OPAC	03	06.98	40	93.02	100
Web OPAC on Mobile / Tablet	00	00.00	43	100.0	100
Consortium (Central OPAC)	00	00.00	43	100.0	100
Bulletin board service	00	00.00	43	100.0	100
Bookmarking	00	00.00	43	100.0	100
Tagging	00	00.00	43	100.0	100

Messaging by SMS	00	00.00	43	100.0	100
Messaging by e-mail	03	06.98	40	93.02	100
Online renewal (if there is no claim)	00	00.00	43	00.00	100
RSS feed for new Acquisition	00	00.00	43	100.0	100
Ask A Librarian/ Help	03	06.98	40	93.02	100
Other	00	00.00	43	100.0	100
Total Respondents					***43***
Source : Primary data					

Graph No. 5.16: - Library services based on web technology



Above table and graph shows the statistical information about how many libraries are providing services based on web technology. All the 100% (43) libraries are providing OPAC in the library. 6.98% (3) libraries are providing Web OPAC, messaging by e-mail and ask a librarian service, while 93.02% libraries are not provided these services to their users.

None of the libraries have a facility to provide web OPAC on users Mobile or Tablet, Consortium or central OPAC, bulletin board service, book marking, tagging facility,

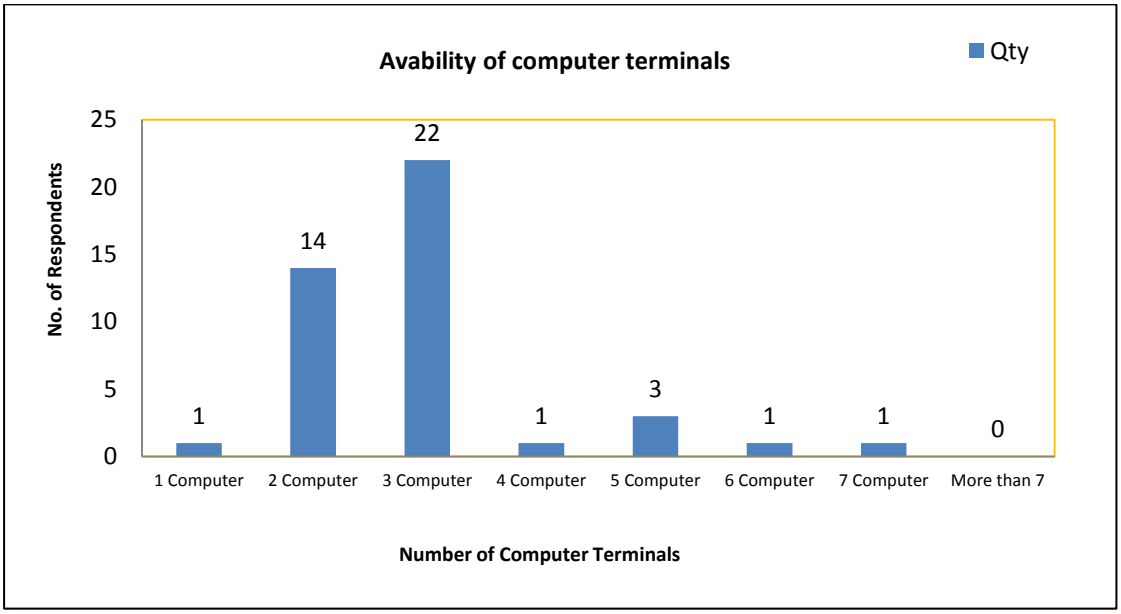
SMS (Short Message Service) facility, online renewal facility and RSS (Really Simple syndicate) fields for new acquisition. From data it is observed that, there is no provision of advanced services through the softwares.

5.2.2 IT infrastructure for individual libraries (Hardware & Software)

Table No. 5.16: Availability of computer terminals:

No. of Computers	*No. of Respondents*	*Total Computers*	*%*	*Remark*
1 Terminals	01	01	02.3	
2 Terminals	14	28	32.6	
3 Terminals	22	66	51.2	
4 Terminals	01	04	02.3	Automated
5 Terminals	03	15	07.0	Libraries
6 Terminals	01	06	02.3	
7 Terminals	01	07	02.3	
More than 7	00	00	00.0	
Total	***43***	**127**	***100***	
Source : Primary data				

Graph No. 5.17: - Availability of computer terminals



Above table and graph shows the statistical information about available number of terminals in automated libraries. Out of 100% (43) libraries, 2.3% (1) library has one number of computer terminal, 32.6% (14) libraries have two number of computers i.e. total twenty eight computers, 51.2% (22) libraries have three number of computers i.e. total sixty six computers, 2.3% (1) library has four number of computer i.e. total four number of computers, 7.0 % (3) libraries have five number of computer i.e. total fifteen number of computers, 2.3% (1) library has six number of computer i.e. total six number of computers, 2.3% (1) library has seven number of computers i.e. total seven computers and none of the libraries have more than seven number of computer terminals. If we aggregate all these numbers, the grand total will be **127** computers. If non automated library (5) computers (5) are added in this figure, the total number of computers will be **132** in number.

Table No. 5.17:- Hardware configuration of the client / server

Configurations not below than	***Number of Respondents***	***%***
Processor type P4	43	100
Processor speed 1 GHz	43	100
512 MB RAM	43	100
80 GB hard disk	43	100
Total Respondents	***43***	***100***
Source : Primary data		

Above table shows, the status of the computer hardware configuration, which they are using at present for library operations, and it is seen that all library computers having the system configuration, not below than P4 type of processor with 1 GB RAM along with 1GHz speed and it is also seen that the configuration of hard disk is not below 80GB. Above information shows libraries are using better sufficient and latest configuration machines.

Information related to system software for server and client

Table No. 5.18: Operating system for server and client

Type of Operating Systems	*Number of Respondents*	*%*
Commercial	48	100
Open Source	00	000
Total Respondents	***48***	***100***
Source : Primary data		

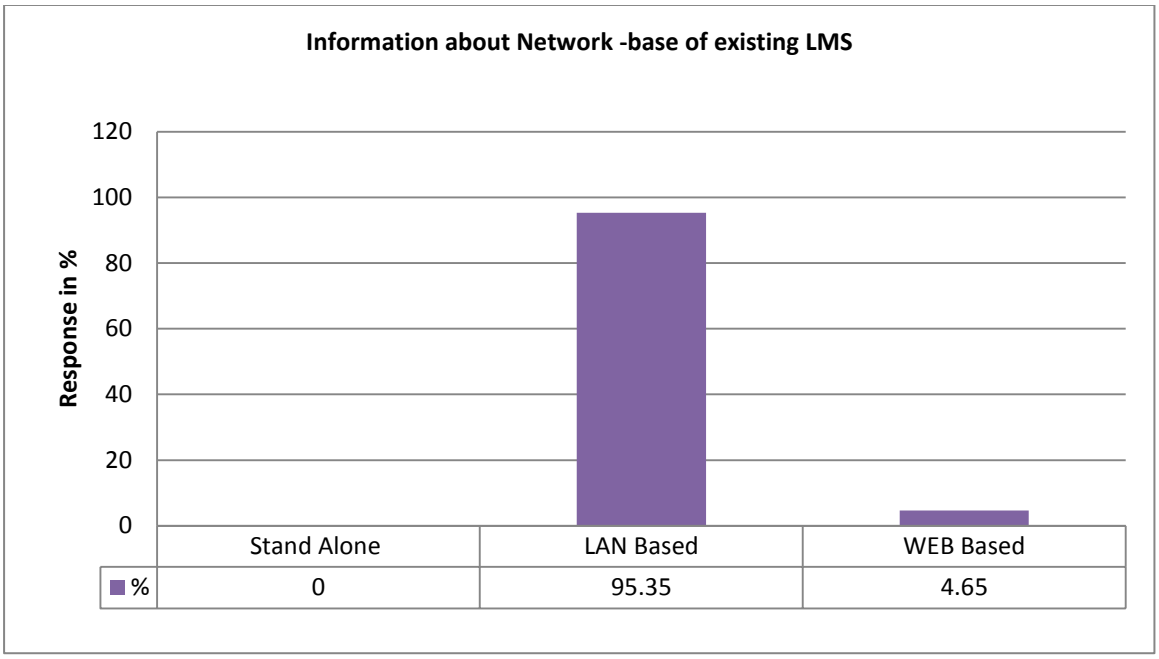
Above table shows the information about use of operating system for the server and client machines and it is clear that from the data, all libraries are using commercial operating system for their computers.

Information related to application softwares (Used LMS)

Table No. 5.19: Information about network-base of existing LMS

Network-base for System	*Number of libraries*	*%*
Stand Alone	00	00.00
LAN based	41	95.35
Web based	02	04.65
Total Respondents	***43***	***100***
Source : Primary data		

Graph No. 5.18: - Information about network- base of existing LMS



Above table shows the information about the network base (specialized system**)** of existing library management system. From the data it is clear that, no library is using standalone LMS. Out of 100% (43) respondents 95.35% libraries are using LAN based and rest, 02 (4.65%) libraries are using web based LMS. Libex.net and Gems library management systems are web based systems, while, Autolib, EasyLib, Libsuite, SLIM21 are the LAN based brands.

Table No. 5.20:- Operating system required for existing LMS

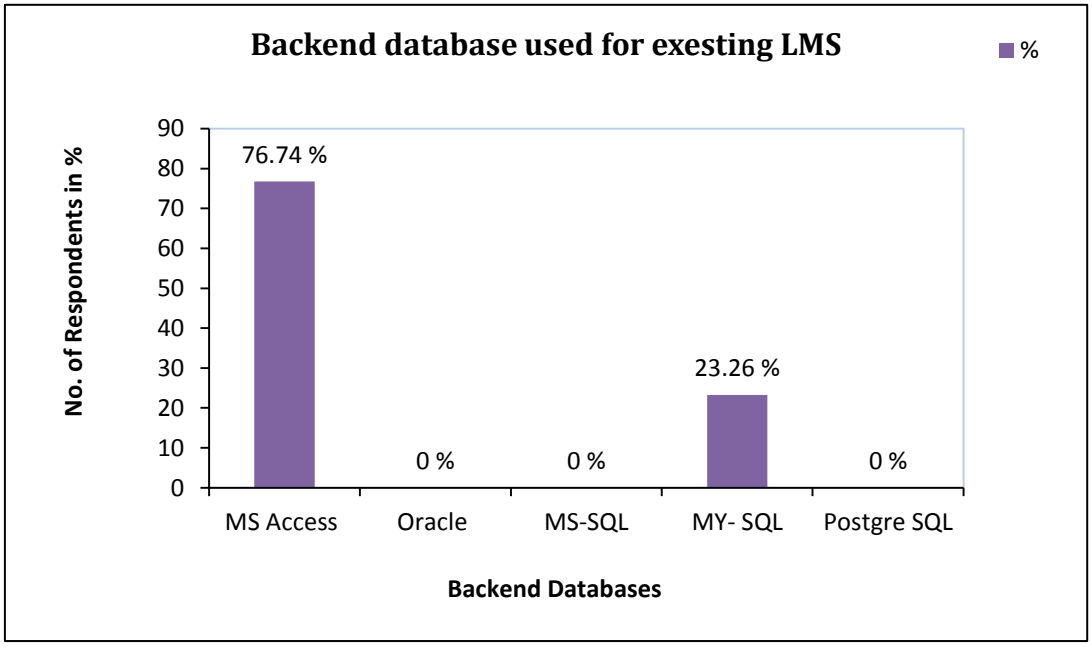
Operating Systems	***Number of libraries***	***%***
Windows	43	100
Linux	00	000
Unix	00	000
Ubuntu	00	000
Mac (OS)	00	000
Total Respondents	***43***	***100***
Source : Primary data		

Above table shows the information about operating system required for present library management system and from the data it depicts that, all libraries was using Windows XP commercial operating system for their computers.

Table No. 5.21: Backend database used for existing LMS

Backend Databases	***Number of Respondents***	***%***
MS Access	33	76.74
Oracle	00	00.00
MS SQL	00	00.00
MySQL	10	23.26
PostgreSQL	00	00.00
Total Respondents	***43***	***100***
Source : Primary data and telephonic discussion with software vendor		

Graph No. 5.19:-Backend database used for existing LMS



Above table and graph shows the information about, used backend database by the software developers to store the data. The information depicts, out of 100% (43) libraries, 76.74% (33) libraries / software developers has used MS Access as a backend database to their respective LMS and 23.26% (10) libraries / software

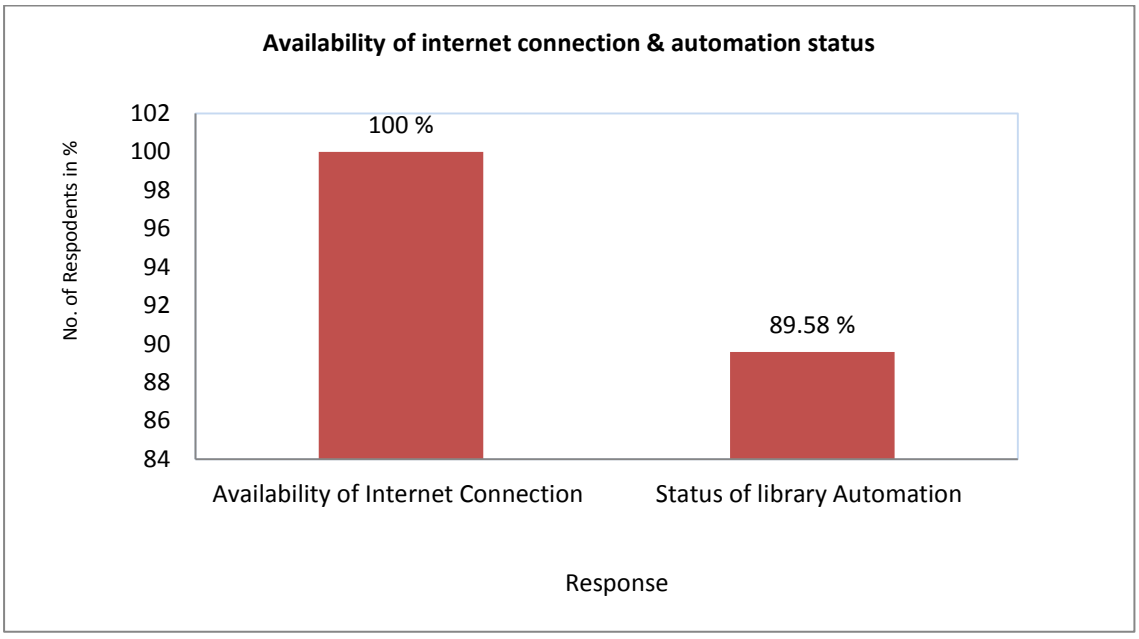
developer has used MySQL backend database to their respective LMS for storing the data. No LMS developer has used Oracle, MS SQL or PostgreSQL types of databases.

5.2.3 Library Automation and cost incurred

Table No. 5.22: Availability of Internet connection and status of library automation

Response	***Yes***	***%***	***No***	***%***	***Total %***
Availability of internet connection	48	100.0	0	00.00	100
Status of library automation	43	89.58	5	10.42	100
Total Respondents					***48***
Source : Primary data					

Graph No. 5.20: - Availability of Internet connection and status of library automation

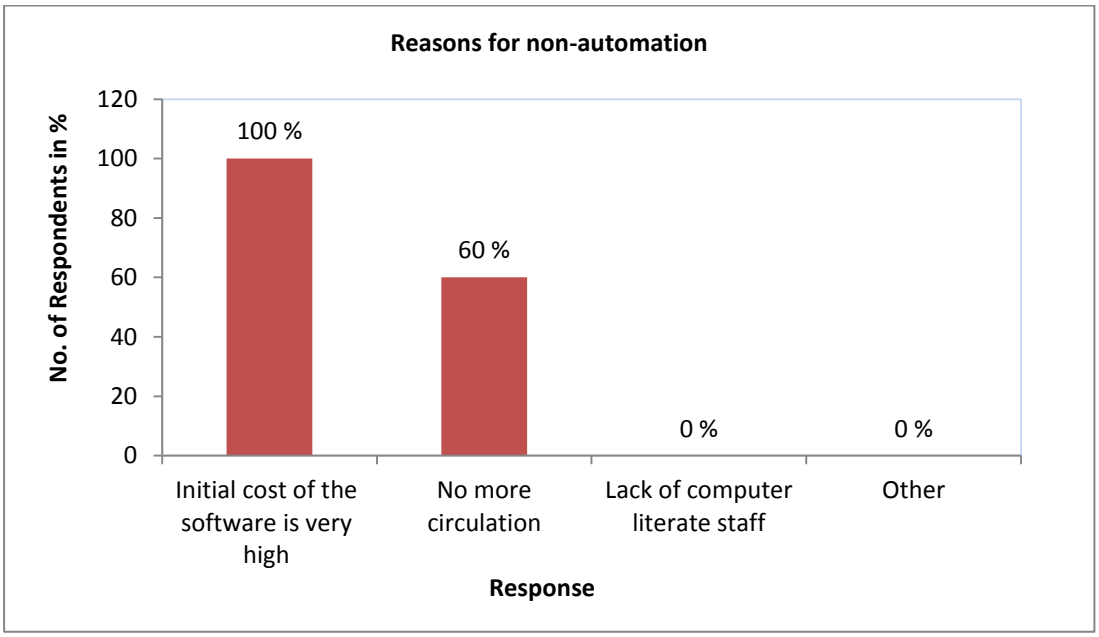


Above table and graph is providing information about availability of internet connection in Sinhgad Institute libraries. All the 100 % (48) libraries having internet connection and 89.58% (43) libraries are automated while 05 (10.42%) libraries are not automated.

Table No. 5.23: Reasons for non-automation

Response	*Number of Respondents*	*%*
Initial cost of the software is very high	5	100
No more circulation	3	060
Lack of computer literate staff	0	000
Other	0	000
Total Respondents		***5***
Source : Primary data		

Graph No. 5.21: - Reasons for non-automation

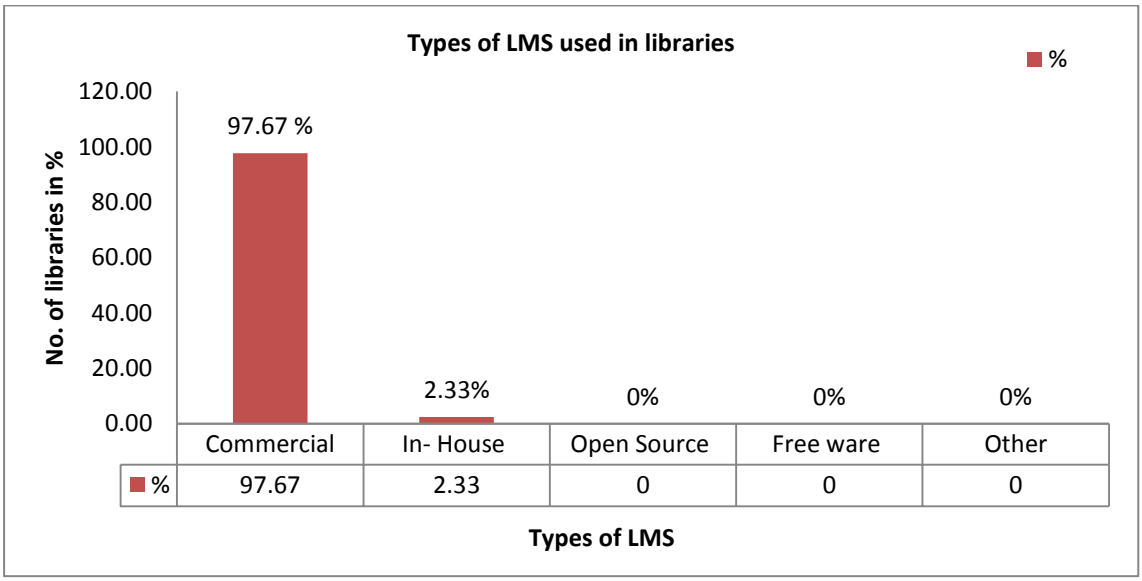


As, already observed, 89.58% (43) libraries were automated while 10.42% (05) libraries are not automated. Above table and graph is providing information about reasons for non-automation of the libraries. All the 100% (5) non-automated libraries are not able to automate their libraries, because initial cost of software is very high, while 60% (03) libraries are not automated due to less number of circulations. None of the libraries is facing a shortage of computer literate staff.

Table No. 5.24: Types of the library management software used

Types of LMS	*Number of libraries*	*%*
Commercial	42	97.67
In- house	01	02.33
Open source	00	00.00
Freeware	00	00.00
Other	00	00.00
Total Respondents	***43***	***100***
Source : Primary data		

Graph No. 5.22:- Types of library management software used



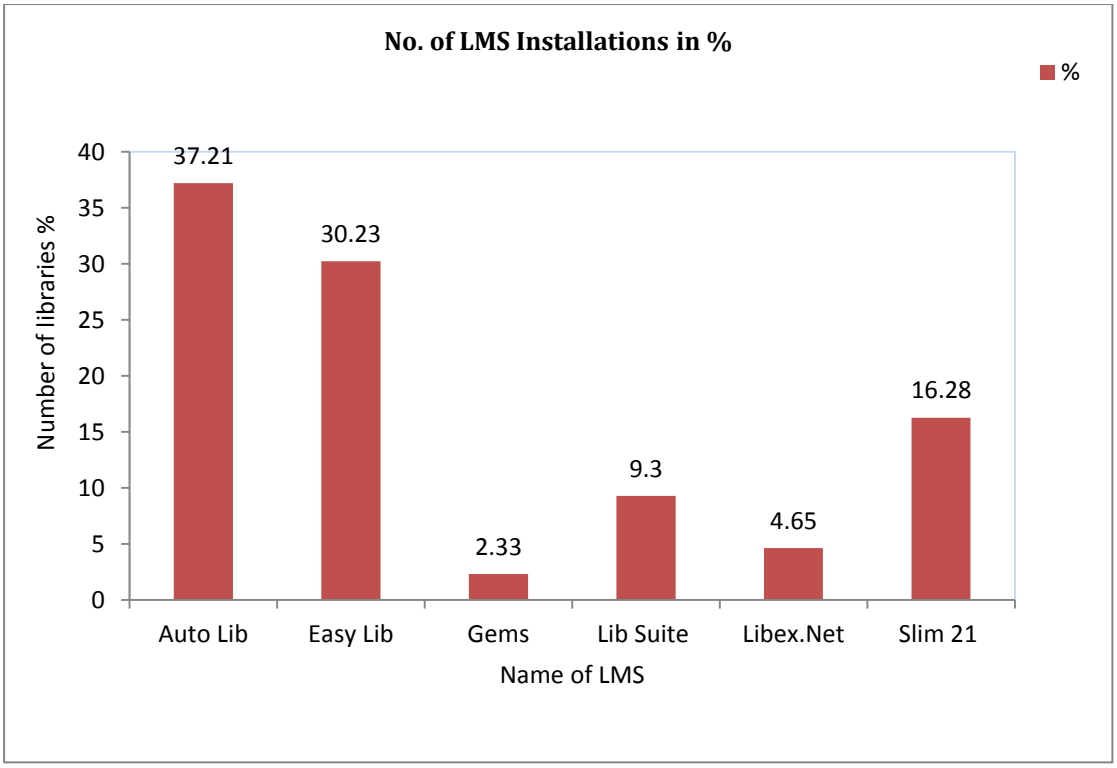
Above table and graph shows the statistical information about types of library management softwares used in the Sinhgad Institute libraries and it is observed that, Out of 43 libraries, 97.67% (42) libraries are using commercial library management software, and only 2.33% (01) library is using in-house library management software.

Cost incurred for library automation:

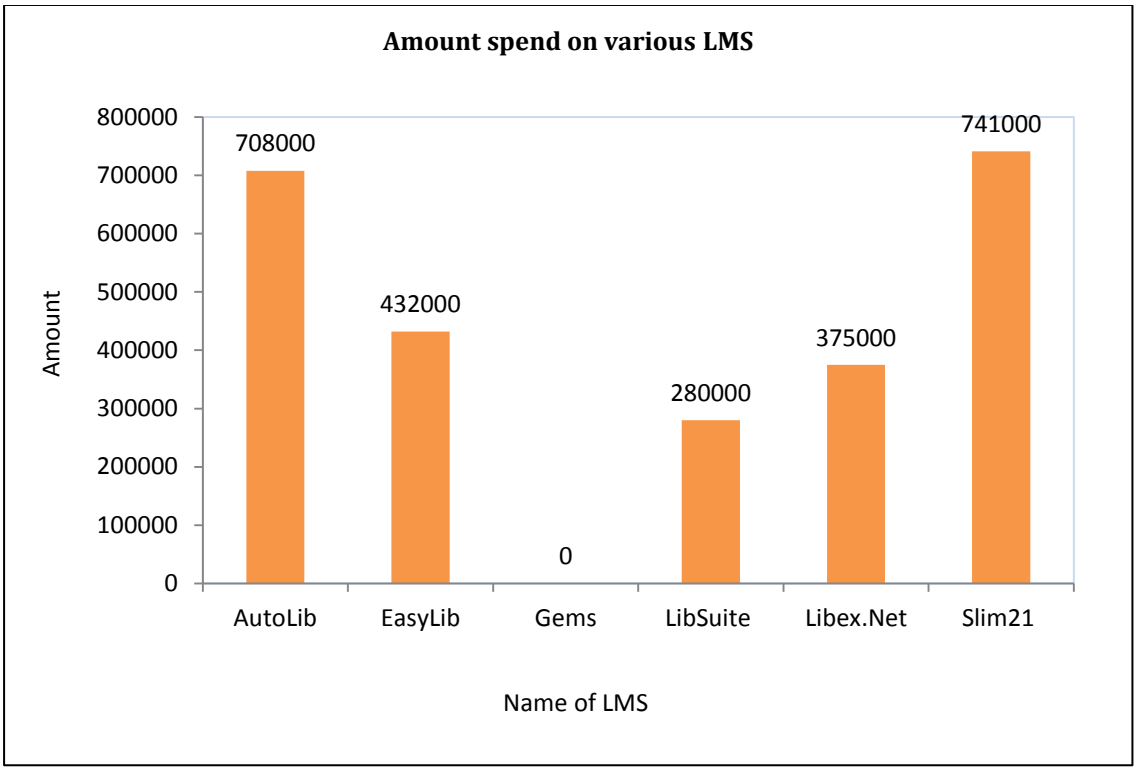
Table N0. 5.25: Number of installations and amount spend for LMS

Sr. No.	*Software Name*	*Developed by*	*Number of Installations*	*%*	*Amount Spend*
1	AutoLib	Aakash InfoTech: Pune	16	37.21	7,08,000
2	EasyLib	Fidelity Coding: Pune	13	30.23	4,32,000
3	Gems	STES: Pune	01	02.33	0,00,000
4	LibSuite	Soft-Aid : Pune	04	09.30	2,80,000
5	Libex.Net	Scrum System: Pune	02	04.65	3,75,000
6	SLIM21	Algorithms : Pune	07	16.28	7,41,000
Total			***43***	***100***	***25,36,000***
Source: Primary data: (Information is this study purpose only)					

Graph No. 5.23:- Number of various LMS installations in Sinhgad Institute



Graph No. 5.24:- Amount spend on various LMS



Above table shows the information about different types of library management softwares installed in Sinhgad Institute libraries. Researcher has stated it in tabular format, as per the brand name, developer name, and amount spent against the capital investment for the library management software. The graph number 5.23 shows number of various LMS and share of each brand in installation and the graph number 5.24 shows integrated and individual amount spent on LMS on each brand.

From the data, the total amount spent by Sinhgad Institute for library Management software is Rs. 25,36,000/- out of it, AutoLib LMS developed by Aakash InfoTech, Pune, has 16 (37.21%) installations and Rs. 7,08,000/- paid by the institutes, EasyLib by Fidelity Coding: Pune, has 13 (30.23%) installations and Rs. 4,32,000/- paid by institutes, LibSuite developed by, Soft-Aid : Pune, has 04 (09.30%) installations and Rs. 2,80,000/- paid by institutes, Libex.Net which is developed by Scrum System: Pune, has 02 (04.65%) installations and Rs. 3,75,000/- paid by Institutes, Gems which is developed by Sinhgad Institute (SIBAR- Pune) has only one installation (2.33%) on trial basis to reduce the automation cost of LMS in Sinhgad, SLIM21 which is developed by Algorithms, Pune, has 07 (16.28%) installations and Rs. 7,41,000/- paid from the Sinhgad Institute against LMS.

Table: 5.26: Software cost and AMCs demanded by software vendors

Software Name	*Software Cost*		*AMC Demanded in Rs.*		*AMC % based on software cost*	
	Minimum	*Maximum*	*Minimum*	*Maximum*	*Minimum*	*Maximum*
AutoLib	021000	070000	02600	07000	04.33	19.05
EasyLib	036000	080000	06000	08000	10.00	20.83
Gems	000000	000000	00000	00000	00.00	00.00
LibSuite	090000	100000	08000	10000	08.89	10.00
Libex.Net	375000	375000	35000	35000	09.35	09.35
SLIM21	131000	160000	16000	25000	10.67	13.14
Source: Primary Data						

Above table shows the information about software cost for individual brand along with Annual Maintenance Charges (AMC) demanded by each brand for the year by software developer. AutoLib LMS, has 16 (37.21%) installations in Sinhgad Institutes, charged between Rs. 21,000/- to Rs. 70,000/- for single installation as a capital cost of library management system. This company has demanded Rs. 2,600/- to Rs. 7,000/- against AMC from Sinhgad Institute libraries and this cost is minimum 4.33% and maximum 19.05% of the capital cost of the LMS.

EasyLib which is developed by Fidelity Coding Marking Solutions: Pune, and has 13 (30.23%) number of installations and charged between Rs. 36,000/- to Rs. 80,000/- for single installation against capital cost of library management system. This company demanded Rs. 6,000/- to Rs. 8,000/- against AMC from Sinhgad Institute libraries and this cost is minimum 10 % and maximum 20.83% of the capital cost of the LMS.

Gems library management software which has been developed by Sinhgad Institute and has only one installation i.e. (2.33%) it has been installed for trial to reduce the capital cost of the library management system as well as AMC charges of library management software.

LibSuite which is developed by Soft-Aid: Pune, and has 04 i.e. (09.30%) installations and charged between Rs. 90,000/- to Rs. 1,00,000/- for single installation against capital cost of library management system. This company demanded Rs. 8,000/- to

Rs. 10,000/- against annual maintenances charge from Sinhgad Institute libraries and this cost is minimum 8.89 % and maximum 10% of the capital cost of the LMS.

Libex.Net which is developed by Scrum System: Pune has single installation i.e. (04.65%) in Mumbai campus of Sinhgad Institute and has charged Rs. 3,75,000/- for single installation as a capital cost of library management system. This company has demanded Rs. 35,000/- against AMC from Sinhgad Institute libraries and this cost is minimum 9.35% of the capital cost of the purchased LMS.

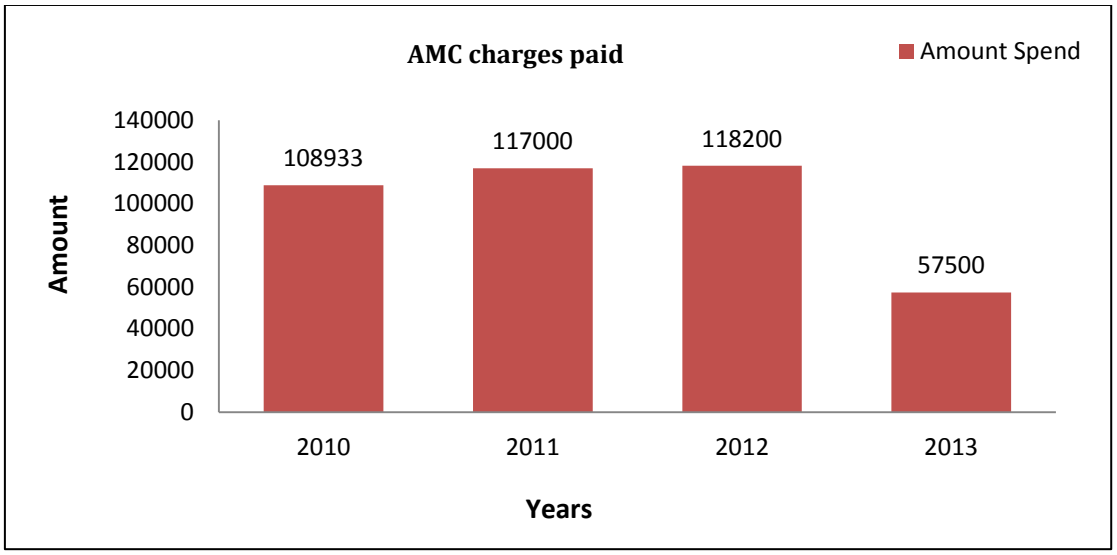
SLIM21 which is developed by Algorithms, Pune, has 07 (16.28%) number of installations and charged minimum Rs. 1,31,000/- to Rs. 1,60,000/- for single installation, rupees for single installation as capital cost of library management system. This company demanded Rs. 16000/- to Rs. 25000/- against AMC from Sinhgad Institute libraries and this cost is minimum 10.67 % and maximum 13.14% of the capital cost of the LMS.

In the discussion with respondents, it has been observed that even if any college fails to pay AMC, still software venders can avail support from company for services like emergency service through phone call, and remote access by paying Rs. 0/- Rs. 1500/- From above information, it is analyzed that, the Libex.net software is very costly while Autolib software is cheaper in commercial series. In-house software is not consuming any cost for development and installation but there are hidden or intangible costs in developmental process. In-house software has still some limitations which can be seen further in theory.

Table No. 5.27: AMC charges paid during last four years:

Years	***Respondent libraries***	***%***	***Amount Spend***
2010	13	30.23	1,08,933
2011	12	27.91	1,17,000
2012	17	39.53	1,18,200
2013	09	20.93	0,57,500
Total	***43***	***100***	***4,01,633***
Source: Primary data (Information is this study purpose only)			

Graph No. 5.25:- AMC charges paid during last four years



Above table and graph shows the statistical information regarding amount paid on AMCs between the years 2010-2013 by Sinhgad Institute. The table shows, in the year 2010, 30.23 % i.e. 13 number of libraries paid Rs. 1,08,933/-. In year 2011, 27.91 % (12) number of libraries paid Rs. 1,17,000/-. In year 2012, 39.53 % (17) libraries paid Rs. 1,18,200/- and in year 2013, 20.93 % (09) libraries paid Rs. 57,500/- as AMCs i.e. total Rs. 4,01,633/- was spent. From above data it has been analyzed that, most of the money was poured in the year 2012 against AMCs and minimum money was spent in the year 2013.

Table No. 5.28: Cost incurred for commercial Operating System

Years	*Net rate/year/PC*	*No. of PCs*	*Net Cost*	*Total cost*
2010	2,300	127	2,92,100	10,23,874
2011	2,260	127	2,87,020	
2012	1,940	127	2,46,380	
2013	1,562	127	1,98,374	
Total Respondents				***43***

Source: Yearly associate agreements done with Microsoft Corporation.
(Information is for this study purpose only, cost. is approx.)

Regarding above table; the information is generated on the basis of yearly agreements renewed by the institute for integrated license purpose with Microsoft Corporation

and it is seen that, campus-wise integrated purchase order is given to the Microsoft Corporation. The table number 5.23 shows the cost involved in commercial operating system or Microsoft packages for computers in the organization. In above table there are 127 computers in the library and 100% libraries are using commercial operating system. It is clearly seen that Microsoft licenses are renewed yearly. In the year 2010, the Rs. 2300/- was charged per computer, in the year 2011, the Rs. 2260/- was charged per computer, in the year 2012, the Rs. 1940/- was charged per computer, and in the year 2013 Rs. 1562/- was charged per computer per year. The total amount spent between the years 2010 to 2013, total Rs. 10,23,874/- spent for 127 computers to operating system purpose.

Table No. 5.29: Cost incurred for installation of an antivirus

Years	***Net rate/year/pc***	***No. of PCs***	***Net Cost***	***Total Cost***
2010	165.33	127	20,997	Approx. 1,03,293
2011	216.00	127	27,432	
2012	216.00	127	27,432	
2013	216.00	127	27,432	
Total Respondents		***43***		
Source : Primary data and secondary data (information for study purpose)				

Above table shows the cost involved for antivirus installation on computers. From the data it is observed that, 127 numbers of computer terminals are involved for various library operations. 100 % libraries are using Quick Heal, antivirus software for data security and consumed total Rs. 1,03,293/- (One lakh three thousand two hundred ninety three) between (2010 to 2013) four years.

Table No. 5.30: Availability and cost involvement for barcode printer

Response	*Yes*	*%*	*No*	*%*	*Cost Involved*
Availability and cost of bar-code printer	11	25.58	32	74.42	2,13,350.00
Cost for procuring frontend and backend DBMS	00	00.00	43	100	0,00,000.00
Total Respondents					***43***
Source : Primary data & secondary data					

Above table shows the information about availability of barcode printer and their cost involvement for it. Out of 100% (43) libraries, 25.58% (11) libraries have barcode printer and integrated amount of these printers is Rs. 213350/- and from above table it is also seen that, none of the libraries are spending a single rupee on procuring frontend and backend database management software because all libraries using commercial LMS and all that issues are taken care by software vendor.

5.2.4 Existing LMS through various aspects:

Table No. 5.31: Training required for operating LMS

Response	*Yes*	*%*	*No*	*%*	*Total %*
Training required for operating LMS	43	100	0	0	100
Total Respondents					***43***
Source: Primary Data					

Above table shows the response given by librarians towards training required for operating LMS. According to data all the respondents require training / guidance to operate library management system.

Table No. 5.32: Library Management System (LMS) updating

Response	*Yes*	*%*	*No*	*%*	*Total %*
Customize on demand	00	000	0	0	100
After specific period	00	000	0	0	100
When updates made available by vendor	43	100	0	0	100
Total Respondents					***43***
Source : Primary data					

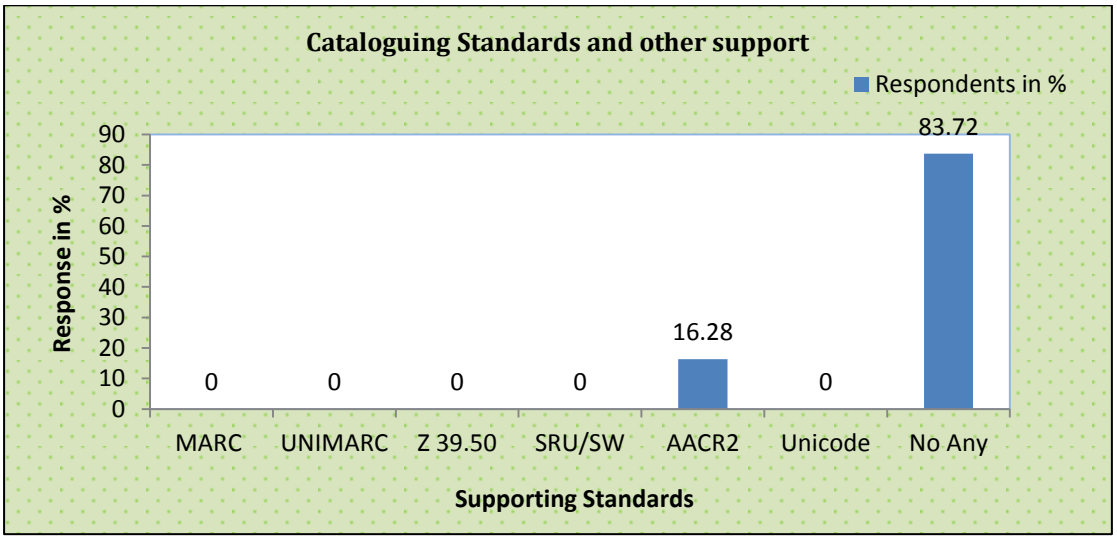
Above table shows the information about opinions about library management software updating. From the data it is observed that, 100% (43) respondent's opinion is, library management system is updated when updates are made available by software developer. It is also seen that, there is no freedom; to customize the LMS as per their need and these LMS / vendor has not determined any specific period to update their version. From the discussion with LMS users it is observed that, updates are made available usually by demanding and paying AMC`s regularly.

Information about support of library standards:

Table No. 5.33: Cataloging Standards and other support

Standards and Support	*Number of Respondents*	*%*
MARC	00	00.00
UNIMARC	00	00.00
Z 39.50	00	00.00
SRU/SW	00	00.00
AACR2	07	16.28
Unicode	00	00.00
No Standards	36	83.72
Total Respondents	***43***	***100***
Source : Primary data		

Graph No. 5.26:- Cataloging Standards and other support.



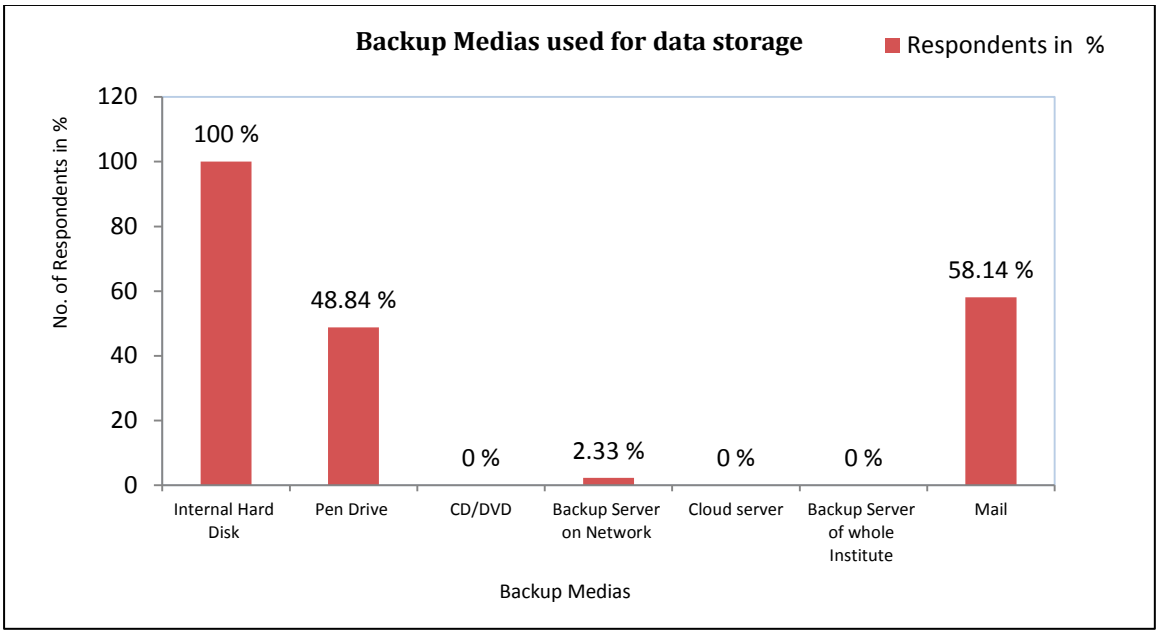
Above table and graph shows the information about the cataloguing standards and other standards supported / maintained by existing library management system. It is observed that none of the existing library management software has supporting for standards like MARC, UNIMARC, Z39.50 and SRU/SW and for Unicode System. Only 16.28% (07) library systems are maintaining AACR2 (Anglo American cataloguing Rules 2) framework and 83.72 % (36) library systems are not supported for any cataloguing standard or any supporting tool.

Information about various backup Medias used by librarians:

Table No. 5.34: Backup Medias used for data storage

Backup Medias	***Number of libraries***	***%***
Internal hard disk	43	100.0
Pen drive	21	48.84
CD/DVD	00	00.00
Backup server on network	01	02.33
Cloud server	00	00.00
Backup server of whole institute	00	00.00
Mail	25	58.14
Other	00	00.00
Total Respondents		***43***
Source : Primary data		

Graph No. 5.27:- Backup Medias used for data storage



As, all the respondents are using computer internal hard disk for storing the data backup file, 48.84% (21) libraries are using Pen drive for storing the data backup file. 2.33% (1) library is using backup server on network to store the database backup file and 58.14% (25) libraries are using email account to store the database backup file. None of the libraries in the Sinhgad Institutes are using CD/DVD, Cloud server, and backup server to store the database backup file. The information depicts that, most of the respondents are keen to store the backup file data in the system hard disk only, second priority seen to be for mail service then pen- drive and finally backup server in the network. None of the librarians has chosen the options like CD/DVD, Cloud server or institute server.

5.2.5 Comparative study of existing LMS packages:

In this section, researcher has tried to find out the use pattern of every LMS package used in the Sinhgad Institute libraries. In this AutoLib, EasyLib, LibSuite, Libex.Net, SLIM21 these commercial softwares along with Gems in-house library management software are studied in terms of features, which are stated below;

Table No. 5.35: Various main modules covered in present LMS

Sr.	LMS Features	Name of the commercial software																				In-House LMS			
1	Main Modules Covered in LMS	AUTOLIB				EASYLIB				LIBSUITE				LIBex.NET				SLIM - 21				GEMS			
		Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%
1.1	Various Masters/ Databases	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
1.2	Acquisition	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
1.3	Cataloguing	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
1.4	Serial controls	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
1.5	Circulation	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
1.6	Administration / Authorities	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
1.7	OPAC	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
1.8	Reports	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
	Total Respondents	16		100%		13		100%		4		100%		2		100%		7		100%		1		100%	

- **Summarized information of above table:**

Sr. No.	Library Management Software Features	Availability of the features in commercial LMS					Name of the in-house software
1	Main Modules Covered in LMS	AUTOLIB	EASYLIB	LIBSUITE	LIBex.NET	SLIM - 21	GEMS
1.1	Various Masters/ Databases	Yes	Yes	Yes	Yes	Yes	Yes
1.2	Acquisition	Yes	Yes	Yes	Yes	Yes	No
1.3	Cataloguing	Yes	Yes	Yes	Yes	Yes	No
1.4	Serial controls	Yes	Yes	Yes	Yes	Yes	No
1.5	Circulation	Yes	Yes	Yes	Yes	Yes	Yes
1.6	Administration / Authorities	Yes	Yes	Yes	Yes	Yes	Yes
1.7	OPAC	Yes	Yes	Yes	Yes	Yes	Yes
1.8	Reports	Yes	Yes	Yes	Yes	Yes	Yes
	Total Respondents	16	13	4	2	7	1

Explanation: Above table shows that the information about facilities covered under various main modules in presents LMS. From data, it is observed that all the software having various masters / databases module, acquisition module, cataloguing module, serial control module, circulation module, administration module, OPAC module and reports module in their software, rest of Gems software has not included acquisition, cataloguing and serial control module.

Table No. 5.36:- Other sub-modules covered in present LMS

Sr.	LMS Features	Name of the commercial software																							
2	Sub - Modules Covered in LMS	AUTOLIB				EASYLIB				LIBSUITE				LIBex.NET				SLIM - 21				In-House LMS GEMS			
		Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%
2.1	Budgetary Control/ Purchase	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
2.2	Branch Management	16	0	100	0	13	0	100	0.0	0	4	0	100	2	0	100	0	7	0	100	0.0	1	0	100	0
2.3	Users Management	16	0	100	0	13	0	100	0.0	0	4	0	100	2	0	100	0	7	0	100	0.0	1	0	100	0
2.4	Newspaper Management	16	0	100	0	0	13	0.0	100	0	4	0	100	0	2	0	100	0	7	0.0	100	0	1	0	100
2.5	Project report Management	16	0	100	0	0	13	0.0	100	0	4	0	100	0	2	0	100	0	7	0.0	100	0	1	0	100
2.6	Information About software	0	16	0	100	0	13	0.0	100	0	4	0	100	2	0	100	0	7	0	100	0.0	1	0	100	0
	Total Respondents	16		100%		13		100%		4		100%		2		100%		7		100%		1		100%	

- **Summarized information of above table:**

Sr. No.	Library Management Software Features	Availability of the features in commercial LMS					Name of the in-house software
2	Other Sub - Modules Covered	AUTOLIB	EASYLIB	LIBSUITE	LIBex.NET	SLIM - 21	GEMS
2.1	Budgetary Control/ Purchase	Yes	Yes	Yes	Yes	Yes	No
2.2	Branch Management	Yes	Yes	No	Yes	Yes	Yes
2.3	Users Management	Yes	Yes	No	Yes	Yes	Yes
2.4	Newspaper Management	Yes	No	No	No	No	No
2.5	Project report Management	Yes	No	No	No	No	No
2.6	Information About software	No	No	No	Yes	Yes	No
	Total Respondents	16	13	4	2	7	1

Explanation: Above table shows, the information about facilities covered under sub modules, which are present in existing library management software. Above table data depicts that, all the softwares are able to do functions related to finance through budgetary control module.

Only, AutoLib, EasyLib, Libex.net, SLIM21 and Gems softwares are having a branch management sub module, while Libsuite software, does not having a facility of branch Management. AutoLib, EasyLib, Libex.net, SLIM21, Gems consists of an users management sub module, while LibSuite does not included this sub module. AutoLib

and Gems software is having a newspaper management and project report management sub module while EasyLib, LibSuite, Libex.net and SLIM21 is not providing this facility through their software. Information about software this facility is available only with Libex.net, SLIM21 and Gems while AutoLib, EasyLib and LibSuite are not providing this facility.

Table No. 5.37: Acquisition module in present LMS

Sr.	LMS Features	Name of the commercial software																				In-House LMS			
3	Acquisition Module	AUTOLIB				EASYLIB				LIBSUITE				LIBex.NET				SLIM - 21				GEMS			
		Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%
3.1	Budget / Fund Management	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
3.2	Budget for - Department wise/ subject /Year wise	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
3.3	Duplicating checking	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
3.4	Book Selections: suggestions, stage file, Approvals	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
3.5	Order placing / cancelling / follow-up, etc.	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
3.6	Generate order letter	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
3.7	Receiving Books	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
3.8	Book Entries / Data Entries/ Accessioning	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
3.9	Data editing	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
3.1	Approving invoice for payment	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
3.11	Acquisition Reports	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
Total Respondents		16		100%		13		100%		4		100%		2		100%		7		100%		1		100%	

- **Summarized information of above table:**

Sr. No.	*Library Management Software Features*	*Availability of the features in commercial LMS*					*Name of the in-house software*
3	*Acquisition Module*	*AUTOLIB*	*EASYLIB*	*LIBSUITE*	*LIBex.NET*	*SLIM - 21*	*GEMS*
3.1	Budget / Fund Management	Yes	Yes	Yes	Yes	Yes	No
3.2	Budget for - Department wise/ subject /Year wise	Yes	Yes	Yes	Yes	Yes	No
3.3	Duplicating checking	Yes	Yes	Yes	Yes	Yes	No
3.4	Book Selections: suggestions, stage file, Approvals	Yes	Yes	Yes	Yes	Yes	No
3.5	Order placing / cancelling / follow-up, etc.	Yes	Yes	Yes	Yes	Yes	No
3.6	Generate order letter	Yes	Yes	Yes	Yes	Yes	No
3.7	Receiving Books	Yes	Yes	Yes	Yes	Yes	No
3.8	Book Entries / Data Entries/ Accessioning	Yes	Yes	Yes	Yes	Yes	No
3.9	Data editing	Yes	Yes	Yes	Yes	Yes	No
3.10	Approving invoice for payment	Yes	Yes	Yes	Yes	Yes	No
3.11	Acquisition Reports	Yes	Yes	Yes	Yes	Yes	No
	Total Respondents	***16***	***13***	***4***	***2***	***7***	***1***

Explanation: Above table shows the information about respondent opinions regarding facilities covered under acquisition module in existing LMS. From above table acquisition related automated functions are not present in Gems LMS. While all the commercial library management softwares are having the modules like, fund management, department wise fund management, duplicate checking, book selection, ordering, generate order letters, receiving books, accessioning, data editing, approving invoice for payment and acquisition report, while these acquisitions related modules are not present in Gems library management software.

Table No. 5.38: Cataloguing module in present LMS

Sr.	LMS Features	Name of the commercial software																				In-House LMS			
4	Cataloguing Module	AUTOLIB				EASYLIB				LIBSUITE				LIBex.NET				SLIM - 21				GEMS			
		Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%
4.1	Record Creation/ Cataloguing New Entry	16	0	100	0	0	13	0	100	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
4.2	Duplicate checking	16	0	100	0	0	13	0	100	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
4.3	Record Editing	16	0	100	0	0	13	0	100	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
4.4	Delete Record	16	0	100	0	0	13	0	100	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
4.5	Authority control	0	16	0	100	0	13	0	100	4	0	100	0	2	0	100	0	0	7	0	100	0	1	0	100
4.6	Copy Catalogue	0	16	0	100	0	13	0	100	0	4	0	100	2	0	100	0	7	0	100	0.0	0	1	0	100
4.7	Bibliographic framework – MARC21 Framework	0	16	0	100	0	13	0	100	0	4	0	100	0	2	0	100	0	7	0	100	0	1	0	100
4.8	Import - Export Data Cataloguing Data	0	16	0	100	0	13	0	100	0	4	0	100	2	0	100	0	7	0	100	0.0	0	1	0	100
4.9	Union Catalogue	0	16	0	100	0	13	0	100	0	4	0	100	0	2	0	100	0	7	0	100	0	1	0	100
4.10	Cataloging of different items	0	16	0	100	0	13	0	100	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
4.11	Cataloguing Reports	0	16	0	100	0	13	0	100	0	4	0	100	2	0	100	0	7	0	100	0.0	0	1	0	100
4.12	Other	0	16	0	100	0	13	0	100	0	4	0	100	2	0	100	0	0	7	0	100	0	1	0	100
	Total Respondents	16		100%		13		100%		4		100%		2		100%		7		100%		1		100%	

- **Summarized information of above table:**

Sr. No.	Library Management Software Features	Availability of the features in commercial LMS					Name of the in-house software
4	Cataloguing Module	AUTOLIB	EASYLIB	LIBSUITE	LIBex.NET	SLIM - 21	GEMS
4.1	Record Creation/ Cataloguing New Entry	Yes	No	Yes	Yes	Yes	No
4.2	Duplicate checking	Yes	No	Yes	Yes	Yes	No
4.3	Record Editing	Yes	No	Yes	Yes	Yes	No
4.4	Delete Record	Yes	No	Yes	Yes	Yes	No
4.5	Authority control	No	No	Yes	Yes	No	No
4.6	Copy Catalogue	No	No	No	Yes	Yes	No
4.7	Bibliographic framework – MARC21 Framework	No	No	No	Yes	Yes	No
4.8	Import - Export Data Cataloguing Data	No	No	No	Yes	Yes	No
4.9	Union Catalogue	No	No	No	No	No	No
4.10	Cataloging of different items	No	No	Yes	Yes	Yes	No
4.11	Cataloguing Reports	No	No	No	Yes	Yes	No
4.12	Other	No	No	No	No	No	No
	Total Respondents	16	13	4	2	7	1

Explanation: Above table shows the information about respondent opinions regarding facilities covered under cataloguing module in existing LMS. All the library management softwares excluding Gems software has covered some features related to cataloguing module. AutoLib, LibSuite, Libex.net, and SLIM21 software has covered the sub module like record creation under cataloguing module. In this module user has to create new records manually as per his knowledge.

AutoLib, LibSuite, Libex.net, and SLIM21 softwares are a facility of duplicate checking, record editing and delete records of cataloguing, while EasyLib and Gems LMS does not have this facility. LibSuite and Libex.net LMS have included authority control facility while AutoLib, EasyLib, LibSuite, SLIM21 and Gems LMS have not included this facility. SLIM21 and Libex.net LMS is having a facility of import-export data of cataloguing, while this feature is not available with AutoLib, EasyLib, LibSuite and Gems software. LibSuite, Libex.net and SLIM21 software have a facility of cataloguing different items while AutoLib, EasyLib, and Gems software does not have this facility. Libex.net and SLIM21 software is having a facility of cataloguing reports while AutoLib, EasyLib, LibSuite and Gems software does not have this facility. None of the software is having a union cataloguing facility.

Table No. 5.39: Serial control module in present LMS

Sr.	LMS Features	Name of the commercial software																				In-House LMS			
5	Serial Control Module	AUTOLIB				EASYLIB				LIBSUITE				LIBex.NET				SLIM - 21				GEMS			
		Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%
5.1	Suggestions	0	16	0	100	13	0	100	0.0	0	4	0	100	2	0	100	0	7	0	100	0.0	0	1	0	100
5.2	Ordering/Subscription	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
5.3	Receipting	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
5.4	Payment Processing	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
5.5	Reminder for non-receving issues (email)	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
5.6	Binding	16	0	100	0	0	13	0	100	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
5.7	Import / Export	0	16	0	100	0	13	0	100	0	4	0	100	2	0	100	0	7	0	100	0.0	0	1	0	100
5.8	Serials Reports	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
Total Respondents		16		100%		13		100%		4		100%		2		100%		7		100%		1		100%	

- **Summarized information of above table:**

Sr. No.	*Library Management Software Features*	*Availability of the features in commercial LMS*					*Name of the in-house software*
5	*Serial Control Module*	*AUTOLIB*	*EASYLIB*	*LIBSUITE*	*LIBex.NET*	*SLIM - 21*	*GEMS*
5.1	Suggestions	No	Yes	No	Yes	Yes	No
5.2	Ordering/Subscription	Yes	Yes	Yes	Yes	Yes	No
5.3	Receipting	Yes	Yes	Yes	Yes	Yes	No
5.4	Payment Processing	Yes	Yes	Yes	Yes	Yes	No
5.5	Reminder through email (Non receiving)	Yes	Yes	Yes	Yes	Yes	No
5.6	Binding	Yes	No	Yes	Yes	Yes	No
5.7	Import / Export	No	No	No	Yes	Yes	No
5.8	Serials Reports	Yes	Yes	No	Yes	Yes	No
	Total Respondents	*16*	*13*	*4*	*2*	*7*	*1*

Explanation: Above table shows the information about respondent opinions regarding facilities covered under serial control module in existing library management software. All the functions related to serial control module are absent in Gems software while AutoLib, EasyLib, LibSuite, Libex.net and SLIM21 softwares are covered serial control related modules like, suggestions, ordering subscription, receipting, payment process and reminder through email. The project binding feature is available only with AutoLib, LibSuite, Libex.net and SLIM21 software. Import Export facility is available with only with Libex.net and SLIM21 while serial reports module is available with only AutoLib, EasyLib, libex.net, and SLIM21 library management software.

Table No. 5.40: Circulation module in present LMS:

Sr.	LMS Features	Name of the commercial software																							
6	Circulation Module	AUTOLIB				EASYLIB				LIBSUITE				LIBex.NET				SLIM - 21				In-House LMS GEMS			
		Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%
6.1	Member Details	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
6.2	Member / User categories	0	16	0	100	13	0	100	0.0	0	4	0	100	2	0	100	0	0	7	0	100	1	0	100	0
6.3	Setting Preferences	0	16	0	100	13	0	100	0.0	0	4	0	100	2	0	100	0	0	7	0	100	0	1	0	100
6.4	Issue / Return / Renewal Transactions	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
6.5	Fines and over dues notices	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
6.6	Book Reservations	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
6.7	Users - Renewal of Items Physically	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
6.8	Users - Renewal of Items: Online	0	16	0	100	0	13	0	100	0	4	0	100	0	2	0	100	7	0	100	0.0	1	0	100	0
6.9	Over Due Charges	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
6.10	Inter Library Loans (ILL)	16	0	100	0	0	13	0	100	0	4	0	100	2	0	100	0	7	0	100	0.0	1	0	100	0
6.11	Facility to Weed Out	0	16	0	100	0	13	0	100	0	4	0	100	2	0	100	0	0	7	0	100	0	1	0	100
6.12	Circulation Statistics / Reports	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
	Total Respondents	16		100%		13		100%		4		100%		2		100%		7		100%		1		100%	

- **Summarized information of above table:**

Sr. No.	*Library Management Software Features*	*Availability of the features in commercial LMS*					*Name of the in-house software*
6	*Circulation Module*	*AUTOLIB*	*EASYLIB*	*LIBSUITE*	*LIBex.NET*	*SLIM - 21*	*GEMS*
6.1	Member Details	Yes	Yes	Yes	Yes	Yes	Yes
6.2	Member / User categories	No	Yes	No	Yes	No	No
6.3	Setting Preferences	No	Yes	No	Yes	No	No
6.4	Issue / Return / Renewal Transactions	Yes	Yes	Yes	Yes	Yes	Yes
6.5	Fines and over dues notices	Yes	Yes	Yes	Yes	Yes	Yes
6.6	Book Reservations	Yes	Yes	Yes	Yes	Yes	Yes
6.7	Users - Renewal of Items Physically	Yes	Yes	Yes	Yes	Yes	Yes
6.8	Users - Renewal of Items: Online	No	No	No	No	Yes	Yes
6.9	Over Due Charges	Yes	Yes	Yes	Yes	Yes	Yes
6.10	Inter Library Loans (ILL)	Yes	No	No	Yes	Yes	Yes
6.11	Facility to Weed Out	No	No	No	Yes	Yes	No
6.12	Circulation Statistics / Reports	Yes	Yes	Yes	Yes	Yes	Yes
	Total Respondents	***16***	***13***	***4***	***2***	***7***	***1***

Explanation: Above table shows the information about respondent opinions regarding facilities covered under circulation module in existing library management software. All the software is covered circulation module in their LMS. The circulation related modules like member details, issues-return, fines, book reservations, overdue charges, user`s renewal, and circulation statistical reports are covered under this module.

User category, setting preferences, this function is available only in EasyLib and Libex.net LMS. Online renewal of literature, this function is available only in SLIM 21 and Gems software. Inter Library Loan this function is available in AutoLib, Libex.net, SLIM21 and Gems software while facility to weed out, this facility is available in Libex.net and SLIM21 library management software.

Table No. 5.41: Administration module in present LMS

Sr.	LMS Features	Name of the commercial software																				In-House LMS			
7	Administration Module	AUTOLIB				EASYLIB				LIBSUITE				LIBex.NET				SLIM - 21				GEMS			
		Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%
7.1	User Rights	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
7.2	Various Codes Control (Acc. No. Bar Code)	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
7.3	Bulk Updating	0	16	0	100	0	13	0	100	0	4	0	100	2	0	100	0	0	7	0	100	0	1	0	100
7.4	Update database	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
7.5	Data Migration	0	16	0	100	0	13	0	100	0	4	0	100	0	2	0	100	0	7	0	100	1	0	100	0
7.6	Stack Verification	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
7.7	Back Up	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
7.8	Administrative Reports	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
	Total Respondents	16		100%		13		100%		4		100%		2		100%		7		100%		1		100%	

- **Summarized information of above table:**

Sr. No.	Library Management Software Features	Availability of the features in commercial LMS					Name of the in-house software
7	Administration Module	AUTOLIB	EASYLIB	LIBSUITE	LIBex.NET	SLIM - 21	GEMS
7.1	User Rights	Yes	Yes	Yes	Yes	Yes	Yes
7.2	Various Codes Control (Acc. No. Bar Code)	Yes	Yes	Yes	Yes	Yes	Yes
7.3	Bulk Updating	No	No	No	Yes	No	No
7.4	Update database	Yes	Yes	Yes	Yes	Yes	Yes
7.5	Data Migration	No	No	No	No	No	Yes
7.6	Stack Verification	Yes	Yes	Yes	Yes	Yes	Yes
7.7	Back Up	Yes	Yes	Yes	Yes	Yes	Yes
7.8	Administrative Reports	Yes	Yes	Yes	Yes	Yes	Yes
	Total Respondents	16	13	4	2	7	1

Explanation: Above table shows the information about respondent opinions regarding facilities covered under administration module in existing library management software. All these commercial and in-house library management systems cover functions like; user rights, various code controls, database updating, stock verification, backup facility and various administrative reports. Bulk updating

facility is available only in Libex.net LMS, while data migration facility is available only in Gems software.

Table No. 5.42: OPAC module in present LMS

Sr.	LMS Features	Name of the commercial software																				In-House LMS			
8	OPAC Module	AUTOLIB				EASYLIB				LIBSUITE				LIBex.NET				SLIM - 21				GEMS			
		Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%
8.1	Easy / Simple Search:	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
8.2	Boolean Search	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
8.3	Advance search:	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
8.4	Z39.50 search	0	16	0	100	0	13	0	100	0	4	0	100	0	2	0	100	0	7	0	100	0	1	0	100
8.5	Circulation Status on OPAC	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
8.6	Print OPAC results	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
8.7	Reservation through OPAC	16	0	100	0	0	13	0	100	0	4	0	100	2	0	100	0	7	0	100	0.0	1	0	100	0
8.8	OPAC customization by end-user	0	16	0	100	0	13	0	100	0	4	0	100	0	2	0	100	0	7	0	100	0	1	0	100
8.9	Availability of OPAC on Web	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
8.10	Mobile Compatible OPAC	0	16	0	100	0	13	0	100	0	4	0	100	2	0	100	0	0	7	0	100	0	1	0	100
8.11	Save Search Results	0	16	0	100	0	13	0	100	0	4	0	100	2	0	100	0	0	7	0	100	0	1	0	100
8.12	Access to Multimedia materials	0	16	0	100	0	13	0	100	0	4	0	100	2	0	100	0	0	7	0	100	0	1	0	100
8.13	Stop word Generation	0	16	0	100	0	13	0	100	0	4	0	100	0	2	0	100	0	7	0	100	0	1	0	100
8.14	End User Book Suggestions	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
8.15	Display of Search History	0	16	0	100	0	13	0	100	0	4	0	100	0	2	0	100	0	7	0	100	1	0	100	0
8.16	Creation of Virtual shelve	0	16	0	100	0	13	0	100	0	4	0	100	0	2	0	100	0	7	0	100	0	1	0	100
8.17	User Help / Ask a Librarian	0	16	0	100	0	13	0	100	0	4	0	100	2	0	100	0	7	0	100	0.0	1	0	100	0
Total Respondents		16		100%		13		100%		4		100%		2		100%		7		100%		1		100%	

- **Summarized information of above table:**

Sr. No.	*Library Management Software Features*	*Availability of the features in commercial LMS*					*Name of the in-house software*
8	*OPAC Module*	*AUTOLIB*	*EASYLIB*	*LIBSUITE*	*LIBex.NET*	*SLIM - 21*	*GEMS*
8.1	Easy / Simple Search:	Yes	Yes	Yes	Yes	Yes	Yes
8.2	Boolean Search	Yes	Yes	Yes	Yes	Yes	Yes
8.3	Advance search:	Yes	Yes	Yes	Yes	Yes	Yes
8.4	Z39.50 search	No	No	No	No	No	No
8.5	Circulation Status on OPAC	Yes	Yes	Yes	Yes	Yes	Yes
8.6	Print OPAC results	Yes	Yes	Yes	Yes	Yes	Yes
8.7	Reservation through OPAC	Yes	No	No	Yes	Yes	Yes
8.8	OPAC customization by end-user	No	No	No	No	No	No
8.9	Availability of OPAC on Web	Yes	Yes	Yes	Yes	Yes	Yes
8.10	Mobile Compatible OPAC	No	No	No	Yes	No	No
8.11	Save Search Results	No	No	No	Yes	No	No
8.12	Access to Multimedia materials	No	No	No	Yes	No	No
8.13	Stop word Generation	No	No	No	No	No	No
8.14	End User Book Suggestions	Yes	Yes	Yes	Yes	Yes	Yes
8.15	Display of Search History	No	No	No	No	No	Yes
8.16	Creation of Virtual shelve	No	No	No	No	No	No
8.17	User Help / Ask a Librarian	No	No	No	Yes	Yes	Yes
	Total Respondents	***16***	***13***	***4***	***2***	***7***	***1***

Explanation: Above table shows the information about respondent`s opinions regarding OPAC (Online Public Access Catalogue) module is covered in existing library management software. Easy or simple search, Boolean search, advance search, circulation search on OPAC, Print OPAC results, availability of OPAC on web and end-user book suggestions these facilities are available in all the commercial as well as in-house library management softwares used in the institute libraries. None the library is using Z39.50 search standard, OPAC customization by end user stop word creation and creation of virtual shelves of the books through library management software.

Reservation through OPAC, this facility is available only in AutoLib, Libex.net, SLIM21 and Gems software. Save search result and access to multimedia material, this facility is available only in Libex.net library management software. Display of the search history function is available only in Gems LMS. User help or Ask a librarian facility is available only in Libex.net and SLIM21 library management software while none of the software has mobile computable OPAC.

Table No. 5.43: Generating various reports

Sr.	LMS Features	Name of the commercial software																							
		AUTOLIB				EASYLIB				LIBSUITE				LIBex.NET				SLIM - 21				In-House LMS			
9	Various Reports																					GEMS			
		Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%	Yes	No	Yes%	No%
9.1	Member list	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
9.2	Batch wise Member list	0	16	0	100	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
9.3	Acquisition Reports	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
9.4	Accession Register	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
9.5	Accession Registers with selected fields	0	16	0	100	0	13	0	100	0	4	0	100	0	2	0	100	0	7	0	100	0	1	0	100
9.6	Book Title list	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
9.7	Periodical/ Journal Subscription list	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
9.8	Missing Issue Report	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
9.9	Circulation Statistics	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
9.10	Borrower list	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
9.11	Reservations	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
9.12	Overdue report of member	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
9.13	Stack Verification	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
9.14	Email Reminders	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
9.15	Catalogue cards printing	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	0	1	0	100
9.16	No Dues Certificate	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
9.17	Batch wise No dues Certificate	0	16	0	100	0	13	0	100	0	4	0	100	0	2	0	100	0	7	0	100	0	1	0	100
9.18	Book sent for Binding list	16	0	100	0	13	0	100	0.0	4	0	100	0	2	0	100	0	7	0	100	0.0	1	0	100	0
Total Respondents		16		100%		13		100%		4		100%		2		100%		7		100%		1		100%	

- **Summarized information of above table:**

Sr. No.	*Library Management Software Features*	*Availability of the features in commercial LMS*					*Name of the in-house software*
9	*Various Reports*	*AUTOLIB*	*EASYLIB*	*LIBSUITE*	*LIBex.NET*	*SLIM - 21*	*GEMS*
9.1	Member list	Yes	Yes	Yes	Yes	Yes	Yes
9.2	Batch wise Member list	No	Yes	Yes	Yes	Yes	Yes
9.3	Acquisition Reports	Yes	Yes	Yes	Yes	Yes	Yes
9.4	Accession Register	Yes	Yes	Yes	Yes	Yes	Yes
9.5	Accession Registers with selected fields	No	No	No	No	No	No
9.6	Book Title list	Yes	Yes	Yes	Yes	Yes	Yes
9.7	Periodical/ Journal Subscription list	Yes	Yes	Yes	Yes	Yes	No
9.8	Missing Issue Report	Yes	Yes	Yes	Yes	Yes	No
9.9	Circulation Statistics	Yes	Yes	Yes	Yes	Yes	Yes
9.10	Borrower list	Yes	Yes	Yes	Yes	Yes	Yes
9.11	Reservations	Yes	Yes	Yes	Yes	Yes	Yes
9.12	Overdue report of member	Yes	Yes	Yes	Yes	Yes	Yes
9.13	Stack Verification	Yes	Yes	Yes	Yes	Yes	Yes
9.14	Email Reminders	Yes	Yes	Yes	Yes	Yes	No
9.15	Catalogue cards printing	Yes	Yes	Yes	Yes	Yes	No
9.16	No Dues Certificate	Yes	Yes	Yes	Yes	Yes	Yes
9.17	Batch wise No dues Certificate	No	No	No	No	No	No
9.18	Book sent for Binding list	Yes	Yes	Yes	Yes	Yes	Yes
	Total Respondents	***16***	***13***	***4***	***2***	***7***	***1***

Explanation: Above table shows the information about respondent opinions regarding reports module in existing library management software. It includes, Member list, acquisition reports, accession register, book title list, circulation statistics, borrower list, reservations, overdue report of member, stock variation No dues certificate and books sent for binding list, all these functions are available in commercial as well as in-house LMS used in institute libraries.

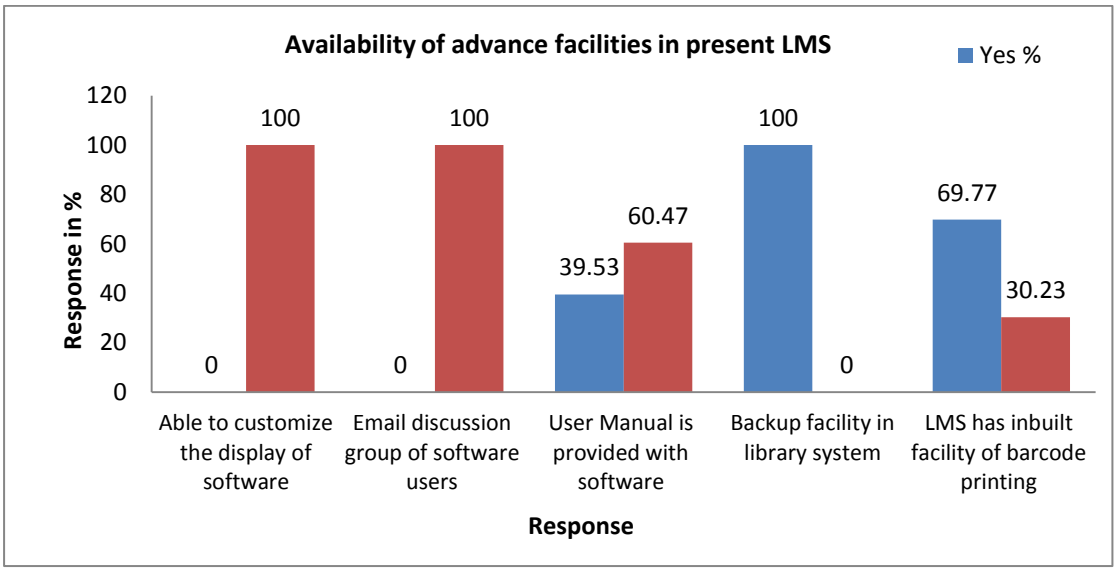
Accession registers with selected fields, batch wise no dues certificate and customization of the reports facility is not present in any commercial LMS used in institute libraries. Batch wise member list function is available only in EasyLib, LibSuite, Libex.net, SLIM21 and Gems LMS. Display of Periodical / Journal subscription list, missing issue report, email reminder and printing cataloguing cards facility is available in AutoLib, EasyLib, LibSuite, Libex.net and SLIM21 library management software.

Information about advance features in existing LMS:

Table No. 5.44: Availability of advance features in existing LMS

Response	*Yes*	*%*	*No*	*%*	*Total %*
Able to customize the display of software	00	00.00	43	100.0	100
Email discussion group of software users	00	00.00	43	100.0	100
User manual is provided with software	17	39.53	26	60.47	100
Backup facility in library system	43	100.0	00	00.00	100
LMS has inbuilt facility of barcode	30	69.77	13	30.23	100
Total Respondents					***43***
Source : Primary data					

Graph No. 5.28:- Availability of advance features in existing LMS

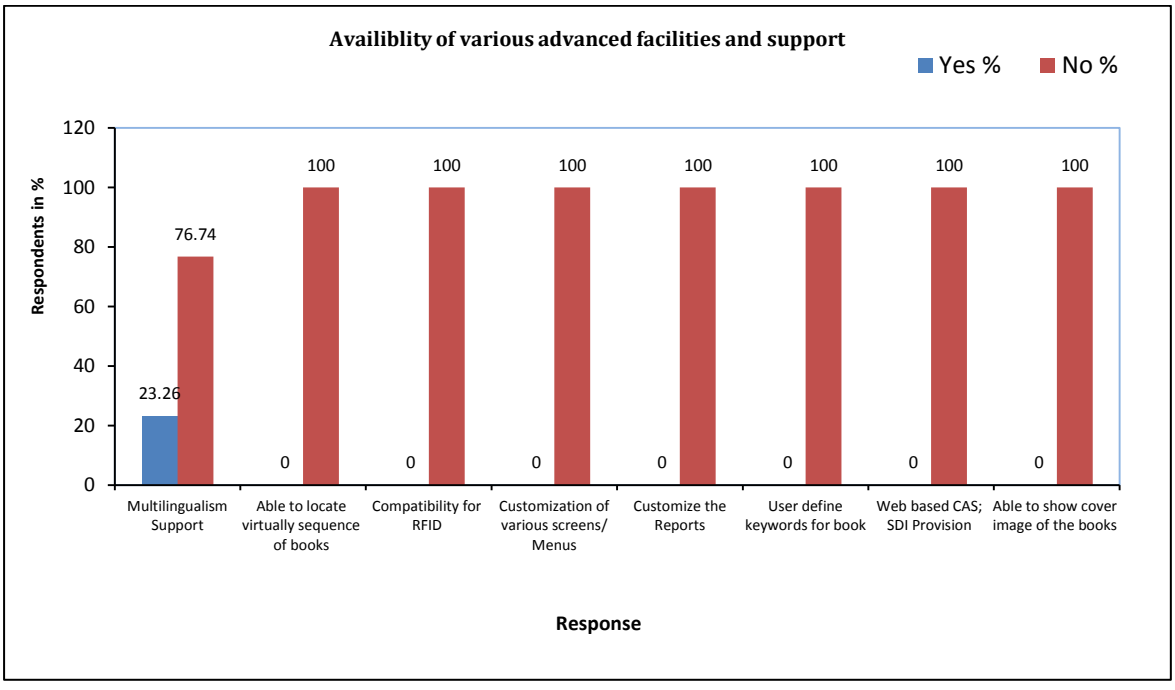


Above table and graph shows availability of advanced facilities which are available in their present library management software and it is seen that, none of the library softwares has given freedom to customize the display of software to the user. There were no email discussion groups among the software users. According to 39.53% (17) respondents, the user manual of LMS is provided by software vendor while 60.47% (26) respondents are not got any user manual from the software vendor. According to 69.77% (30) librarian's opinion, there is inbuilt facility to print barcode labels from their LMS.

Table No. 5.45: Availability of various advanced facilities and supports

Response	*Yes*	*%*	*No*	*%*	*Total %*
Multilingualism support	10	23.26	33	76.74	100
Able to locate virtually sequence of books	00	00.00	42	100.0	100
Compatibility for RFID	00	00.00	43	100.0	100
Customization of various screens/ menus	00	00.00	43	100.0	100
Customize the reports	00	00.00	43	100.0	100
User define keywords for book	00	00.00	43	100.0	100
Web based CAS, SDI provision	00	00.00	43	100.0	100
Able to show cover image of the books	00	00.00	43	100.0	100
Total Respondents					***43***
Source : Primary data					

Graph No. 5.29:- Availability of various advanced facilities and supports



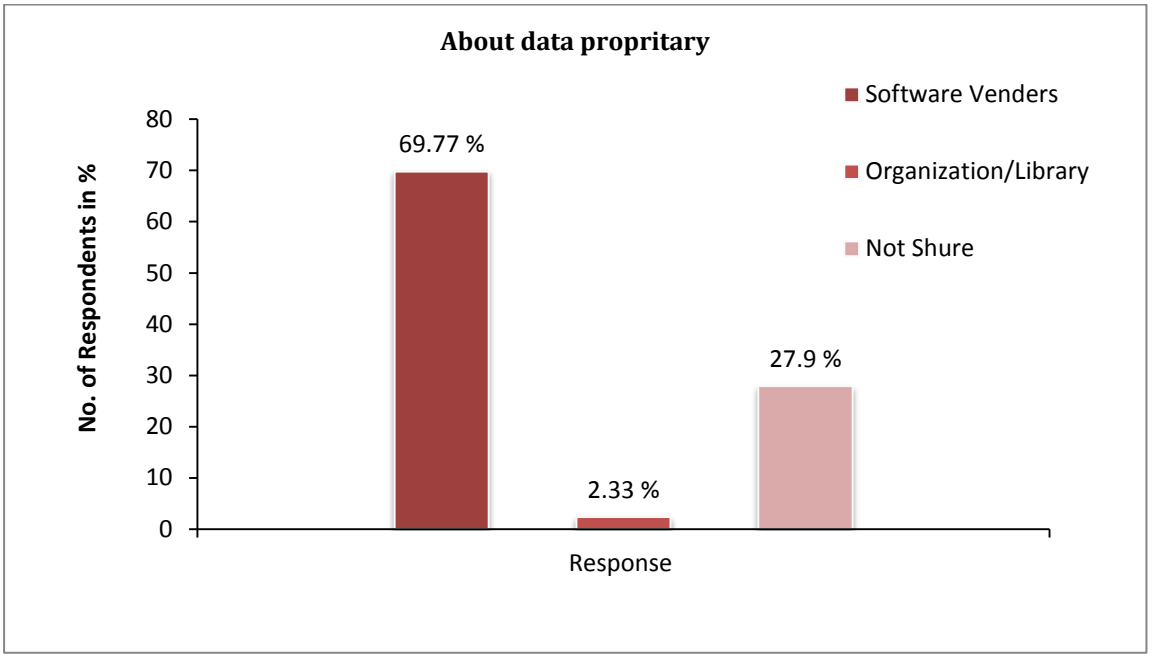
Above table and graph shows the information about, their opinions about different facilities, advanced features available in present library management software. According to data, 23.26% (10) libraries have given a positive reply towards existing software (SLIM21, Libex.net, Gems) has Multilingualism support. None of the existing library management software has been able to locate virtually the sequence of books, compatible with RFID system, able to customization of various screens/ menus, able to customize the reports, able to provide user rights to the user for customization of OPAC for defining the keywords for books and none of the existing library management system is able to show cover image of the books. From above table, it is clear that, existing software are not updated with advanced features and not able to provide advanced services.

5.2.6 Data Migration, Data Proprietary

Table No. 5.46: About data proprietary

Response	***Yes***	***%***	***No***	***%***	***Total %***
Software venders	30	69.77	13	30.23	100
Organization/Library	01	02.33	42	97.67	100
Not Sure	12	27.09	31	72.91	100
Total Respondents					***43***
Source : Primary data					

Graph No. 5.30:- About data proprietary

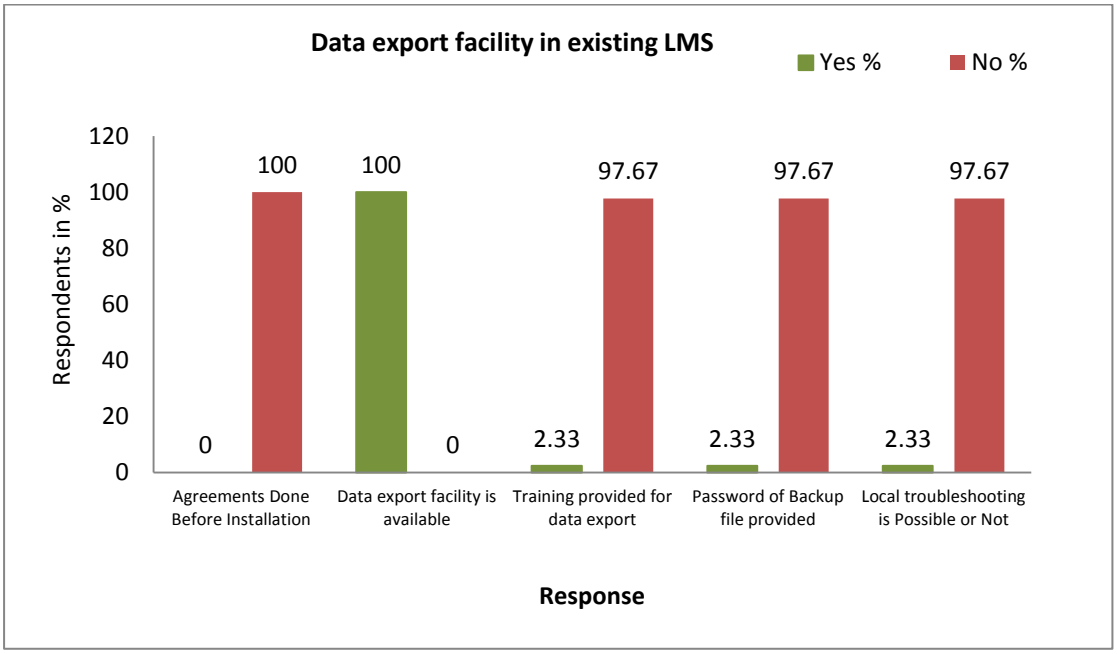


Above table and graph shows the statistical information about response given regarding data proprietary. The table shows, according to 69.77% (30) respondents, software vendor is the data proprietor, while 2.33% (1) respondent says; organization or library is the data proprietor of backup file generated by library management software, while 27.09% (12) respondents are not sure about proprietors of data.

Table No. 5.47: Data export facility in existing LMS

Response	***Yes***	***%***	***No***	***%***	***Total %***
Agreements done before installation	00	00.00	43	100.0	100
Data export facility is available	43	100.0	00	00.00	100
Training provided for data export	01	02.33	42	97.67	100
Password of backup file provided	01	02.33	42	97.67	100
Local troubleshooting is possible or not	01	02.33	42	97.67	100
Total Respondents					***43***
Source : Primary data					

Graph No. 5.31: - Data export facility in existing LMS



Above table and graph shows the information about availability of data export facility in existing library management software, training provided for data export with password of backup file, awareness among the respondents regarding doing legal agreements before installation of software and enquiry about whether local troubleshooting possible or not in existing software.

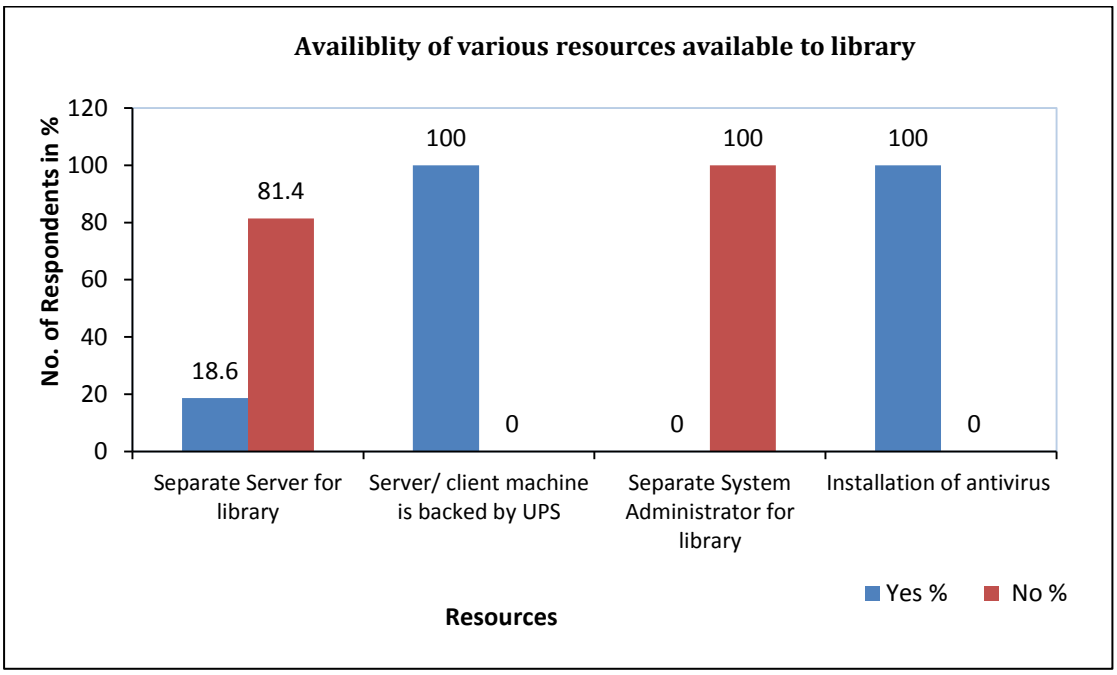
Above table shows 100% libraries have not done any legal agreements regarding data export facility (at the time of installation / replacing the software) before installing the software. 100% respondents stated that, data export is available in their software, while 97.67% respondent's stated, proper training was not given by software vendor to export the data as well as back file password is not given by the software vendor. Then 97.67% respondents stated that, local trouble shooting is not possible when problem occurs, in software operation, they have to depend upon software vendor for any troubleshooting.

5.2.7 Resource Sharing Practices among Sinhgad Institutes

Table No. 5.48: Availability of various resources to library

Resources	*Yes*	*%*	*No*	*%*	*Total*
Separate server for library	08	18.60	35	81.40	100
Server/ client machine is backed by UPS	43	100.0	00	00.00	100
Separate system administrator for library	00	00.00	43	100.0	100
Installation of antivirus	43	100.0	00	00.00	100
Total Respondents					***43***
Source : Primary data					

Graph No. 5.32: - Availability of various resources to library



Above table and graph shows the information about availability of various resources to the library. From the table it has seen that, 18.60% (8) libraries have a separate server for the library. By understanding the configuration of server, it is clear that, single computer machine dedicated for doing server work. All the 100% (43) library server / client machine is backed by UPS and all libraries are installed antivirus software on their computers for data security measure and none of library has a separate system administrator for library.

Table No. 5.49: Centralized resource sharing practices through LMS

Response	*Yes*	*%*	*No*	*%*	*Total %*
Centralized budget control	00	00.00	43	100.0	100
Centralized purchasing	00	00.00	43	100.0	100
Centralized acquisition (editing/entry)	00	00.00	43	100.0	100
Centralized cataloguing / classification	00	00.00	43	100.0	100
Inter library loan	21	48.84	22	51.16	100
Using web catalogue of other campus	00	00.00	43	100.0	100
Using web OPAC of other campus	00	00.00	43	100.0	100
Total Respondents					***43***
Source : Primary data					

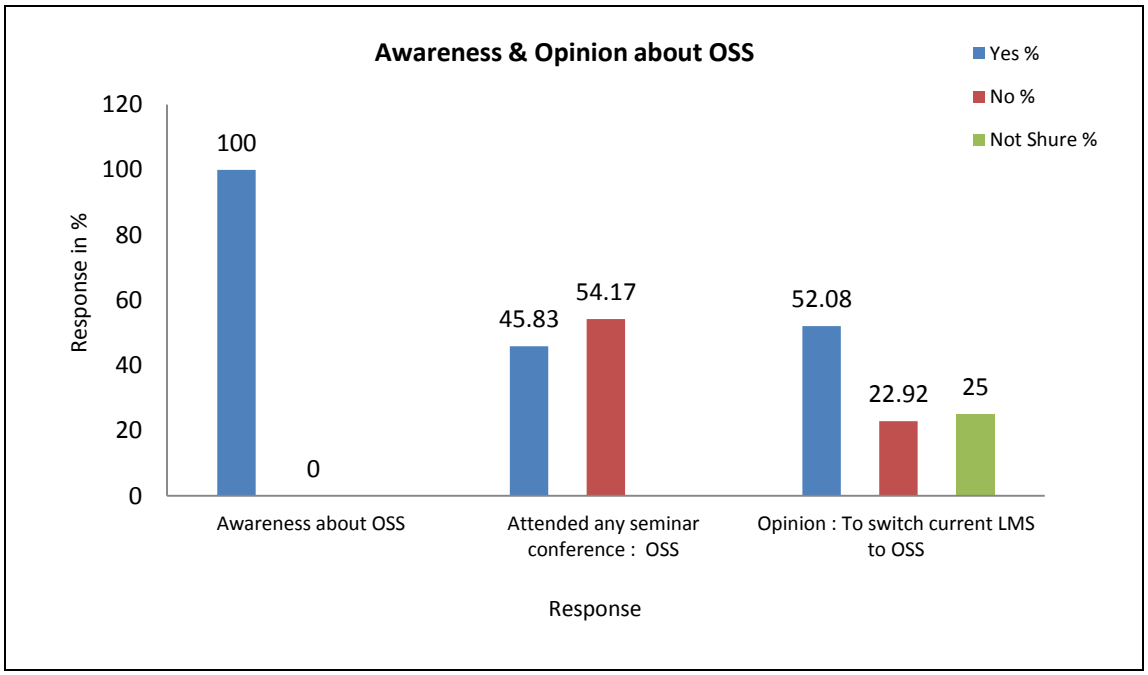
Above table shows, various types of centralized resource sharing practices or activities are being done in Sinhgad Institute libraries. The table shows, 48.84 % (21) libraries are doing inter library loan related activities manually. None of the libraries are not doing centralized budget control activity, centralized purchasing (library material) centralized acquisition (adding, editing entries), centralized cataloguing and / classification, using the web OPAC or web catalogue of other campus.

5.2.8 Knowledge/ Awareness/ IT literacy about OSS

Table No. 5.50: Awareness, new installation and opinion: replace existing LMS

Response	*Yes*	*%*	*No*	*%*	*Not Sure*	*%*	*Total %*
Awareness about OSS	48	100.0	00	00.00	--	--	100
Attended any seminar conference : OSS	22	45.83	26	54.17	--	--	100
Opinion : new installation (for non-automated) and to switch current LMS to OSS (Automated)	25	52.08	11	22.92	12	25	100
Total Respondents							***48***
Source : Primary data							

Graph No. 5.33:- Awareness, new installation and opinion: replace existing LMS



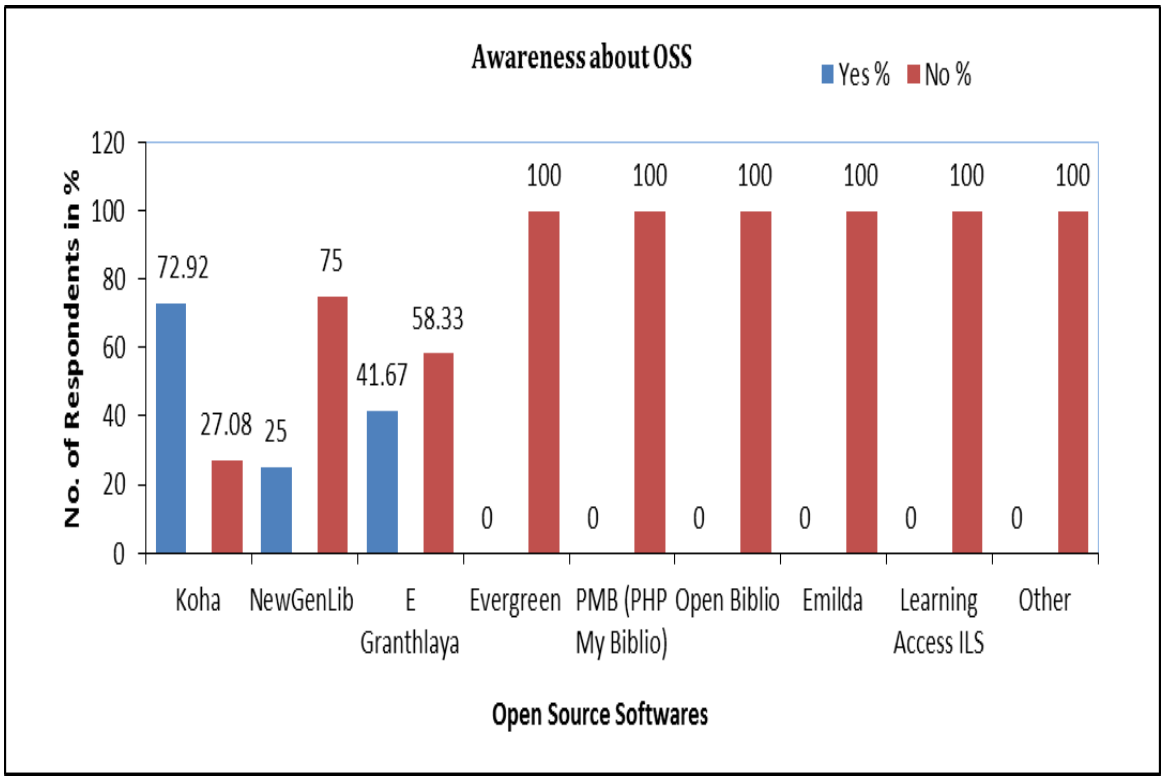
Above table and graph shows the statistical information about overall awareness, interest for attending seminar, conference or any workshop regarding OSS and opinion to replace existing LMS has checked out. It has been seen that, out of 100% (43) respondents, all the respondents are aware about open source software. 45.83% (22) respondents have attended seminar/workshops/conferences related to OSS, while 54.17% (26) respondents have not attended any seminar/workshops/conferences related to open source software. 52.08% (25) librarians are interested to switch their existing library management software to open source software. It has ben also seen that non-automated libraries are interested to install new OSS while 22.92% (11) respondents are not in favor to switch existing library management software to open source software and 25 % (12) respondents were not sure to switch existing LMS to open source software.

Table No. 5.51: Software wise awareness and use of open source software

Software Name	***Awareness***				***Used***			
	Yes	***%***	***No***	***%***	***Yes***	***%***	***No***	***%***
Koha	35	72.92	13	27.08	2	4.17	46	95.83
NewGenLib	12	25.00	36	75.00	0	0.00	48	100.0

e-Granthalaya	20	41.67	28	58.33	1	2.08	47	97.92
Evergreen	00	00.00	48	100.0	0	0.00	48	100.0
PMB (PHP My Biblio)	00	00.00	48	100.0	0	0.00	48	100.0
OpenBiblio	00	00.00	48	100.0	0	0.00	48	100.0
Emilda	00	00.00	48	100.0	0	0.00	48	100.0
Learning Access ILS	00	00.00	48	100.0	0	0.00	48	100.0
Other	00	00.00	48	100.0	0	0.00	48	100.0
Total Respondents								***48***
Source : Primary data								

Graph No. 5.34: - Software wise awareness and use of open source software



Above table and graph shows the awareness and literacy among the Sinhgad Institute librarians using OSS. Most of the librarians are aware about Koha open source software and 4.17% (02) librarians have used Koha. 25% (12) librarians are aware about NewGenLib open source software and none of the librarians has used NewGenLib library management software. 41.67% (20) librarians are aware about e-Granthalaya open source software and 2.08% (01) librarian has used e-Granthalaya

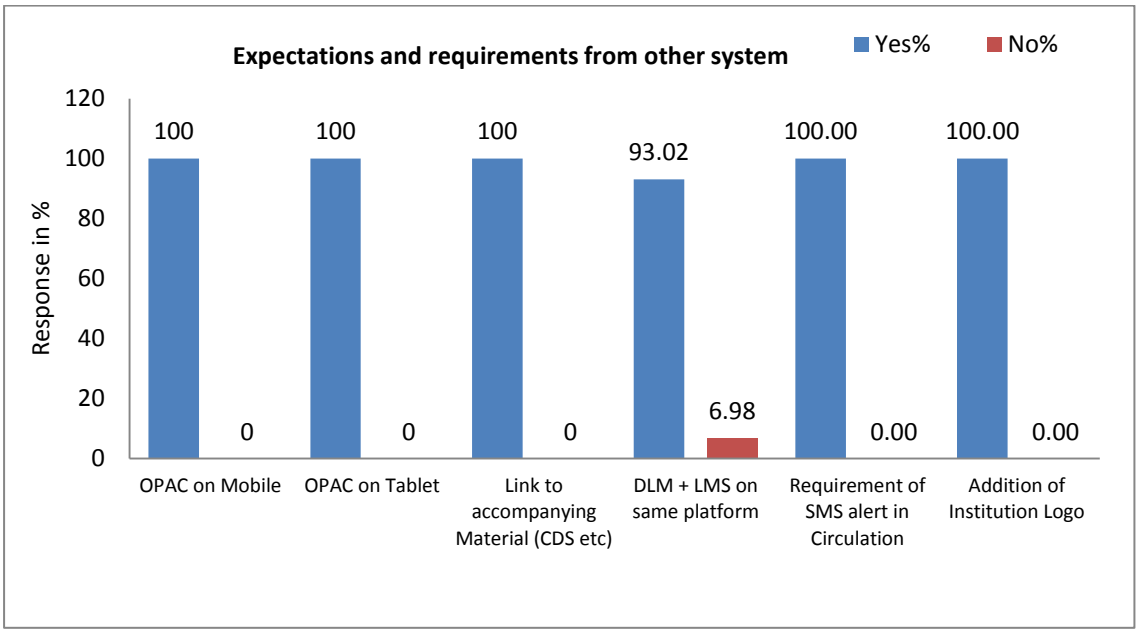
open source software. None of the librarians are aware or used Evergreen, PMB (PHP My Biblio), OpenBiblio, Emilda, Learning Access ILS open source software.

Information about expectations and requirements from other system

Table No. 5.52: Expectations and requirements from other system

Expectations	*Yes*	*%*	*No*	*%*	*Total %*
OPAC on Mobile	43	100.0	0	0.00	100
OPAC on Tablet	43	100.0	0	0.00	100
Link to accompanying material (CDS etc.)	43	100.0	0	0.00	100
DLM + LMS on same platform	40	93.02	3	6.98	100
Requirement of SMS alert in circulation	43	100.0	0	0.00	100
Insert institution logo (LMS)	43	100.0	0	0.00	100
Total Respondents					***43***
Source : Primary data					

Graph No. 5.35:- Expectations and requirements from other system



Above table and graph shows the statistical information about requirements and new expectations from library management system regarding the facilities. The information of above table depicts, all the 100% (48) respondents want to look OPAC

(Online public access catalogue) on Mobile phone and tablet. All the 100% (48) respondents wants to give link of accompanying material like CD`s with the help of library management software. Out of 100% (48) respondents, 93.02% (40) respondents want to look digital library management software and library management software has to be on the same platform or it will be installed by single installation, while 6.98 (3) respondents do not need this facility. All the 100% (43) respondents are willing to insert their own institute`s logo in their library management system and want to bring SMS alert (Short Message Service) in circulation.

5.3 Conclusion:

In this chapter all the relevant data is analyzed scientifically using different statistical tools and arranged systematically for getting answers towards determined objectives of this study. This data interpretation and Analysis also helps in validating the hypothesis set at initial phase. The logical findings are stated on the basis of interpreted data which has been expressed in chapter eight.

Chapter-VI
Feasibility Study of the Proposed Model

6.1 Introduction:

Feasibility study is very important aspect for any proposed model. It gives us direction to implement or not to implement the further proposed project. This chapter deals with the feasibility study of the proposed model with relevant theoretical and statistical data. This study is carried out with the help of literature, primary data, current market prices and logical thoughts. In this chapter the term "feasibility" has discussed with relevant statistical data to complete the determined objectives to this chapter.

6.2 Objectives of the Feasibility Study:

Jennifer Campbell (2007) has elaborated some of the objectives of the feasibility study, which are as follows,

- To explain present situation of the automation.
- To find out if a system development project can be done is possible.
- To find out whether the final product will benefit end user.
- To suggest the possible alternative solutions.

Even though, feasibility study does not directly help to solve the problems, its purpose is to determine the direction towards implementation of the project for problem solving. Feasibility study in the present work deals with areas like operational feasibility, technical feasibility, economic feasibility and time-line feasibility. Due to various factors, the researcher has come across some of the constraints while developing the prototype model which are like,

1. It is bit difficult to determine the price of any specific hardware and software as there are various products available in the market.
2. It is also observed that the quality of the products both software and the hardware differ from brand to brand.
3. The prices or costs involved in this study are based on the current market prices that are already paid by some of the libraries that are part of this study.

4. Libraries are the service providing organizations and in such cases, it is very difficult to find out some of the tangible and in-tangible benefits of the system. While conducting this feasibility study, the researcher has looked into following aspects.
    - Current scenario of the library automation in Sinhgad Institutes.
    - Deficiencies of existing systems.
    - Goals to be achieve from new System.

    In addition to this, the researcher has observed some limitations, while going towards feasibility study which are as follows,

6.3 Limitations of Feasibility Study:

1. This feasibility study is limited only Commercial library management software and Open source software.
2. In this feasibility study, there are some intangible / hidden costs related to internet connections either wired or Wi-Fi, UPS, Electricity Generators, remunerations to IT expert or system administrators, etc. Some of these costs are difficult to calculate as these are purchased or used for common use of whole institute.
3. Software license agreements (yearly/ permanent) have purchased commonly for all the computers used in whole organization either on individual machines or by campus agreements. So it is impossible to determine the pricing at an individual machine level.

6.4 Types of Feasibility:

There are four types of feasibilities expressed by Jennifer Campbell (2007) which are discussed in this chapter with relevant data. The economic feasibility, technical feasibility, operational feasibility and scheduled feasibility are the major types of feasibility.

1. **Economic Feasibility:**

In this type of feasibility, the cost of hardware, software and overall budget is evaluated to run the new system. Tangible and intangible benefits are also considered in the evaluation.

2. **Technical Feasibility:**

In this type of feasibility, the present hardware and software compatibility with the new one is checked out to run the new system.

3. **Operational Feasibility:**

In this type of feasibility, the issues like, operational scope for the fast accept-ability of the alternative solution, human issues, social issues, internal issues (organizational conflicts) and legal issues are to be checked out.

4. **Schedules Feasibility:**

In this type of feasibility, the skills required for properly applying the new technology with training in minimum time and the time duration can be checked out to implement or overrun the new project within minimum time.

6.5 Study of Present System in Sinhgad Institutes:

In the present study, Researcher has collected some relevant data with the help of questionnaire, observation and discussions, and found that there is a scope to improve the library services with latest technology at a minimum cost. During the study, it is observed that forty-three libraries are automated. At the same time there are five libraries that are yet to be automated, due to high capital cost of LMS. (Ref. Table No. 5.22, 5.23, 5.25. 5.26). Most of the libraries of the Sinhgad Institutes are having good Internet connectivity (Ref. Table No. 5.22). It is also observed that, one library is using in-house software for LIS operations, while remaining all other libraries are using commercial library management software, like, AutoLib, EasyLib, LibSuite, Libex.Net and SLIM21 by spending huge amount on library automation. (Ref. Table No. 5.25, 5.26). Now a day`s, library management system is supposed to follow all the database management systems standards and practices like MARC21 for the record structure and the Z39.50

protocol for the online OPACs. On the contrary, in the present structure it is observed that most of the software does not follow the database standards and systems. (Ref. Table No. 5.33)

As on today, all the libraries that are automated are using commercial operating system Windows from Microsoft and are also using antivirus software. This has incurred a huge amounts on purchase of the licenses and the Annual Maintenance Contracts (AMC) for renewal of license agreements, etc. (Ref. Table No.5.28, 5.27, 5.26). As some of the library management systems do not provide support to Web-based services, the users have to completely depend on the services that are available only through library premises. (Ref. Table No. 5.19)

6.5.1 Pitfalls of Existing System:

During this study, it is observed that most of the libraries are unwilling to pay for getting the updates and upgradations of the systems as this is a taxing amount for the libraries. Even, most of the libraries are not happy with the updates or upgrades that are given after the payments. Some of the general as well as specific problems related to LMS are mentioned in following points.

- In most of the LMS software there is a vendor lock that becomes a hurdle for data export. (Ref. Table No.5.46, 5.47)
- Similarly due to the software vendor locks, sometimes some vendors claim data propriety on the data of the individual libraries: (Ref. Table No. 5.46)
- Use of commercial backend software for the database management creates problem after certain number of users and the records.
- As the base prices of most of the LMS software are very high, the working capital cost too goes very high.
- In most of the cases, it is observed that the libraries do not get advanced services as per promises from the vendors. (Ref. Table No. 5.44, 5.14)
- As mentioned earlier, there are lack of International Standards in the System (Ref. Table No. 5.33)
- In most of the commercial software there is a lack of online / troubleshooting help messages. (Ref. Table No. 5.47)

- It is observed that most of the vendors charge separately and exorbitantly for add-on services or features like the web 2.0 services.
- Some of the vendors also ask for extra charges for services like copy cataloguing or even there are charges for the libraries where from the copy cataloguing services will be opted by the libraries.
- Discussion Forums and e-Mail or online supports are not provided by many of the vendors (Ref. Table No. 5.44)

6.5.2 General Expectations from New System:

After understanding the existing LMS problems, researcher has developed a tentative structure for centralized library management system that may be an alternative solution to the existing system. Researcher has tried to find out following aspects with LMS to achieve the goals from new system.

- LMS suitable for centralized or multi locational library system.
- Zero capital cost of the LMS.
- No updating charges.
- No AMC required for the system.
- Minimum cost for supporting hardware and software.
- Maximum web-based advanced services.
- Unlimited entries for backend database.
- Maximum international supporting standards.
- Technological driven support.

6.6 Feasibility Study: Towards Development of Prototype Model:

In this study, the researcher has checked out the aspects related to economic feasibility, technical feasibility, operational feasibility and scheduled feasibility with relevant data which is discussed below.

6.6.1 Economic Feasibility Study:

The economic feasibility is related to prices of required material to run the system; these prices are relevant to suitable hardware and required software cost. Researcher has been studied the economic feasibility of commercial library

management system and Open source library management system, which has been studied in terms of hardware cost and software cost.

1. Using Commercial LMS:

To create centralized library system, using existing or any commercial library management software for the Sinhgad institute libraries is not feasible, because, at first stage, it is necessary to connect all the libraries into the network and the existing LMS are creating following hurdles to run the system,

- Varity of Library Management Softwares (LMS): In the Sinhgad Institute libraries, variety of commercial softwares are being used and brand wise these software architecture is different.
- LMS, not able to communicate each other: Due to variety of features, technology and architecture, these softwares not interlinked and hence cannot communicate with each other.
- No data exchange: Each and every commercial library software is using different data structures and not compatible to data exchange to new system.
- Lack of database standard support: These systems do not support any database international standards like, Z39.50 or MARC21etc.
- Different features of various LMS: Different software developer has different features and there is no consistency.
- At present, institutes have to contact commercial software vendor from time to time for any updates.

Solution:

- To overcome all the above problems, one needs to use the centralized library management system that needs a single (Uniform) LMS license, and would not create any hurdle for connecting each other. The following table indicates estimated capital cost for library automation using commercial LMS in ideal situation. The chart is created on the basis of approx. market prices.

Table No. 6.1: Estimated cost of required hardware for library automation using commercial (In an ideal situation) software

Sr. No.	Required Hardware Particulars	Qty.	Average Approx. Cost	Total Approx. Cost	Remarks
1	Server Machines	48	50,000	24,00,000	One per library
2	Client Machines	192	22,500	43,20,000	Three to five per library
3	Barcode Printer	48	9,750	4,68,000	One per library
4	Barcode Reader	96	3,500	3,36,000	Two per library
5	Laser Printer	48	6,500	3,12,000	One per library
TOTAL				**78,36,000**	

Explanation: In the existing situation, Sinhgad Institute higher education libraries are having 132 computer terminals along with eight separate servers in 48 libraries for library house-keeping operations. In an ideal situation, they required one separate server for each library i.e. 48 server machines required to run the system. The approx. market price of one server with minimum configuration is Rs. 50,000/- then the integrated cost of 48 servers will be Rs. 24,00,000/-. In ideal situation, if planed properly, each library will need at least 4 client machines, then integrated amount for 192 client machines will be Rs. 43,20,000/-. In all the libraries, barcode printer is necessary equipment for printing barcode labels. So as per the requirement, if the approx. cost of barcode printer is Rs. 9,750/- then integrated cost for 48 barcode printers will be Rs. 4,68,000/- If the average cost of laser printer is Rs. 6500/- then integrated amount of 48 laser printers will be Rs. 3,12,000/-. Barcode reader is also necessary equipment to read the printed barcodes. All the commercial library management systems will require barcode readers for barcode reading. If one or two barcode readers are supplied to respective libraries as per their need, then integrated cost for 96 barcode readers will be Rs. 3,36,000/-. So the expenditure for the various hardware will be Rs. 78,36,000/-.

Table No.6.2: Estimated cost of required software for library automation using commercial (In an ideal situation) software

Sr. No.	Required Software Support	Qty.	Average Approx. Cost	Total Approx. Cost	Remarks
1	Capital cost of the LMS	48	1,00,000	48,00,000	Applicable as per brand
2	AMC charges per year (LMS)	48	10,000	4,80,000	Applicable as per brand
3	Updating charges (LMS)	48	0	0	Charges included : AMC
4	Operating system (server)	1	10,000	4,80,000	License copy
5	Operating system (client)	192	1,931	3,70,752	Yearly charges
6	Antivirus software (server)	48	273	13,104	Yearly charges
7	Antivirus software (client)	192	273	52,416	Yearly charges
8	Training cost	1	0	0	From vendor
TOTAL				**61,96,272**	

Explanation: The above table shows estimated cost of required software when commercial LMS are in use for library automation. This chart is created on the basis of existing situation, market prices and for ideal situation. From the primary data it is clear that, all the libraries are using commercial library management systems and not able to support centralized library system, but in ideal situation there is required uniform (Single) LMS with separate license's copy. There are total 48 libraries and they required 48 LMS license copies for library automation, but todays approx. market price of the LMS is Rs. 1,00,000/- then integrated amount for 48 licenses will be Rs. 48,00,000/-. The commercial library management system is required to pay Annual Maintenance Charges (AMC) for each license copy and this amount will be Rs. 4,80,000/- per year. This AMC charges usually includes updating charges and training cost. All the libraries are using commercial operating system on their computers and the average cost of operating system is Rs. 1931/- per year for renewal agreements to operating system, so integrated amount for 192 client machines will be Rs. 3,70,752/- per year. If we think about operating systems for server machines, generally organizations / institutes purchases permanent license copy for server machine. In current situation, the approx. market cost of the permanent license copy

of operating system software is Rs. 10,000/- then integrated cost of 48 licenses will be Rs. 4,80,000/-. The average cost of antivirus is Rs. 273/- per computer per year (it may differ from company to company), so the integrated cost for antivirus will be Rs. 65,760/- for client (192) and Server (48) machines. So the expenditure for the software will be Rs. 61,96,272/- and the integrated expenditure on hardware and software for library automation using commercial LMS will be Rs. 1,40,32,272/-.

2. Economic Feasibility Study: Using OSS (Koha):

Table No. 6.3: Estimated capital cost of hardware for CLM using OSS

Sr. No.	Required Hardware Particulars	Qty.	Average Approx. Cost	Total Approx. Cost	Remarks
1	Server Machine	1	2,00,000	2,00,000	Central Server
2	Client Machines	192	22,500	43,20,000	Three to five per library
3	Barcode Printer	0	0	0	Not required
4	Barcode Reader	192	3,500	6,72,000	Two per library
5	Laser Printer	48	6,500	3,12,000	One per library
TOTAL				**55,04,000**	

Explanation: Above table indicates the estimated capital cost of library automation in terms of hardware for using open source software. This chart is created on the basis of ideal situation, current market prices and for ideal circumstances. The dedicated server is required to run centralized library management system with open source software. Being the centralized server for all libraries, a huge load is expected on the single server. Hence a server with high configurations is considered for this project. Hence the cost of a single server is approx. Rs. 2,00,000/- rather than that of Rs. 50,000/-. In ideal situation, if we provides three to five client machines for each library as per their necessity, then integrated amount for 192 client machines will be Rs. 43,20,000/-. Barcode printer is necessary equipment for printing barcode labels. Most of the libraries require barcode printers and most of the open source library management softwares support laser printer to draw the barcode labels. At present situation if the average cost of laser printer is Rs. 6500/- per unit then integrated cost for 48 laser printers will be Rs. 3,12,000/-. Barcode is also necessary equipment to read the printed barcodes, all the Open Source Software (OSS) library management

systems require barcode gun for barcode reading, if one or two barcode guns supplied to respective libraries as per their need, then integrated cost for 96 barcode guns will be Rs. 3,36,000/- So the expenditure for the various hardware`s will be Rs. 55,04,000/-.

Table No. 6.4: Estimated cost of software for Centralized Library Management (CLM) using OSS

Sr. No.	Required Software Support	Qty.	Average Approx. Cost	Total Approx. Cost	Remarks
1	Capital cost of the LMS	1	0	0	Not required
2	AMC charges per year (LMS)	48	0	0	Not required
3	LMS updating charges	48	0	0	Not required
4	Operating system (Server)	1	0	0	Linux (OSS)
5	Operating system (Client)	192	0	0	Not required
6	Antivirus software (Server)	1	0	0	Not necessary
7	Antivirus software (Client)	193	0	0	Not necessary
8	Training cost (Once)	1	30,000	30,000	Yearly
TOTAL				**30,000**	

Explanation: Above table shows estimated cost of software for centralized library system using open source software. The chart is created on the basis of ideal situation and current market prices. Most of the Open source softwares are ‘free to download’ from the internet, so it does not require any capital cost for software. Also it does not require AMC charges and updating charges. Apart from the LMS software, other requisite and supporting software for backend and other purposes are available / downloadable free of cost. This system runs on Linux operating system which is again available in open source from the internet. Since the LMS runs on Linux, it does not require any antivirus. As these are newly and upcoming technologies, the library professionals may require one training to train the staff. The average training cost will be Rs. 30,000/- per year, so the expenditure for the software related aspects will be

only Rs. 30,000/- and the integrated expenditure on hardware and software will be Rs. 55, 34,000/- in terms of open source software.

In addition to this, OSS has a facility to connect our library database to cloud server. If user library / libraries wish to use this this facility, there are paid as well as free options are available. SMS facility is also one of the most important facilities of this model. If users wants to use this facility there are paid option are also available from various service providers like, idea, Airtel, Vodaphone, etc. From the above data, researcher has stated the following table of observation related to economic feasibility study.

Table No. 6.5: Integrated financial estimation of hardware & softwares for centralized library system (CLM)

Sr. No.	Particulars	Commercial LMS	OSS LMS
1	Hardware cost	78,36,000	55,04,000
2	Software cost	61,96,272	30,000
TOTAL		**1,40,32,272**	**55,34,000**

Findings: Above table shows the cost difference of working capital models using commercial LMS and open source LMS for 48 libraries. Working capital cost for commercial software option is approx. Rs. 14,032,272/- and if we are using OSS LMS, like Koha then the approx. working capital cost may be Rs. 55,34,000/-. Difference between approx. working capital cost using commercial library management software model vs. open source library management software model will be Rs. 84,98,272/-. From the above table it is clear that, the open source software is very cost effective solution instead of commercial library management system.

6.6.2 Technical Feasibility Study:

In this type of feasibility, researcher has checked out whether present hardware and softwares are compatible with the new system for overrun the project.

Findings:

- All the library computer terminals have sufficient configuration (hardware & software) to adopt new software along with present configuration, (Ref. Table No. 5.16, 5.17) but still there is opportunity to add/ increase computer terminals for each library as per their need.
- All the campuses are having Wi-Fi facility to access the Internet, so it is helpful to provide web based services.
- All the campuses having UPS as well as electricity generation facility, so there is no disturbance for power cut. (Ref. Table No. 5.48)
- Most of the libraries having barcode printers and Laser printers (Ref. Table No. 5.30)

6.6.3 Operational Feasibility Study:

In this type of feasibility, researcher has checked the issues like, operational scope for the fast acceptability of the alternative solution, human resources issues, social issues, internal issues (organizational conflicts) and legal issues, etc.

Findings:

- There are 100% computer literate library personnel to understand the new system. (Ref. Table No. 5.4)
- The 100% library staff is aware about open source software. (Ref. Table No. 5.50, 5.51)
- 52.08% library staff wanted to switch their libraries towards OSS (Open Source Software). (Ref. Table No. 5.50)
- In commercial LMS, the maintenance is taken care by the vendor where as in OSS, it will be the responsibility of every individual library. This can be achieved either by the library staff or the system administrator. If not both, then the same can be outsourced.

6.6.4 Scheduled Feasibility Study:

In this type of feasibility, researcher has to check the time duration to implement the new project with minimum time along with the skills required for properly applying the new technology with training in minimum time.

Findings:

- All the libraries are keeping backup of their data in various ways. (Ref. Table No. 5.34) It is possible to convert their data in excel and MARC21 format and upload to new system.
- If all the library staff supports for this project with relevant data, within two to three month duration, it is possible to start new system.

6.7 Transitions from Commercial LMS to OSS:

Following table shows some of the institutes, where existing commercial library management systems are switched to OSS. Researcher has visited some of them and discussed their experience and views. After hearing the experiences and views about OSS, researcher has stated the following major findings, which are given below,

1) Users are able to download, install and use open source software.
2) They have successfully reduced the capital cost of LMS.
3) They are able to reduce AMC charges, commercial operating system cost and antivirus cost.
4) In the lack of IT expertise, there are many professional organizations and individuals who are ready to give technical support.
5) Able to reduce hardware components.
6) They are able to enhance library services after the replacement of commercial library management system. The major services are expressed in chapter number eight.

Table No. 6.6: Transitions from Commercial LMS to OSS

Sr.	Name of the Library / Institute	Switched to OSS
1	Mahatma Gandhi University, Kerla	Koha
2	Symbiosis International University, Pune	Koha
3	Bharti Vidyapeeth`s, Dr. Patangrao Kadam Mahavidlaya, Sangli (Maharashtra)	e-Granthalaya
4	Gulbarga University, Gulbarga (Karnataka)	Koha

5	University of Madras, (Tamilnadu)	Koha
6	Marathi Grantha Sangrahalaya, Thane (Mumbai)	Koha
7	Pillai, Group of Institutes. Panvel (Mumbai)	Koha
8	Mysore University, Mysore (Karnataka)	Koha

Explanation: From the existing software study, reviews of different types of literature about OSS, feasibility study of different types of library automation and transition study of the OSS, researcher has determined to use Koha OSS (Open Source Software) for developing a prototype model, which is further discussed in next chapter.

6.8 Conclusion:

- The model being considered operationally, technically, economically as well as legally feasible in the Sinhgad Institute libraries.
- Open source software 'Koha' is the alternative solution to the commercial as well as in-house library software.
- Though, there is some cost consumption to implement the open source software, the outcome result is in the form of services. So the benefits derived from the software cannot be calculated in statistical format. Some benefits are tangible and some are intangible.
- All this information gives a green signal to the problem solving solution and one can proceed with the project.

References:

1. Campbell, J. (2007). *Objectives of feasibility study*. Retrieved from http://www.cdf.toronto.edu/~csc340h/winter/lectures/w3/L3part2-4up.pdf Retrieved on 02.04.2014.
2. Ibid.

Chapter-VII
Development of Prototype Model for Centralized LMS Using OSS

7.1 Introduction:

Development of prototype model is a vital aspect of this research work. Researcher has studied the literature related to open source software in third chapter. In which the tools and techniques related to OSS are discussed as well as its features and facilities of various open source library management softwares are also studied. After the study of different OSS, the prototype model can be developed with the help of suitable open source LMS like Koha.

This chapter deals with theoretical review related to development of prototype model for centralized library management system along with graphical draft or plan for the prototype model. In addition to this researcher has taken a feedback and opinions from respondents towards prototype model and analyzed in the last section of this chapter.

7.2 Definitions and Types of Model:

1. According to Elliott (2002) from Oxford Dictionary:

A model can be defined with following points,

1- Representation in three-dimensional of an existing person or thing, typically on a smaller scale. 2- A figure made in clay or wax which is then reproduced in a more durable material. 3- Something used as an example. 4- A simplified mathematical description of a system or process, used to assist calculations and predictions. 5- An excellent example of a quality. 6- A person employed to display clothes by wearing them. 7 - A person employed to pose for an artist. 8 - A particular design of a product.

2. According to investorwords.com:

A model can defined as, a representation of a system that allows for investigation of the properties of the system and in some cases, prediction of future outcomes. Models are often used in quantitative analysis and technical analysis and sometimes also used in fundamental analysis,

Considering various definitions of the models, the last definitions from Oxford best suits our model as our model is proposing skeleton solution for centralized library management systems.

Types of Model:

To understand the types of model, it is very important to know the Software lifecycle Model it is descriptive and diagrammatic representation of the software life cycle. This includes series of identifiable stages that a software product undergoes during its lifetime. The software lifecycle is also referred to as the system development life cycle. Software development organizations realized that adherence to a suitable well defined life cycle model helps to produce good quality products and that without time and cost overruns, There are five types of life cycle model which are, Prototype Model, Classical Waterfall Model, Iterative Waterfall Model, Evolutionary Model and Spiral Model, but here researcher has disused only "Prototype Model".

7.3 The Prototype Model:

According to ecomputernotes.com the prototyping model is applied when detailed information related to input and output requirements of the system is not available. In this model, it is assumed that all the requirements may not be known at the start of the development of the system. It is usually used when a system does not exist or in case of a large and complex system where there is no manual process to determine the requirements. This model allows the users to interact and experiment with a working model of system known as prototype. The prototype gives the user an actual feel of the system.

This type of model requires that before carrying out the development of the actual software, a working prototype of the system should be built which is a very crude version of the actual system, using inefficient, inaccurate or dummy function or short using. It is used when requirements are not well understood, serves as a mechanism for identifying software requirements, focuses on those aspects of the software that are visible to the customer/user and feedback is used to refine the prototype model. The following are the stepwise approach to designing software prototype.

7.4 Factors Involved in Developing Prototype Model:

1. **Basic Requirement Identification**: This step involves understanding the very basics product requirements especially in terms of user interface. The more intricate details of the internal design and external aspects like performance and security can be ignored at this stage.

2. **Developing Initial Prototype:** In this stage, where the very basic requirements are focused and user interfaces are provided. These features may not exactly work in the same manner internally in the actual software developed and the workarounds are used to give the same look and feel to the customer in the prototype developed.

3. **Review of the Prototype:** The prototype developed is then presented to the customer and the other important stakeholders in the project. The feedback is collected in an organized manner and used for further enhancements in the product under development.

4. **Revise and Enhance the Prototype:** The feedback and the review comments are discussed during this stage and some negotiations happen with the customer based on factors like, time and budget constraints and technical feasibility of actual implementation. The changes accepted are again incorporated in the new Prototype developed and the cycle repeats until customer expectations are met. Here, the Researcher has taken a feedback of the prototype model from some respondents.

7.5 Proposed Developing Centralized LMS with "Koha":

Sinhgad group of institutes is having 48 libraries at various locations in Maharashtra. At present, these libraries are automated with different commercial LMS software for providing library services to 109 academic programmes. Due to growth and development in information technology it is possible to use one library management system for multi locational libraries; this can be achieved by Koha, as open source software that facilitates the computerization of many libraries with single installation. Let us understand the steps involved in it.

1. Ensure suitable hardware for centralized integrated system / server considering size of data and establishing network features (along with Internet / Intranet)
2. Have the required operating systems, software and tools like Linux/Windows, Data server SQL, Apache web server.
3. Install open source platforms, tools, servers and latest version of Koha.
4. Create profile for group of libraries using.
5. Add libraries participating in integration.
6. Create types of material and then add books and other materials data either by bulk import or item by item.
7. Create types of patrons and then add patron by bulk import and manually one by one.
8. Create attributes for patrons and provide borrowing privileges.
9. Add circulation rules for respective libraries.
10. Provide search facility for individual library or whole group.
11. Activate circulation facility for respecting libraries.
12. Training for all library staff to adopt Koha LMS.

7.5.1 Proposed Model with Koha LMS: (Cloud Server)

As per the discussions above the proposed prototype model will like the one shown in the following figures. Figure 7.1 uses the cloud computing server whereas in the other model, i.e. Fig 7.2 uses the local Server of the Sinhgad Institute. The cloud server is a second option to secure our data, now days so many companies are providing cloud services to secure our data. The following figure shows Koha based Centralized Library Management System (CLMS) which is connected to cloud server; in this all the 48 libraries are connected to cloud server. The top ten companies in India are Tata Consultancy Services, Infosys, Wipro Limited, Insta Compute – Tata Communication, Zenith InfoTech Limited, Cypher Cloud, Cirrologix Private Limited, Clogeny Technologies Private Limited and App Point. Most of these company headquarters are in Bangalore, Chennai and Mumbai.

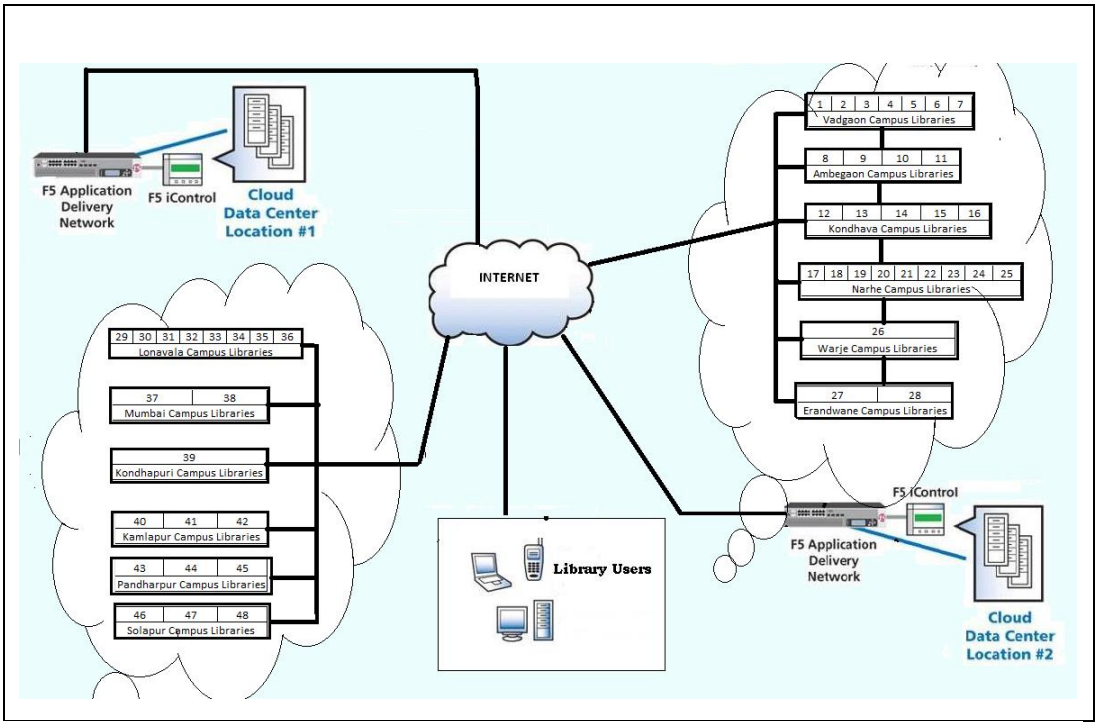


Figure 7.1:- Proposed model (LMS) with cloud computing server

7.5.2 Proposed model with Koha LMS: (Local server)

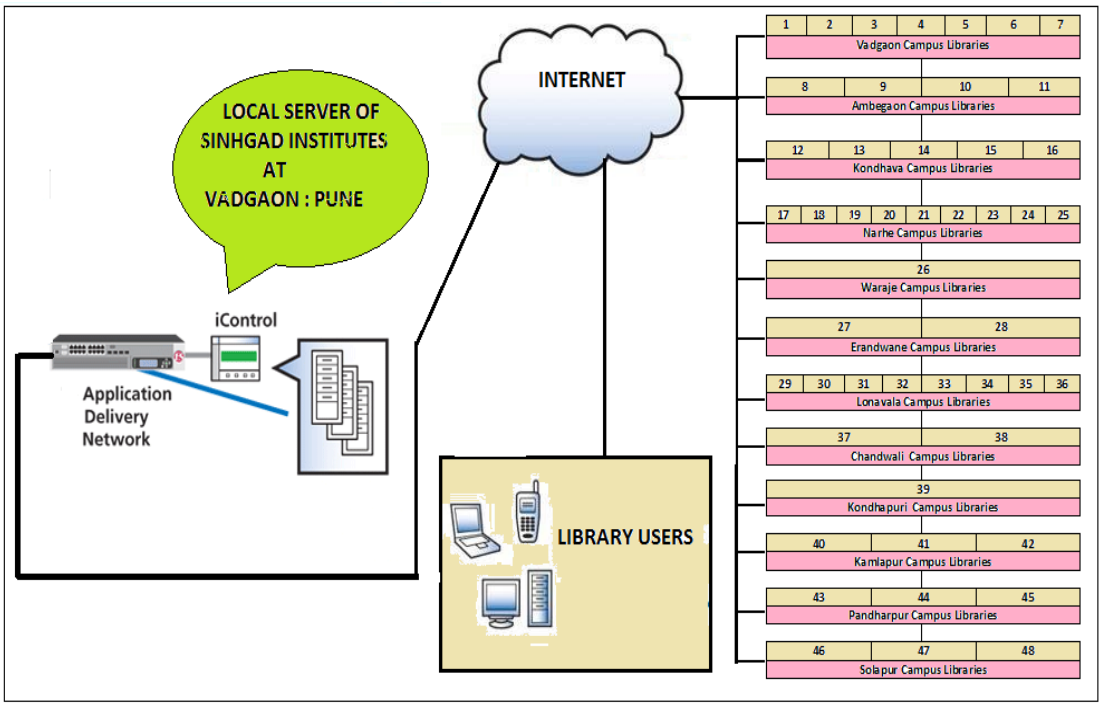


Figure No. 7.2: Proposed model (LMS) with local server

7.6 Factors Involved in Developing Prototype Model with Koha :

7.6.1 Hardware Requirements:

1. Server: A dedicated server with good configuration required for installing the software and storing the data. Cloud server could be another option to install the software and store the data. According to DELNET (www.delnet.nic.in) the hardware requiremants for Koha installation is minimum or more than given specification as below,

- Processor Pentium
- Processor speed - 2.6 GHz or higher
- RAM – 2 GB
- Hard Disk – 80 GB
- DVD Drive

(Source: http://delnet.nic.in/programmes.html).

2. Client machines for administration work: Depending on the requirement of the individual or branch libraries, three or more computer terminals with good configuration required for library work.

3. Internet connection: All the connecting libraries require internet connection with good bandwidth along with UPS backup. If campus is having Wi-Fi internet connection it is good for library users to access library / OPAC from Network/ laptop/tablet/ mobile.

4. Printer: Preferably, all these libraries can have a LaserJet / Inkjet or any printer for taking printouts of the reports, barcode labels, OPAC search results etc.

5. Barcode reader: All the libraries require barcode reader/ laser gun for barcode reading.

6. UPS / Power backup: To avoid for unwanted power cuts it is very necessary to connect our system to the UPS connection.

7.6.2 Software Requirements :

The following system softwares/application softwares are required to run open sources software to the computer,

1. **Integrated Library Management Software (ILMS):** To develop centralized library management system, 'Koha' has been selected as open source software that can be downloaded from http://www.koha.org or it is also available for downloading at, www.sourceforge.net

2. **Operating system software:** An operating system is a programme or software that manages computer hardware sources and provides common services for computer programs. The operating system is an essential component of the system software in a computer. There are number of operating systems available in the market as well as in open source. Researcher has selected Open Source 'Linux' platform to run the system.

3. **DBMS software**: MySQL or PostgreSQL from open source can be used for maintaining the backend database of the system and,

4. **Supporting softwares are:-**
   - Apache Server Apache Tomcat Servlet
   - Exim-4 mail Server PHP5
   - Dovecot, IMAP Server Lots of Perl modules required for Koha
   - Squirrel mail, a web-based mail client Open JDK
   - Postgre SQL Database Server IBUS for multi-lingual Input Method
   - MySQL Database Server Z39.50 Server
   - Open SSH Server VSFTP Server **(Shewale & Barve, 2011).**

7.6.3 Installation of "Koha" and Pre-requisite Softwares:

There are many ways of "Koha" installation. One can have a look at the Installation procedure from its official website http://www.koha.org or at the same time one can use the live CD that can be downloaded from http://sourceforge.net. Some of the live CDs that are available on Sourceforge.net are, LibLive CD,

koha-latest, EasyKoha, Xubuntu-koha, koha-liveDVD-on-ubuntu, vufind-koha-dspace, Live DVD vufind-koha ILS Dspace, koha-live-DVD-old-stable-version. (http://sourceforge.net).

7.6.4 Setting up Global Parameters :

It is very important to give global parameters in the Koha Management system. Global System Preferences (GSP) control to the Koha system to works in general as per our customization. In theory you need to set these preferences before anything do in Koha. Go to Koha Administration > Global System Preferences. You will see that you are in the Acquisition menu section, with a menu on the left hand side of the page leading to other sections.

7.6.5 Creating Groups and Branch Libraries:

After successful installation of the Koha Software on a mother / central server, one can create various groups and branch libraries in Koha as follows.

Sr. No.	Lib. Code	College / Institute Name
1	SCOE	Sinhgad College of Engineering
2	SKNCOE 1	Smt. Kashibai Navale College of Engineering (MBA)
3	SCOP	Sinhgad College of Pharmacy
4	SCOA	Sinhgad College of Architecture
5	SDCH	Sinhgad Dental College And Hospital
6	SIOM 1	Sinhgad Institute of Management
7	SIOM 2	Sinhgad Institute of Management (MCA)
8	SCOS	Sinhgad College of Science (Senior)
9	SLC	Sinhgad Law College
10	SKNSSBM	S.K.N. Sinhgad School of Business Management (MBA)
11	NBNSTIC	NBN Sinhgad Technical Institutes Campus
12	SIBAR 1	Sinhgad Institute of Business Administration and Research - MBA
13	SIBAR 2	Sinhgad Institute of Business Administration and Research - MCA
14	SKNCOP 1	Smt. Kashibai Navale College of Pharmacy
15	SCOC 1	Sinhgad College of Commerce

Sr. No.	Lib. Code	College / Institute Name
16	SAOE	Sinhgad Academy of Engineering (MBA)
17	SIOTS	Sinhgad Institute of Technology and Science
18	SCOAC	Sinhgad College of Arts & Commerce
19	SKNMC	Smt. Kashibai Navale Medical College and General Hospital
20	SCON	Sinhgad College of Nursing
21	SKNCOP 2	Smt. Kashibai Navale College of Physiotherapy
22	SSBS	Sinhgad School of Business Studies
23	SIMCA 1	Sinhgad Institute of Management & Computer Application – MBA
24	SIMCA 2	Sinhgad Institute of Management & Computer Application - MCA
25	SIOP	Sinhgad Institute of Pharmacy
26	RMDSTI	RMD Sinhgad Technical Institutes
27	SBS 1	Sinhgad Business School
28	SKNCOC	Smt. Kashibai Navale college of Commerce
29	SIT	Sinhgad Institute of Technology
30	SKNCOET	Smt. Kashibai Navale College of Education and Training (B.Ed.)
31	SSITS	SKN Sinhgad Institute of Technology & Science
32	SIBACA 1	Sinhgad Institute of Business Administration & Computer Application - MBA
33	SIBACA 2	Sinhgad Institute of Business Administration & Computer Application - MCA
34	SIOPS	Sinhgad Institute of Pharmaceutical Sciences
35	SIHM	Sinhgad Institute of Hotel Management and Catering Technology
36	NBNCOC	Nivrutti Babaji Navale College of Commerce
37	SIBM 1	Sinhgad Institute of Business Management
38	SCOC 2	Sinhgad College of Commerce
39	SMC	Sinhgad Management School
40	SIBM 2	Sinhgad Institute Of Business Management (MBA)
41	SIBM 3	Sinhgad Institute Of Business Management (MCA)
42	SKNCOE 2	Smt. Kashibai Navale College Of Education (B. Ed)
43	SKNSBS	S.K.N. Sinhgad Business School (MBA)
44	SICS	Sinhgad Institute of Computer Sciences (MCA)
45	SKNSCOE	S.K.N. Sinhgad College Of Engineering

Sr. No.	Lib. Code	College / Institute Name
46	SBS 2	Sinhgad Business School (MBA)
47	SSCS	Sinhgad School of Computer Studies (MCA)
48	NBNSCE	N. B. Navale Sinhgad College of Engineering

7.6.6 Creating Types of Items:

The customization of library material or creating types items is a process in which codification of each type material has been essential to support the data entry in to the Koha LMS, which has been given below,

Sr. No.	Type of Item	Item Code
1	Book	BK
2	Periodicals & Journals	PJ
3	Thesis / Dissertations	TD
4	Project Report	PR
5	News Paper	NP
6	CDs	CD
7	DVDs	DV

7.6.7 LMS Model: Main Modules:

After the study of transitions from commercial software to OSS, it came to be known that open source softwares are providing more features instead of used commercial softwares. The proposed framework of prototype model with the help of OSS is given below,

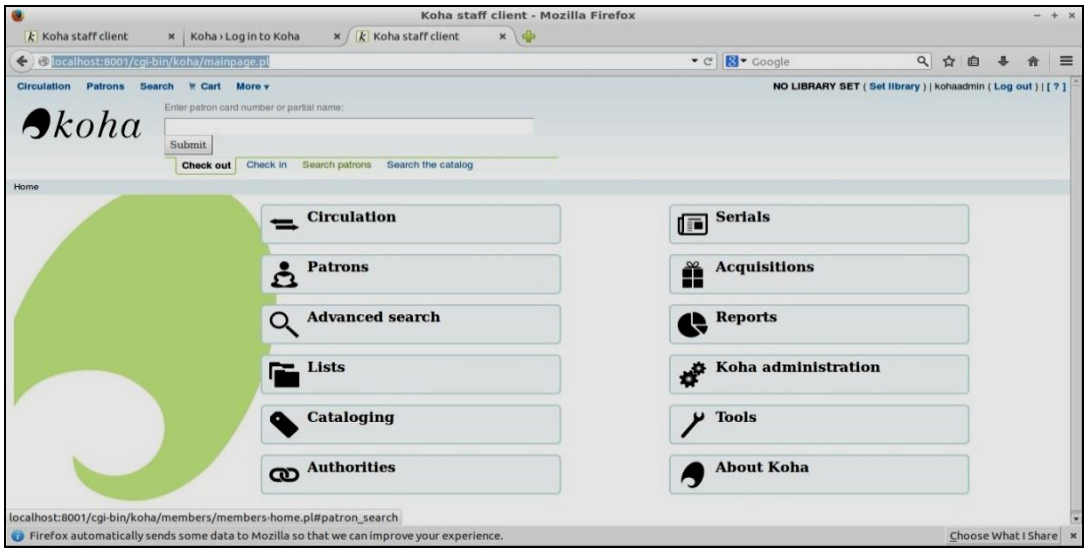


Figure No. 7.3:- The main modules in Koha LMS

7.6.8 Data Import / Entry

There are different way of entering the bibliographic data into Koha LMS, one, is manual data entry, second is bulk import of data using the MARC21 (.mrc) file or copy cataloguing from other libraries. As there are many libraries of the Sinhgad Institutes, and in most of the cases, the data is already entered by many libraries in some or the other library management systems. The data from all these systems can be exported to either excel (.xls) or comma separated values (.csv) format then can be imported into the proposed model using MarcEdit program which is available freely on the internet. During the preliminary study, the researcher has tried to figure out the size of data, which is approximately as follows.

Sr. No.	Type of Material	Approx. Nos. Entries
A	**Collection**	
1	Book	50,00,000
2	Periodicals & Journals	2405
3	Thesis, e- Books, e - Databases	1470
4	News Paper	15
5	DVDs / CDs	16591

7.6.9 Creating Patrons :

Patrons Data: There are various types of users including the undergraduate and post-graduate students as well as the teaching and non-teaching staff. Tentatively the number users are around 51,000.

Patron Categories: Patron categories allows Koha user to organize library patrons or members into different roles, age groups, and patron types. There is option to go to Koha Administration > Patrons & Circulation > Patron Categories for front screen of Koha. To add a new patron category click 'New Category' at the top of the page The 'Category Code' is an identifier for your new code. The category code may be limited to ten characters.

7.6.10 Cost of Outsourcing: (Installation, Customization, AMC`s etc.)

This option is useful when local expertise is not available in the institute. There are so many companies as well as individual supports are available to maintain Koha library management open source software. The companies like, Informatics Pvt. Ltd. Bangalore, DELNET-(director@delnet.ren.nic.in) Delhi, Avior

Technologies Pvt. Ltd. Kolkata, (www.aviortechnologies.com) are providing the support for Koha installation and maintenances.

7.6.11 Training Cost:

It is very difficult to say the actual training cost for OSS workshop because the cost varies from supplier to supplier or organizer to organizer. Researcher has found out some pamphlets related to workshops organized by various institutes in the year 2011 - 2015 in India, on the topic of OSS, and mathematically determined the average cost of one training, which is given below,

Sr.	Name of Workshop Organizer	Fees	Intake	Approx. Training Cost
1	Mahatma Gandhi University Library, Kerala (July, 2011)	1250	25	31250
2	CHMK Library, University of Calicut, Kerala (Apr, 2012)	750	30	22500
3	Gokhale Institutes of Economics & Politics : Pune (Aug, 213)	2000	20	40000
4	Department of Library and Information Science, C.H. Mohammed Koya Library, University of Calicut & Kerala Library Association Kozhikode Region University of Calicut (May, 2014)	2000	30	60000
5	Mahatma Gandhi Central Library IIT Roorkee (May, 2015)	3500	35	122500

Explanation: Above table shows, the information about, various organizations organized workshops on open source software (Koha) training programmes for LIS professionals. As mentioned above the training cost of the workshop is varies organizer to organizer. Researcher has calculated fees charged by organizer for per participation of above workshops and find out the average training cost; and it was approximately Rs. 1900/- training cost per participation. There are other options available to get training from institutes or private organizations, for example, DELNET, Informatics-Bangalore, Avior Technologies Pvt. Ltd. Kolkata. These organizations are also providing their support to Koha installation and maintenances. According to their official websites, the training costs is approximately Rs. 30000/- per training program. The Sinhgad group of Institute is having 48 libraries, if management has organized one training program per year for the library professionals, then approximately Rs. 30000/- will be spent on

training purpose. On the other hand, if institute will promotes to one or more active persons (Librarian) to learn advanced knowledge from various workshops, for providing new information or knowledge through training in the organization, the training cost may be reduced.

7.6.12 Model Feedback and Opinions:

The following tables show the information about the feedback and opinions given by respondents towards the prototype model developed for centralized library management system with Koha open source software.

Table No. 7.1: Feedback: developed framework of the model

Response	***Yes***	***No***	***Yes %***
Excellent	02	41	04.65
Good	33	10	76.74
Average	08	35	18.61
Total Respondents		***43***	***100***
Source : Primary data			

Above table shows the feedback given by respondents towards developed framework of the model. Out of 100% respondents, 4.65% (2) librarians feels, developed framework of the model is excellent, 76.74% (33) librarian's feels that, developed framework of the model is good while 18.61% (8) respondents feels, this model is average.

Table No. 7.2: Feedback: features and facilities discussed about model are,

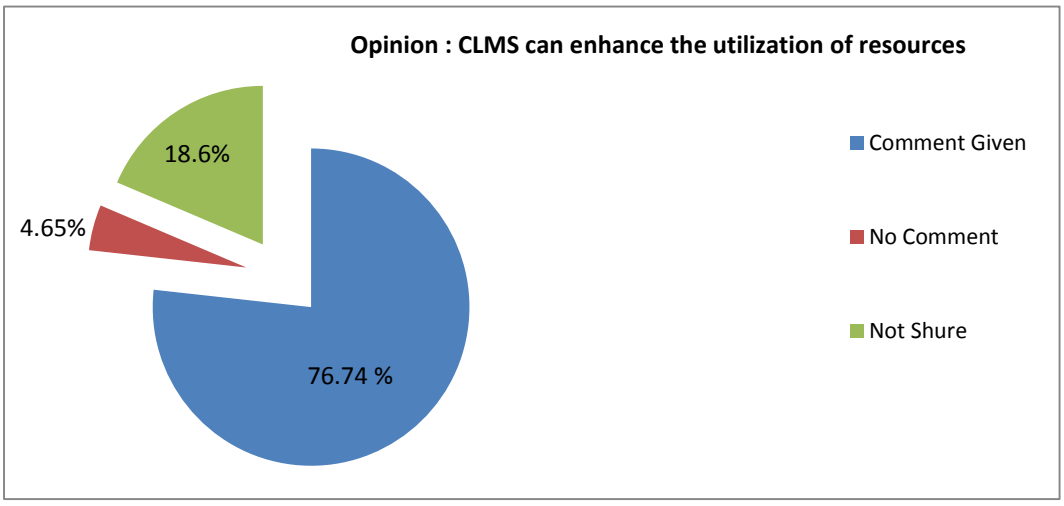
Response	***Yes***	***No***	***Yes %***
Excellent	02	41	04.65
Good	41	02	95.35
Average	00	00	00.00
Total Respondents		***43***	***100***
Source : Primary data			

Above table shows the feedback given by respondents towards features and facilities covered in prototype model. Out of 100% respondents, 4.65% (2) librarian`s feels, features and facilities covered in prototype model are excellent, rest of them i.e. 95.35% (41) librarian's feel that, features and facilities covered in prototype model are good.

Table No. 7.3: Opinion: Centralized Library Management System (CLMS) can enhance the utilization of resources:

Response	***Yes***	***No***	***Yes %***
Comment given	33	10	76.74
No comment	02	41	04.65
Not Sure	08	35	18.60
Total Respondents		***43***	***100***
Source : Primary data			

Graph No. 7.1:- Opinion: Centralized Library Management System (CLMS) can enhance the Utilization of Resources



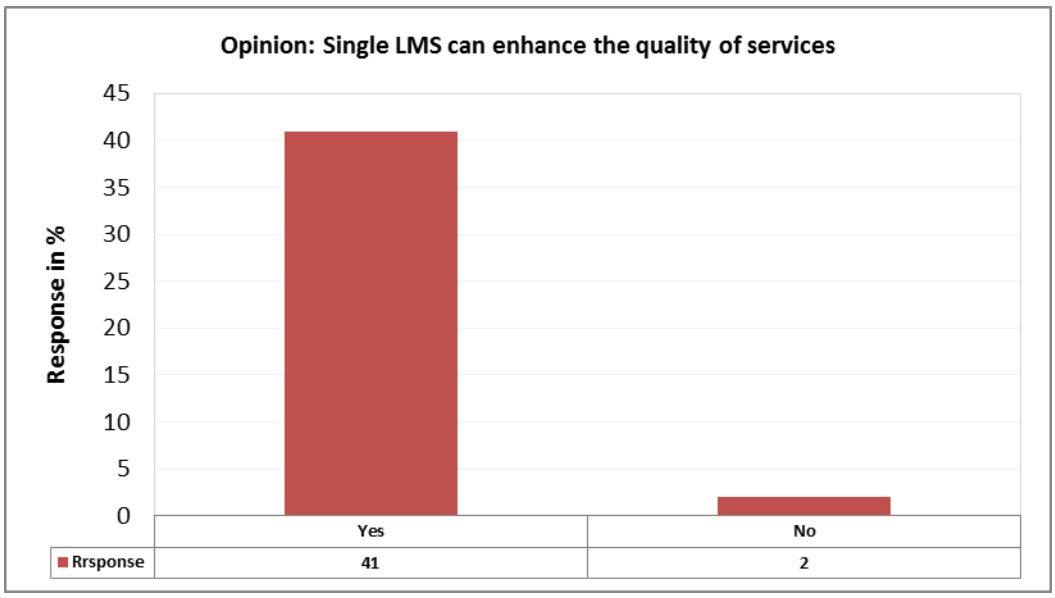
Above table and graph shows that, statistical information about comments given by librarians for the utilization of resources after creating centralized library management system using open source software. It has been seen that, librarians are looking forward for enhancing the services. According to comments given by them, training is required for using OSS like Koha as well as most of the librarians

are not comfortable with Linux operating system. From the data it has been seen that, Out of 100%, respondents, 76.74% (33) librarians feel that OSS may be enhance the library services rest of them 4.65% (2) librarians did not comment about OSS and 18.60% respondents are not Sure about OSS can be utilization of the resources.

Table No. 7.4: Opinion: single LMS can enhance the quality of services

Reply	Librarian's Opinion		Total
	Yes	No	
Number of libraries	41	2	43
Percentage	95.35%	4.65%	100.00%

Graph No. 7.2:- Opinion: single LMS can enhance the quality of services



Above table and graph shows, the librarian's opinion about centralized library system can be effective with single LMS irrespective of OSS or commercial. It has been seen that 41 librarians (95.35%) replied that implementation of centralized LMS can enhance the utilization of resources irrespective of the technology used is open source while only 2 (4.65%) doubted the efficiency of OSS as compared to commercial software.

7.7 Conclusion:

Usually the needs for each organization differ depending on their budget, collection and number of users. There is no change in user needs; only the source of providing information is changing from time to time as technology driven. In this ICT era, the technological growth is affecting on the library services. Today`s technology will be outdated in near future but another technology with more specifications will come, at that time our systems must be compatible to adopt all the new changes and fulfill the needs of user. The benefits of open source software are obviously more than commercial and organizations and governments would be tempted to adopt OSS but practically open sources software like 'Koha' is very beneficial to build centralized library system. Let`s check out the feasibility of the Koha OSS in to the next chapter.

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Chapter-VIII
Findings, Suggestions and Conclusion

8.1 Introduction:

This chapter gives an idea about the complete research work carried out on the basis of analysis and interpretation of the data. In this chapter, the researcher has drawn specific findings on the basis of data collected from the respondents, tested of hypothesis and then drawn the suggestions and conclusion. It also gives the direction for further research and future trends in library automation.

8.2 Findings:

8.2.1 Information about Sinhgad Institutes:

1. Sinhgad Group of Institutes located at different places in Maharashtra and there are 48 higher education libraries.
2. These libraries are providing services to 109 academic programmes, which are divided into 9 types of disciplines and 33 types of courses. (Ref. Table No. 5.1, 5.2 and 5.3)
3. The libraries under Management, Engineering, Pharmaceutical and Arts Commerce, Science discipline contain a number of courses, hence the collection, circulation and addition of literature is more in these libraries compared to other libraries. (Ref. Table No. 5.5, 5.6, 5.7)

8.2.2 Information about libraries & IT infrastructure:

1. These 48 libraries of Sinhgad Group of Institutes appointed around 182 professional and non-professional library staff for various library operations. Entire (100%) library staff is computer literate excluding library peons. (Ref. Table No. 5.4)
2. From the observation and primary data it is found that, all the institute libraries are using central UPS connection for continuous power supply. In every campus, Sinhgad Institute has power Generator facility as well as a very large capacity of UPS which can be sufficient for the whole institute including computer laboratory, administration office and the library. (Ref. Table No.5.48)

3. It is observed that 81.4% (35) libraries are not maintaining separate server for library, only 18.6% (8) libraries have separate server / computer for their LMS. (Ref. Table No.5.48)
4. Around 4.65% (2) software is web based whereas 95.35% (41) libraries are having softwares which are compatible only to LAN (Local Area Network) (Ref. Table No. 5.19)
5. All the libraries having sufficient hardware and software configuration required to install either commercial library management software or open source software. (Ref. Table No. 5.17)
6. There is no separate system administrator in any library to attend to the complaints and for troubleshooting; Computer lab in-charge who is an expert in computer hardware maintenance can handle all these troubleshooting issues. (Ref. Table No. 5.48)
7. As much as 23% (11) libraries and 38% (18) reading rooms are open for 24 hours whereas other libraries and reading rooms are open for 10 to 15 hrs. only (Ref. Table No. 5.8)

8.2.3 Services offered presently:

1. All the 43 (100%) automated libraries are providing basic services like provision of general and specific information, assistance in searching and locating documents, assistance in the use of reference books and helping in the use of OPAC. (Ref. Table No. 5.11)
2. Most of the libraries are providing informational services along with routine work. Library orientation or library tour is not offered in most of the libraries. (Ref. Table No. 5.12, 5.13)
3. Most of the libraries are providing advanced services and traditional service like information about check-out details. Almost 4.65% (2) libraries are performing services like claim activation, online/ self-renewing, browsing of individuals details by ID and access to bibliographical database, etc. (Ref. Table No. 5.14)
4. The interest towards providing web based services is very less, i.e. around 4.65% (2) libraries are using web based technology for service providing. (Ref. Table. No.5.15)

8.2.4 Library automation:

1. There are 89.58 % (43) libraries automated while 10.42% (5) libraries are yet to be automated. From the automated, 97.67% (42) libraries are using commercial library management software like, AutoLib, EasyLib, LibSuite, Libex.Net and SLIM21 whereas 2.33% (1) library is using in-house (Gems) LMS, which is developed by Sinhgad Institutes. (Ref. Table No. 5.22, 5.25)
2. All the respondents have expressed that, the library management software are updated only after the AMC paid to the vendor. (Ref. Table No. 5.32)
3. Regarding the online manual, it is observed that only 60.47% (26) LMS software has got user manual from software vendors (Ref. Table No. 5.35)
4. All the existing library management softwares have a backup facility. (Ref. Table. No. 5.44)
5. All the librarians required training for operating any library management software at first time installation. (Ref. Table. No. 5.31)

8.2.5 Cost involvements for library automation:

1. All the libraries are having internet connection in their libraries. All the libraries are automated during 2004 – 2012 by spending almost Rs. 25,36,000/- as a capital cost for LMS. Only 10.42% (5) libraries are not automated due to high capital cost of LMS at initial stage. (Ref. Table No. 5.20, 5.2, 5.25, 5.23)
2. There is no uniform criterion followed by software vendors at the time of selling the license copy of software and AMC to the institute libraries. (Ref. Table No. 5.26)
3. From 2010 to 2013 almost Rs. 4,01,633/- spent towards AMC. Maximum AMC amount is spending during 2011. (Ref. Table No. 5.27)
4. All the libraries are using commercial operating system (Windows) on their computer terminals (127 numbers) and approx. Rs. 10,23,874/- was spend for Microsoft license agreement between the 2010 to 2013. (Ref. Table No.5.18, 5.28)
5. All the libraries are using antivirus as a data security measure. Quick Heal antivirus software brand is used on their computer terminals and almost Rs.

1,03,293/- spent between the 2010-2013 for (renewal/purchase) license agreement. (Ref. Table No. 5.29)

6. There are 11 barcode printers available in Sinhgad group of Institute libraries and approx. Rs. 2,13,350/- spent on barcode printers. (Ref. Table No. 5.30)

8.2.6 Data Structures / Data Formats:

1. It is observed that none of the library has to pay for the maintenance of the backend database software as it is an inbuilt part of the whole LMS. Any issues regarding DBMS are attended by commercial LMS vendor. (Ref. Table No.5.30)
2. It is observed that the library management software use MS Access and MySQL as a backend database for storing the data. (Ref. Table No. 5.21)

8.2.7 LMS features, facilities:

1. SLIM21 and Libex.Net LMS are compatible for multilingual support.
2. Many of the LMS are not able to provide online CAS and SDI service. (Ref. Table No. 5.13)
3. None of the commercial library software, which is used in Sinhgad Institute libraries, is adhered to cataloguing and communication standard. (Ref. Table No. 5.33)
4. None of the LMS is able to guide virtual sequence of books, computable for RFID, not able to show cover image of the books and the user is not able to define keywords for the book. (Ref. Table No. 5.45)
5. None of the LMS has email discussion group of their software user. (Ref. Table No. 44)
6. None of the LMS is customizable to display of the software or screen menus and reports. (Ref. Table No. 5.45)

8.2.8 Other features of Autolib, EasyLib, LibSuite, Libex.net and SLIM21:

1. These software have other sub-modules like, facilities of budgetary control, branch management, and user management in their existing LMS. AutoLib LMS have additional facility of newspaper management and project report management. (Ref. Table No. 5.36)

2. These software have acquisition module that includes facilities like, allocating the budget for various departments, it includes subject-wise and year-wise budget management. It also includes a facility of duplicate checking, selection of the books from suggestions, stage file and book approvals. (Ref. Table No. 5.37)
3. Few library LMS have a facility of cataloguing of different items, authority control, copy catalogue, etc. (Ref. Table No. 5.38)
4. These software are having a serial control module that includes facilities like, placing the order to the vendor, to receipt the goods, to process the payment, to remind for non-receiving titles through email. (Ref. Table No. 5.39)
5. All the existing LMS have administration module that facilitates allocating the user rights, update the system database, stock verification, and backup of the data. (Ref. Table No. 5.41)
6. All the existing LMS having OPAC Module which facilitates easy or simple and Boolean search on title, author, publisher, subject name, abstract and key word. In advance search one can search by accession number, ISBN/ISSN number, class number, etc. Also there is a facility getting suggestions from the end user Except (EasyLib and LibSuite) LMS having the facility to reserve the books through OPAC. (Ref. Table No. 5.42)
7. None of the LMS are having mobile compatible OPAC, able to provide access to multimedia material or ask a librarian facility. None of the LMS has a facility to customize the OPAC by end-user and facility to create a virtual shelf of the books. (Ref. Table No. 5.15, 5.42)

8.2.9 Data Migration:

1. None of the library has made any agreement before LMS installation regarding vendor lock and data migration. According to 69.77% (30) respondent's opinion, software vendor is the proprietor of database backup file generated by software. (Ref. Table No. 5.46, 5.47)
2. All the librarians have opined that, data export facility is available in their LMS but due to lack of proper training, librarians are not able to export or modify the data as per their need. (Ref. Table No. 5.47)

8.2.10 Resource sharing practices:

1. None of the libraries are practicing any resource sharing like, centralized budgeting, centralized purchasing, centralized acquisition, cooperative cataloging and classification, using web catalogue and OPAC of other campus libraries. (Ref. Table No. 5.49)

8.2.11 Software expectations:

1. All the respondents want to bring their OPAC on Mobile / Tablet, SMS alert in circulation and also add the absent features in new software. (Ref. Table No. 5.52)
2. All the respondents want to provide a link of accompanying material like CD`s through LMS. These respondents expect ILMS (Integrated Library Management System) and DLM (Digital library Management software) may be introduced on single installation. (Ref. Table No. 5.52)

8.2.12 Knowledge and IT literacy about OSS:

1. All the librarians are aware about Open source software like, Koha, NewGenLib and e-Granthalaya LMS. In the past, Koha LMS has been used by 4.17% (2) respondents and e-Granthalaya is used by only 2.08% (1) respondents. Around 45.83% (22) respondents have attended seminar, conference and workshops regarding OSS. (Ref. Table No. 5.50, 5.51)
2. Total 52.08% (25) respondents would like to switch or newly install OSS on their computers. Out of these 25 respondents, 5 are non- automated libraries. Whereas 22.92% (11) respondents do not want to switch over OSS and 25% (12) respondents are not sure to make decision about switch over from existing LMS to OSS. (Ref. Table No. 5.50)

8.3 Post feasibility study findings:

It is observed that the prototype model using OSS, being considered is feasible operationally, technically and economically as well as legally in the Sinhgad Institute libraries. All the required facilities, IT infrastructure, human resources are available with Sinhgad Institute libraries to implement OSS. Little training to the library staff to handle the new phenomenon like the open source software for

the Operating System and the LMS Koha can help to start the implementation of the centralized system as proposed in the study.

8.3.1 Expected features, facilities and services from the LMS system:

From literature review and feasibility study of the centralized library management system using "Koha", the researcher could come to an understanding that one can expect the following enhanced features, facilities and services by implementing Koha in Sinhgad Institute libraries.

a. Organizations point of view:

1. Reduces cost of library automation
2. Reduces yearly maintenance cost of automation
3. Centralized allocation of budget
4. Centralized control on purchase
5. Improved way of resource sharing
6. Transparency in purchase

b. Librarians point of view:

1. Collaborative intelligence software
2. LMS customized as per our need
3. Interlinking of all the libraries
4. RFID compatible
5. E-Mail discussion group of software users
6. Updates are available frequently
7. Redundancy of work
8. Cooperative acquisitions / classification / cataloguing
9. Importing of cataloguing data from branch / other libraries
10. Resource sharing
11. Interlibrary loan
12. Able to provide batch wise no dues certificate
13. Customization of reports
14. Transparency in administration work
15. Library / Organization is data proprietor

16. Data migration will be easy
17. Local troubleshooting of LMS is possible
18. More security with Linux

c. Users point of view:

1. Integrated web OPAC of all the campus libraries
2. Reservation / Holdings through OPAC
3. Renewal through OPAC
4. Mobile compatible OPAC
5. OPAC customization
6. User can define keywords to book
7. Display search history
8. Web 2.0 based services like, RSS, Tagging and Instant Messaging, etc.
9. Web based CAS, SDI
10. Ask a librarian or help
11. Self Check-ins
12. Able to provide book image of cover page under enhanced contents
13. Creation of virtual shelves
14. SMS alert
15. Transparency in circulation
16. End user suggestions

8.3.2 Analysis of Feedback and Opinions: Prototype model using Koha

After the development of the prototype model, one more survey was conducted among the Librarians of the participating Libraries to know their views about the prototype model. The detailed analysis of the same is presented as follows.

The developed prototype model using Koha is 1) excellent framework for two respondents, 2) good for 33 respondents and 3) average for only 8 respondents. The features and the facilities of the proposed prototype model were also discussed with the participating librarians and we found that the two respondents gave their opinion as excellent and for the rest forty two respondents its good. (Ref. Table No. 7.1, 7.2)

Similarly, a question about the resources utilization was asked. Surprisingly, it was found that 33 respondents were of the opinion that the centralized library management system (CLMS) can enhance the utilization of resources. Somehow, 4 respondents did not feel that the CLMS can enhance the utilization of resources. As usual, 8 respondents gave a neutral feedback. (Ref. Table No. 7.3)

Lastly, one more question was asked, whether the proposed model would enhance the quality of services offered by the libraries? Almost all the librarians (except two) said that there will be an enhancement in the quality of the services that will be offered in the centralized LMS system. (Ref. Table No. 7.4)

8.4 Fulfillments of Objectives:

1. To study the services presently offered by automated libraries of Sinhgad Institutes:

   While studying this objective, the researcher collected the data of all the 43 automated libraries. It is observed that, presently all the libraries in this network provide all the basic services like, library membership, circulation, all kinds of reference/referral service, assistance in searching and locating documents, assistance in the use of reference books and helping in the use of OPAC, etc. Few of the libraries also offer following services like, library orientation/library tour, reservation, inter-library loan, reprography, self-renewing, electronic document Delivery (EDD), etc. The same is reflected in Tables 5.11 – 5.15 in Chapter – 5. This detailed analysis indicates that the above objective is fulfilled.

2. To study concepts, tools and techniques related to OSS:

   In the chapter 3, the researcher has studied in depth the concepts of the open source software, its philosophy, genesis and the developments till date. Also it discusses the advantages and limitations of using the open source software. The researcher also in depth studied the various tools that accompany the open source software phenomenon. Researcher has also pulled out the detailed account of it international and national scenario as on today. This indicates the fulfillment of this objective.

3. To evaluate the library management softwares adopted by Sinhgad Institute higher education libraries:

During the study, the researcher found that 43 off the 48 libraries are already automated. Unfortunately, it is observed that five commercial and one in-house, software is being used in various libraries. Even though the individual libraries are running the show using either commercial or open source software, the researcher found that none of the software was suitable to use for the centralized system. Main hurdles behind this problem were the inconsistency of using non-standard practices. Apart from these there were some other hurdles like non-export of the data features and interlinking between the databases. Lastly, the biggest hurdle was the cost, as one has to pay for each and every license for every library. All the features and pit-falls of commercial software used in the Sinhgad Institutes libraries are discussed in details in chapter -5 and chapter-6. Thus this indicates the fulfillment of this objective.

4. To compare commercial and open source software in terms of features and services:

   During the study, the researcher has studied the pros and cons of various commercial softwares. As compared to the cost and the kind of services provided by the commercial LMS software, none of the software was found worth implementing for the centralized system. The researcher has also studied a number of open source software like Koha, NewGenLib, e-Granthalaya, etc. After applying various parameters, the researcher could take a call on Koha as one of the open source software that best suits for implementation of the centralized LMS for Sinhgad Group of Institutes and with this the objective to compare the commercial and open source software is fulfilled.

5. To study the feasibility and implementation of centralized library system using OSS in Sinhgad Group of Institutions:

   While studying this objective researcher has worked out a feasibility study of the software in chapter number six. After analyzing all the relevant data from feasibility study of the proposed model, it is understood that the model using OSS using Koha is operationally, technically and economically as well as legally feasible in the Sinhgad Institute libraries. All the required facilities, IT infrastructure, human resources are available with Sinhgad Institute libraries to implement centralized system with OSS LMS like Koha. It is also observed that

the new system can be implemented with a minimal training to the existing library staff of the Sinhgad Institute libraries. This fulfills the current objective.

6. To build a prototype model of the centralized library system of Sinhgad institutes higher education libraries using OSS for enhancing library services:
   During the study, the researcher has developed a prototype model of centralized library management system using Koha OSS. In this study, all the forty eight libraries are connected through internet that can work either on the local single server or the cloud server. The model also evaluates the system from the point of views of the organization, librarians and the user's perspectives. After the successful study of the model, a feedback of the librarians was sought. Analysis of the feedback indicates that the libraries are ready to welcome and implement the topic at the earliest for the benefit of all the three communities, i.e. the organization as a whole, the librarians and the users of the libraries. This indicates that the researcher has achieved the goal of this objective. The same has been discussed elaborately in chapter – 07.

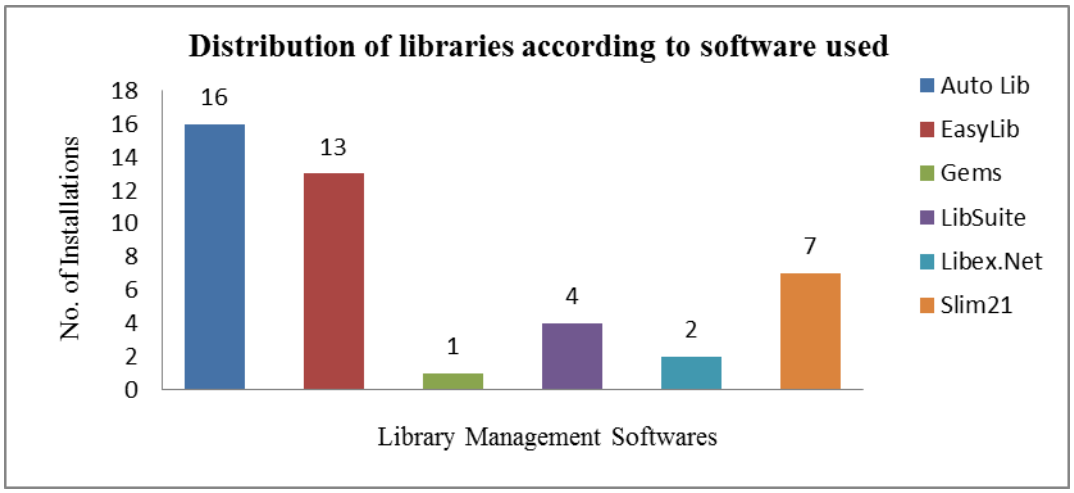
8.5 Testing of Hypothesis:

Hypothesis Number 1: *Individual libraries falling under one parent organization or institute use different library management systems for library automation and thereby create a hurdle for centralized library system.*

Table No. 8.1: Number of various software installations in Sinhgad Institute higher education libraries.

Sr. No.	***Software Name***	***Developed by***	***Number of installations***	***%***
1	AutoLib	Aakash InfoTech: Pune	16	37.21
2	EasyLib	Fidelity Coding: Pune	13	30.23
3	Gems	STES: Pune	01	02.33
4	LibSuite	Soft-Aid : Pune	04	09.30
5	Libex.Net	Scrum System: Pune	02	04.65
6	SLIM21	Algorithms : Pune	07	16.28
Total Respondents			***43***	***100***

Graph No. 8.1:-Distribution of libraries according to software used



The above table and graph shows distribution of the libraries according to **s**oftware used in various institutes. 'AutoLib' is used by 37% (16) libraries, 'EasyLib' is used by 30% (13) libraries, 'LibSuite' is used by 9% (4) libraries, 'Libex.Net' is used by (5%) 2 libraries, 'Gems' is used by 2% (1) library and 'SLIM21' is used by 16% (7) libraries.

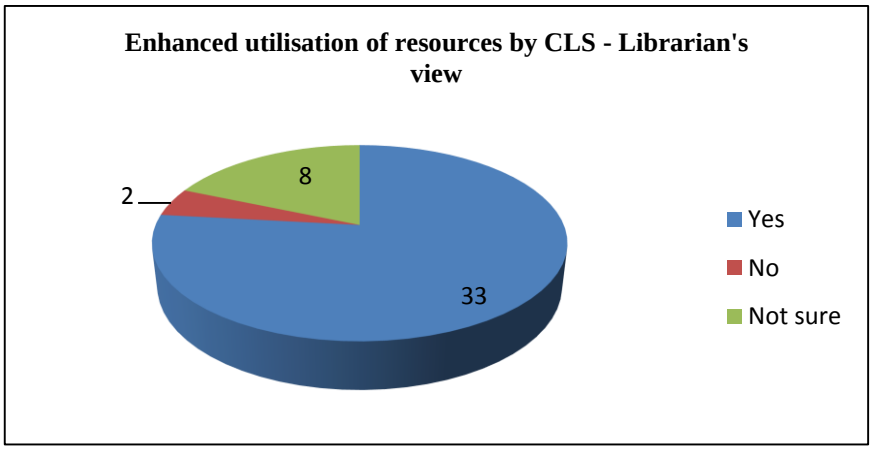
Conclusion: *It is clear that the libraries under "Sinhgad Institute" are not using centralized (single) LMS and there are six different library management softwares in use, thus, creating a hurdle for centralized library management system.*

Hypothesis Number 2: *Implementation of centralized system can enhance the utilization of resources in terms of technical process like cooperative acquisition, cataloging, union catalogue and also in terms of manpower, IT infrastructure etc.*

Table No. 8.2: Librarians view: Implementation of centralized LMS can enhance the utilization of various resources.

Reply	Librarians view			Total
	Yes	No	Not sure	
Number of libraries	33	2	8	43
Percentage	76.74%	4.65%	18.60%	100.00%
Source : Primary data and Feasibility study				

Graph No. 8.2:- Librarians view: enhances utilization of resources by centralized library system



The above table and graph shows; the opinion of librarians about implementation of centralized library system can enhance the utilization of various resources of the institute. As per the statistics 76% (33) librarians replied that, implementation of centralized system can enhance the utilization of resources in terms of processes mentioned above, 5% (2) reported disagreement and 19% (8) were not sure about the efficiency of centralized library system.

Explanation:

Let, p = Proportion of librarian who are in favor of CLS.

H_0: p = 0.5 i.e. there are equal number of librarians who believe or don't believe (or unsure of) the efficiency of CLS.

Vs.

H_1: p > 0.5 i.e. number of librarians believing in enhancement due to centralized library system (CLS) is significantly higher than those who don't believe.

Table No. 8.3: Statistical proven data table for hypothesis number two:

Chi –Square Corrected)	Degree of freedom (d.f.)	P-value
11.26	1	0.0004

Using one sample test of proportion, it can be seen the proportion of librarians favoring centralized library system (CLS) is significantly higher than 0.5 (P-value = 0.0004) (P-value= table value).

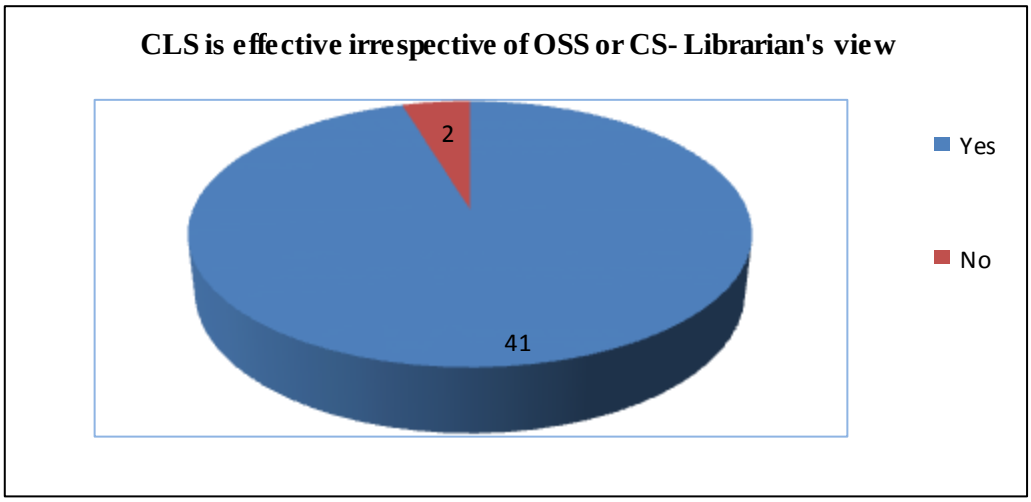
Conclusion: *According to librarians opinion and feasibility study we can say that, implementation of centralized system can enhance the utilization of resources in* terms *of technical process like cooperative acquisition, cataloging, union catalogue and also in terms of manpower, IT infrastructure etc.*

Hypothesis No. 3: *Using a single library management system irrespective of commercial or open source can enhance the quality of services provided by individual libraries.*

Table No. 8.4: Librarians opinion: Single library management system (LMS) can enhance the quality of services.

Reply	Librarians Opinion		Total
	Yes	No	
Number of libraries	41	2	43
Percentage	95.35%	4.65%	100.00%
Source: Primary data and Feasibility Study			

Graph No. 8.3:- Librarians Opinion: Centralized Library System **(**CLS) is effective irrespective with OSS



The above table and graph shows opinion of librarians regarding centralized library system (CLS) is effective irrespective of OSS or commercial system. 95% (41) librarians replied that implementation of centralized system can enhance the utilization of resources irrespective of the technology used is open source or commercial, while only 5% (2) doubted the efficiency of OSS as compared to commercial software.

Explanation:

Let, p = Proportion of librarian who believe OSS and commercial software are equally efficient as centralized library system (CLS).

H_0: p = 0.5

Vs.

H_1: p > 0.5

Table No. 8.5: Statistical proven data table for hypothesis number three

Chi –Square (Corrected)	Degree of freedom (d.f.)	P-value
33.58	1	< 0.01

Using one sample test of proportion, it can be seen the proportion of librarians who believe OSS and commercial system (CS) are equally efficient as centralized library system (CLS) is significantly higher than 0.5 (P-value < 0.01) (P-value= table value).

Conclusion: *According to librarian's opinion and with the help of feasibility study, we can say that, using a single library management system irrespective of commercial or open source can enhance the quality of services provided by individual libraries.*

Hypothesis Number 4: *Use of open source software can be an economical solution for library automation in terms of the consistency and the cost involved.*

Table No. 8.6: Integrated financial estimation of hardware & softwares for all forty-eight libraries

Sr. No.	Particulars	Commercial LMS	OSS LMS
1	Hardware cost	78,36,000	55,04,000
2	Software cost	61,96,272	30,000
TOTAL		**1,40,32,272**	**55,34,000**

The above table shows, the financial estimation of hardware & softwares for all forty-eight libraries using commercial library management system and open source library management system. The details of the table are described in chapter number VI titled "Feasibility Study of Proposed Model".

Conclusion: *From the above table it is clear that open source software is a very cost effective solution instead of commercial library management system.*

8.6 Suggestions:

After an in depth study, the researcher has come out with a lot of valuable suggestions which are worth mentioning here.

1. To reduce the cost of operating system, librarians should think of using an operating system that is based on open source technology.
2. Similarly, the librarians also can think of reducing the cost of antivirus software by using the open source software for the client as well. According to experts the virus affection for this operating system is low as compared to other operating systems.
3. It is recommended that the Librarians should use all the advance technologies which can reduce the gap between users and library resources for enhancement of the library services.
4. It is observed that the in-house software are not sustainable for a long term due to various reasons, hence the librarians should always avoid use of such software even though it comes free of cost.

5. Even if the Librarian wishes to use the commercial software for some reasons, one must ensure the terms and conditions regarding data export, data transfer or data migration, etc.
6. Irrespective of any make of the software, whether commercial, open source or in-house, one must ensure the provision for the web based services. These will ease a lot to the librarians and the users.
7. Some of the open source LMS software do have their discussion forums but apart from this, the librarians also should have their local discussion forums so that they can discuss and resolve the local issues.
8. Librarians are advised to actively attend or participate in seminars, workshops and conferences held on open source software so that they are updated about the recent developments in the open source software.
9. It may not be feasible for all LIS professionals, but wherever possible, LIS professionals should get involved in the free/open source softwares development projects by contributing their ideas for the library profession.

8.7 Scope for future research:

There are hundreds of library management software packages which are running successfully in libraries. There are a lot of directions and tools available to help librarians for selecting suitable software for the library. The selection of software is critical because day by day technology is changing rapidly. Therefore library professionals are suggested that, they should give more attention towards the study of library softwares, which can enhance the library professional's confidence towards various technologies. Here, the researcher has suggested a few subjects for the purpose of further research.

1. Study of cost-benefit analysis of different commercial and open source softwares.
2. Technology driven: comparative study of various open source software and commercial library management software packages.
3. Implementation of open source library management software.
4. Use of IT applications in library automation
5. Role of OSS in changing environment.

8.8 Benefit of this research to society:

There are so many big educational organizations in the society like Sinhgad Institutes, distributed geographically at various places. These organizations may be spending huge amount on library automation. These organizations may be wanted to reduce the cost of automation along with improved library services. These organizations can able to save their money and time of library administrator and staff by implementing suitable open source software.

8.9 Conclusion:

The capital investment of the commercial software, it`s upgradations charges, service packs and Annual Maintenances Changes (AMC) are affecting the library budget. The taxing AMC amount is increasing on regular basis and creating hurdles in the development of the organizations. Most of the commercial library software developers ignored cataloging standards such as MARC21, AACR2, etc. Open source library management systems like Koha could be installed and maintained and maintained by librarians themselves. Alternatively, even it can be outsourced to the IT organizations satisfying library standards. The OSS like 'Koha' is of the best possible solutions for the Sinhgad Group of Institute libraries because all the functional requirements of a central library management system are covered in Koha as OSS reduces the automation cost of libraries significantly and enhances services of library automation system. Now it is essential to provide training to library professionals working in Sinhgad Institute libraries to implement OSS (Koha). From above discussion, lastly researcher concludes that, commercial and paid solutions can only survive when they work for the welfare of society along with their business.

Bibliography

Introduction: To create a bibliography is very important aspect in any research. Bibliography directed towards the original source of information. This gives the message of the authentication of the explained data, as well as new literature comes in focus with ideas of author. This research mainly focuses on open source software, commercial software and in-house software. Researcher has also studied the services of various types of software's between the studies. Researcher has referred different books, magazines and web sites as listed below which is based on APA (American Psychological Association) style manual.

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Appendix: I - Questionnaire

Development of Prototype Model of Centralized Library System of Sinhgad Institutes Higher Education Libraries Using Open Source Software for Enhancing Library Services

- All the questions are for automated libraries.
- Section A and J is for non-automated libraries.
- Write your comment in the applicable question.

A. General Information:

1. Name of the College / Institute : _____
2. Year of Establishment : _____
3. Address and Communication Numbers: _____

   _____

   Phone No. _____ Mobile No. _____

   Email :_____

   Website Address _____
4. Name of the Organization : _____
5. Name of the Parent/Sister Organization : _____
6. Name of Librarian: _____
7. Name of the disciplines:

   Management ☐ Engineering ☐ Health Sciences ☐

   Pharmaceutical ☐ Architecture ☐ Arts, Science and Commerce ☐

   Law ☐ Education ☐ Hotel Management ☐ Other ☐
8. For which programmes/courses your library is providing services now?

   _____
9. Library timings in hours:

   8-10 ☐ 10-15 ☐ 15-20 ☐ 20-24 ☐
10. Reading room timings in hours:

    8-10 ☐ 10-15 ☐ 15-20 ☐ 20-24 ☐
11. Number of users of the library : (Students, Teachers, Library Staff)

    Less than 500 ☐ 500 to 1000 ☐

    1000 to 2000 ☐ Above 2000 ☐
12. Details of circulation statistics per day?

    Less than 500 ☐ 500 to 1000 ☐

    1000 to 2000 ☐ Above 2000 ☐

13. Library Personnel:

Designation	***Number***	**Computer Literate**		**Additional Computer Course**	
		Yes	***No***	***Yes***	***No***
Librarian					
Dy. Librarian					
Assistant Librarian					
Library Clerk					
Library Attendant					
Peon					
Total					

14. Collection details of your library:

Sr. No.	***Type of Literature***	***Number***
1	Book Collection	
2	Periodicals & Journals	
3	e - Books	
4	e - Databases	
5	CDs / DVDs	

15. Addition of literature:

1) Approximate book volumes added per year:

Less than 500 ☐ 500 to 1000 ☐ 1000 to 2000 ☐

2000 – 3000 ☐ above 3000 ☐

2) Approximate book titles added per year:

Less than 100 ☐ 100 – 250 ☐ 250 – 500 ☐

500 – 750 ☐ 750 – 1000 ☐ above 1000 ☐

B. Library Services:

1. Which of the following library services and facilities are offered at present?

1.1 Library Services Performed usually

Sr. No.	***Services***	***Yes***	***No***
a	Provision of general & specific Information		
b	Assistance in searching & locating documents		
c	Assistance in the use of reference books		
d	Assistance in the use of OPAC		

1.2 Library Basic and other services:

Sr. No.	***Services***	***Yes***	***No***
a	Library Membership		
b	Library Orientation / Library tour		

c	Circulation (Issue / Return)		
d	Reservation		
e	Reference service		
f	Referral service		
g	Inter-library loan		
h	Reprography		

1.3 Informational services:

Sr. No.	***Services***	***Yes***	***No***
a	Current Awareness Service (CAS)		
b	Selective Dissemination Information (SDI)		
c	Electronic Document Delivery (EDD)		
d	Indexing & Abstracting		
e	Bibliographical services		

1.4 Advanced Services:

Sr. No.	***Services***	***Yes***	***No***
a	Information about due date		
b	Claim activation		
c	Online self-renewing		
d	Circulation details browsing by ID		
e	Access to bibliographical database		
f	Other		

1.5 Services based on web technology:

Sr. No.	***Services***	***Yes***	***No***
a	OPAC in Library		
b	Web OPAC		
c	Web OPAC on Mobile / Tablet		
d	Consortium (Central OPAC)		
e	Bulletin Board Service		
f	Book Marking		
g	Tagging		
h	Messaging by SMS		
i	Messaging by e mail		
j	On line renewal (if there is no claim)		
k	RSS feed for new Acquisition		
l	Ask A Librarian/ Help		
m	Other		

C. Library Automation:

1. How many Computers / terminals are in your library?

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ More than 7 ☐

2. Whether the library has Internet connectivity? Yes ☐ No ☐
3. Whether the library is automated? Yes ☐ No ☐ If No,
4. What are the reasons, responsible for non-automation?
   Initial cost of the software is very high ☐ No more circulation ☐
   Lack of computer literate staff ☐ other ☐_____ If Yes,
5. Year of library automation : _____
6. Which type of library management software do you use?
   Commercial ☐ In-house ☐ Open Source ☐
   Freeware ☐ Other ☐
7. Name of the library management software: _____
8. Software developed by: _____

D. Cost involved in library automation including hardware & software.

1. Capital cost of the software: _____
2. AMC charges – i) Per Year _____ ii) Per Call: _____
3. AMC charges paid during last four years:

Year	***Amount in Rupees***	***Year***	***Amount in Rupees***
2010		2012	
2011		2013	

4. How frequently the library management software is updated?
   Customize on demand ☐ After specific period ☐
   Updates made available by vendor ☐
5. Is there any training required to operate this library management software? Yes ☐ No ☐
6. Whether the Operating system is for Server / Clients?
   Commercial ☐ Open Source ☐
7. Which of the following operating systems are supported to run existing LMS? Windows ☐ Linux ☐ UNIX ☐ Ubuntu ☐ Mac-OS ☐
8. What is the approx. cost involved for one time / yearly licenses?

Year	***Amount in Rupees***	***Year***	***Amount in Rupees***
2010		2012	
2011		2013	

9. Whether the LMS is installed on a separate server? Yes ☐ No ☐
10. Whether the server / machines backed up by UPS? Yes ☐ No ☐
11. Is backup facility is available in your LMS? Yes ☐ No ☐
12. If yes, specify backup media / device, that you can store your database?
    Internal hard disk ☐ Pen drive ☐ CD/DVD ☐ Backup server on network ☐ Cloud server ☐ Backup server of whole institute ☐ Mail ☐ other specify _____
13. Whether the library management software has in-built facility for barcode printing? Yes ☐ No ☐
14. Are your library having barcode printer? Yes ☐ No ☐
15. If yes, what is cost involved for barcode printer? _____
16. Whether any anti-virus software is installed for the data security?
    Yes ☐ No ☐
17. What is the approx. cost involved per year for antivirus installation?

Year	***Amount in Rupees***	***Year***	***Amount in Rupees***
2010		2012	
2011		2013	

18. Whether the library is having a separate system administrator to attend server / client machines? Yes ☐ No ☐
19. Tentative expenditure on system administrator per year: _____
20. Network base of the existing LMS is,
    Stand Alone ☐ LAN based ☐ LAN with web based ☐
21. Are your client/ server machine hardware configuration is not below than, Processor Type P4 ☐ Processer speed 1 GHz ☐ 512 MB RAM ☐ 80 GB Hard Disk ☐
22. Which backend database is used to store the data?
    MS Access ☐ Oracle ☐ MSSQL ☐ MySQL ☐ PostgreSQL ☐
23. Is there any paid support required for backend, frontend, web services in LMS? Yes ☐ No ☐
24. Are you able to customize the display of home page of the software?
    Yes ☐ No ☐
25. Is there are any user manual provided with LMS? Yes ☐ No ☐
26. Is there any email discussion group of the LMS users? Yes ☐ No ☐

E. About Data Migration:

1. Who are the data proprietors of the backup file?
   Software vendor ☐ Organization / library ☐ Not sure ☐
2. Have you made any agreements before installation related to data export when software will be changed? Yes ☐ No ☐
3. Local troubleshooting is possible or not? Yes ☐ No ☐
4. Regarding data export facility;
   Facility is available ☐ Training provided for data export ☐
   Password of data backup file provided ☐

F. Regarding advance facilities & additional features :

1. Can your LMS support Multilingualism? Yes ☐ No ☐
2. Are your LMS is able to locate virtually the sequence of books on screen? Yes ☐ No ☐
3. Are your LMS is compatible to RFID system by installing SIP server? Yes ☐ No ☐
4. Whether the LMS supports the customization of various screens/ menus? Yes ☐ No ☐
5. Can library staff customize the reports? Yes ☐ No ☐
6. Can user define keywords for the book? Yes ☐ No ☐
7. Can web based CAS, SDI Provision is possible from your LMS?
   Yes ☐ No ☐
8. Can your LMS able to show cover image of the books?
   Yes ☐ No ☐
9. Which cataloguing / library standards are maintained by your LMS?
   a) MARC 21 ☐ b) UNIMARC ☐ c) Z39.50 ☐
   d) SRU/SW ☐ e) AACR2 ☐ f) Unicode ☐
   g) No Any ☐

G. Software-wise comparative study or use pattern of available features of existing LMS:

1. Which of the following modules are covered by your LMS for doing library operations?

Name of the Software :			
Sr. No.	***Main Modules Covered***	***Yes***	***No***
1	Various Masters/ Databases		
2	Acquisition		
3	Cataloguing		
4	Serial controls		
5	Circulation		
6	Administration / Authorities		
7	OPAC		
8	Reports		

2. Other Sub – Modules:

Sr. No.	***Sub - Modules Covered***	***Yes***	***No***
1	Budgetary Control/ Purchase		
2	Branch Management		
3	Users Management		
4	Newspaper Management		
5	Project Report Management		
6	Information About software		

3. Acquisition Module:

Y= Feature is available in LMS, **N=** Feature is not available in LMS
X= Features is available but does not meet requirements

Sr. No.	***Features***	***Y***	***N***	***X***
1	Budget / Fund Management			
2	Budget for department wise/ subject /Year wise			
3	Duplicating checking			
4	Book Selections: suggestions, stage file, approvals			
5	Order placing / cancelling / follow-up, etc.			
6	Generate automatic purchase order			
7	Receiving books			
8	Book entries / Data entries/ Accessioning			
9	Data editing			
10	Approving invoice for payment			
11	Acquisition reports			

4. Cataloguing Module:

Sr. No.	***Features***	***Y***	***N***	***X***
1	Record Creation/ Cataloguing new entry			
2	Duplicate checking			
3	Record editing			
4	Delete record			
5	Authority control			
6	Copy catalogue			

7	Bibliographic framework – MARC 21			
8	Import – Export Cataloguing data			
9	Union catalogue			
10	Cataloging of different items			
11	Cataloguing reports			
12	Other			

5. Serial Control Module:

Sr. No.	***Features***	***Y***	***N***	***X***
1	Suggestions			
2	Ordering/Subscription			
3	Receipting			
4	Payment processing			
5	Reminder through email (Non-receiving)			
6	Binding			
7	Import / Export			
8	Serials reports			

6. Circulation Module:

Sr. No.	***Features***	***Y***	***N***	***X***
1	Member details			
2	Member / User categories			
3	Setting preferences			
4	Issue / Return / Renewal transactions			
5	Fines and Over-dues notices			
6	Book reservations			
7	Users - Renewal of items physically			
8	Users - Renewal of items: online			
9	Over-due charges			
10	Inter Library Loans (ILL)			
11	Facility to weed Out			
12	Circulation statistics / Reports			

7. Administration Module:

Sr. No.	***Features***	***Y***	***N***	***X***
1	User rights			
2	Various codes control (Acc. No. Bar Code)			
3	Bulk updating			
4	Update database			
5	Data Migration			
6	Stack verification			
7	Backup facility			
8	Administrative reports			

8. OPAC Module:

Sr. No.	*Features*	*Y*	*N*	*X*
1	Easy / Simple search:			
2	Boolean search : And, Or, Not			
3	Advance search:			
4	Z39.50 search			
5	Circulation status on OPAC			
6	Print OPAC results			
7	Reservation through OPAC			
8	OPAC customization by end-user			
9	Availability of OPAC on web			
10	Mobile compatible OPAC			
11	Save search results			
12	Access to multimedia materials			
13	Stop word generation			
14	End-user book suggestions			
15	Display of search history			
16	Creation of virtual shelve			
17	User Help / Ask a Librarian			

9. Various Reports :

1. Which types of reports are generated from your LMS?

Sr. No.	*Features*	*Y*	*N*	*X*
1	Member list			
2	Batch wise member list			
3	Acquisition reports			
4	Accession register			
5	Accession registers with selected fields			
6	Book title list			
7	Periodical/ Journal subscription list			
8	Missing issue report			
9	Circulation statistics			
10	Borrower’s list			
11	Reservations			
12	Overdue report of member			
13	Stack verification reports			
14	Email reminders			
15	Catalogue card printing			
16	No dues certificate			
17	Batch wise: No dues certificate			
18	Book sent for binding list			

H. Centralized resource sharing practices:

1. Which of the following centralized resource sharing practices you are doing?

Sr. No.	*Type of Resource Sharing Practices*	*Yes*	*No*
a	Centralized budget control		
b	Centralized purchasing		
c	Centralized acquisition (editing / entry)		
d	Centralized cataloguing / classification		
e	Inter library loan		
f	Using web catalogue of other places		
g	Using web OPAC of other campuses		

I. Additional expectations and requirement :

1. Please check out features expectations from LMS, which can attract library users towards library and makes LMS strong to facilitate the users?
   OPAC on Mobile ☐ OPAC on Tablet ☐ Link to accompanying material ☐ LMS and DLM on same platform ☐ SMS Alert's ☐ Institutes logo on LMS home page ☐

J. Awareness about OSS:

1. Are you aware of any open source library management software?
   Yes ☐ No ☐
2. If yes, which of the following open source library management software do you know?

Sr. No.	*Software Name*	*Awareness*		*Used*	
		Yes	*No*	*Yes*	*No*
1	Koha				
2	NewGenLib				
3	e-Granthalaya				
4	Evergreen				
5	PMB (PhpMyBibli)				
6	OpenBiblio				
7	Emilda				
8	Learning Access ILS				
9	Other				

3. Have you attended any seminar / conference / workshop for on OSS for LMS? Yes ☐ No ☐
   If yes, mention the name of the software _____
4. Do you have any plan to switch over from present commercial software to OSS? Yes ☐ No ☐ Not Sure ☐

5. Give your comments about Open source software,

_____

_____

_____

_____

APPENDIX: II
FEEDBACK - FORM

Development of Prototype Model of Centralized Library System of Sinhgad Institutes Higher Education Libraries Using Open Source Software for Enhancing Library Services

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A. General Information: (write your comment or give relevant data)

1. Name of the Respondent:
   _____
2. College / Institute Name :
   _____
3. Designation of Respondent :
   _____
4. Communication Numbers:
   Mobile / Phone (O) _____

B. Feedback :

1. The developed framework of the model is,
   Average ☐ Good ☐ Excellent ☐
2. Features and facilities discussed regarding Model are,
   Average ☐ Good ☐ Excellent ☐
3. Express your suggestions about LMS model,
   _____
   _____
   _____

C. After understanding prototype model,

4. What is your opinion about open source software (OSS) and centralized LMS,
   1. Implementation of CLMS can enhance utilization of resources?
      Yes ☐ No ☐ Not Sure ☐
   2. Implementation of single LMS can enhance quality of library services? Yes ☐ No ☐