Chapter -4

Conceptual Framework of the Study

Library and Society:

The need for redefining the position and the objectives of all the institutions which are working with information, knowledge and culture is seemingly understood as an integral part of the development of the information society. Among others the most discussed are Media and Education which are poised as the mass information providers to the society as their spread of information is large and audience is relatively bigger. Particularly in the case of education, libraries which are recognized as one of the primary sources of access to open information has been increasingly be concentrated than in the initial stages as the access to open source of information is accepted to be the very crucial for the democratic information society development. The clear need for the information society to maintain the institutions which would be spearheading the concept of collection and organizing information and more importantly providing general access to it has been accepted worldwide. When there is overall development in the ideas of independent learning and acting the libraries have a larger role today more than ever. The citizens among all things have to be having access to all information which is considered to be the key raw material and yet can be a zero resource too if in case the there are no access points to it as well as the documentations containing the information is not stored in order.

4.1 Library and Society:

The most important functions of a library lies in the acquisition, organization, preservation and offering for use of the publicly available information irrespective of its form ranging from Print to network in such as a way as to ensure that whenever it is required it can be accessed to and put in to use. This long term systematic work is unique to libraries and not shared by many of the other information sources (Ryynänen Mirja, 1999)[i]. Libraries and the societies which they are a part of seemingly are inter-linked and inter-dependent. A society without libraries has very little significance and the library without the society has no reason for existence. Libraries are seen as the vehicles of social change and their role in the social development cannot be undermined owing to the following reasons:

- Libraries help in assembling, organizing, preserving, socializing and most importantly serve all the expressions which might be embodied in any form and size including manuscripts, texts or periodicals other document forms which have been produced as means of communication

- They help in the transmission of knowledge from the earlier generations to the present generations
- Helping in the accumulation of the further build of knowledge from one generation to another
- Aiding in the contemporary development of knowledge by reducing the repetition of efforts which leads in to wastage of research potential of humanity
- To enhance the research effort by providing easy access through faster search options for the literature
- More importantly aiding in the perpetual self-education among individuals
- To make sure that all the recorded information on various subjects and concepts is collected as such to be socialized and made available to be served freely among all who are in need of the information in just at the time they need it
- Helping in knowledge developed required to develop the economic resources of humanity so that the challenges faced by the ever increasing population is overcome and they are in a comfort zone by able to cater to their needs, wants and demands
- To enable individuals, communities and countries to exist in a mutually co-operating and mutually tolerant and peaceful environment
- The books, pictures, sound records, videos and other forms of information provided by the libraries help in a self-dependent use of leisure which is elevating
- Libraries help in increasing the opportunity for spiritual awakening of all members in a community as well as overall humanity

Libraries apart from these roles are beneficial to the society in more than one ways. They have not been representing institutions of learning but also in a social context they have been places where people come seeking information or seeking answers to their queries. Over the period of times libraries have always been in the centre of cities which provided an opportunity for the residents to gather to share information. It was just one among the public places in the likes of a amphitheatre or a park or a plaza which can turn in to a impromptu forum. With the shift in societal norms where people are no more encouraged to loiter around public places and heavy curbs have been laid on impromptu gatherings cross the world citing annoyance and illegality many of these gathering and the places used for them have lost their prominence and libraries being one of them. This has led in to the development of a concept called as the 'third place" in any society -a place for gathering as a community which is neither a home or a place of work for the participants. This concept was defined by

Oldenburg (1999) initially even though he has not mentioned libraries specific in his book yet the libraries can be looked upon as a 'third place' which is more of a neutral territory where people of the society are treated equally with fair chances to accumulation of resources which suits the ideas of existence of a library in itself.

There has been numerous studies advocated to the fact that libraries are places which do not consider economic status of individuals and provide level playing opportunities. In a study conducted in Norway, the authors (Aabø & Audunson, 2012; Aabø, Audunson & Varheim, 2010) illustrate the idea of levelling in a society where an unemployed man is looking for employment in a computer and sitting across is a recently published author researching for his subsequent literatures. It has always been found through researches in libraries that irrespective of socio economic status of individual's together make up for the patrons for the libraries across the world. Even though their activities confined to their personal requirements and fall under the category of usual functions of a library their set up makes libraries to be part of the 'third place'. The neutrality that the libraries provide are ensuring that people with multiple cultural background have no issues in mingling at a place whether for any organized activity or a structured trip for people to learn a native language or in certain cases for a causal interaction. Through this libraries have been able to fulfilling the need for the society's need for a place for people to meet (Aabø & Audunson, 2012, p. 145). Until this point when only the 'physical spaces' of a library are considered in the concept of neutrality and third places in the society. What happens is interesting is note is the emergence of digital libraries which are not confined to just physical spaces. Libraries are not only communities and functions but also linking people and ideas to each other (Pomerantz and Marchionini, 2007) and a library is in itself much more than a physical building. This view is further agreed upon by Leckie and Buschman (2007) who state that the concepts of communities and place are in actuality nor synonymous to each other and further state that the like-minded people can create communities online too without being ever visiting a common location. In fact the digital libraries are more advantageous as they provide a collaborative learning environment without the restrictions of physical space there by making possible for the formation of online communities which are for less socialization and more by common interests. In a way this attributes to the positives negating the negatives of less commonality in individuals and more commonality on their interests. This confirms that even without a shared common place the digital libraries are also aligning to the concept of 'third place' developed by Oldenburg by

providing a common space for exchange of ideas, collaborate with each other and discuss important topics.

Hence these researches prove that even though there are multiple reasons for people to come to a library, the more stronger is the sense of 'Place' of a library in a society. The neutrality, the third place and common interest is what connects the library and the members of a society where everybody feels that they are being treated fair and there is a place to improve upon their knowledge without being marginalized due to their background whatsoever it may be. Hence it can be concluded that the libraries indeed are fulfilling their position in the communities or societies that they are a part of by being able to provide a place for the members of societies and communities for their private as well as their parochial activities making people to interact among one another at every level of the socialization process.

4.2 Advancement of Library

The advancements in technology and more importantly the changes in information technology has had a lasting impact on the libraries. In a technology fuelled world the libraries have been able to rebound themselves and are thriving owing to them being ready to embrace technological advancements as and when they were introduced. They no longer are the warehouses of books and literature rather they are in the transformational phase of being the centres of creativity, research and collaboration. The expectations of the library patrons have changed a lot and people are expecting to be able to find and access information from where ever they are. This has made many public libraries to use computers in their premises as well create digital library platforms across the internet to enable the patrons to reach them. Slowly libraries have started themselves to be converted in to hubs of technology offering computerized services enabling e-books, databases etc. In the developed west, the libraries are moving to next levels where libraries have emerged which are totally book free. Technology has been starting to be used in many activities which was never envisioned like

- GPS enabled applications capable to locating the materials inside the library
- Mobile applications enabling the patrons to access library from remote
- Access to 3D printers and binding services in many cases
- Delivering the books through robots or drones

Technology on the other hand also possess a lot of challenges to the libraries and the librarians managing it in the way of its distribution and operational functions. The large

availability of information in the form of databases, e-books, archives and other digital materials have made the organizational innovations a mandatory process in the libraries. Just the way bookstores were becoming irrelevant the libraries were poised to be the next in line which the libraries are over turning due to the adaptation of technology. A search engine definitely has the capability to at an instant to pride a plethora of information more quickly and easily yet the onus on the quality of the information being provided lies with no one which is a big compromise which does not hold in the case of libraries.

A simple library card which was used just as a access to books and periodicals is nowadays more than that and it is an access to information across the globe and the librarians who are managing this play a major role than ever before. So the role of libraries have changed from book houses and that of the librarians have changed from stewards of information. With the changing needs of patrons as well as the technologies advocate for many changes the libraries still remain as a place filled with information, imagination and a community. Among all the advancements the most important concepts are

- Advancements in ICT
- Digital Libraries

Advancements in ICT:

Information and Communication Technology or ICT in Short used often used as an extended synonym for Information Technology (IT) rather it's a term which is used to stress the unified role that communications technologies and telecommunications together with computer technology including the hardware and the software are used in cohesion with storage and audio visual systems which enable the users to access, sore, transmit and manipulate information. Neither the acronym of ICT nor a definition for it has been universally accepted till date owing to the fact that it is a constantly evolving field and these changes are many a times difficult to cope up with. The simplest way to work with ICT is to make sure that all the existing technologies be used effectively by individuals and organizations in effective use of information. One of the major areas where ICT is making a mark is its use in libraries.

Application of ICT in Libraries:

ICT is highly useful in libraries in such a way that it influences the libraries to create the databases on their own and making them available to all the users through the networks. The inter-dependent, mutually supportive and inter-related activities of the library including acquisition, circulation, office management and information can all be maintained through establishing a comprehensive ICT based infrastructure. There are four major areas in a library wherein the information technology based gadgets can be used and be much relevant for he modern library and are found to be highly convergent. The areas are:

1. Computer technology

2. Communications technology

3. Reprographic technology

4. Printing technology

The effective use of Information technology under these areas would ensure that a library functions effectively under a IT infrastructure.

Computer Technology:

In library operations presently computers are being extensively used enabling a greater streamlining of operations of libraries and communication centres. The various fields of a library where the computer application takes place includes broadly can be classified as:

1. Information resource building
2. Data entry
3. Classification and cataloguing
4. Circulation control
5. Serial control
6. Documentation and allied services
7. Information retrieval

The following are the activities which can be computerized under these functions.

1. Information resource building:

Information resource building includes all the activities which are mentioned below:

- Vendor Selection

- Preparation of order and cancellation of the order lists

- Creating terms and conditions of the supply

- Preparation of budget and maintenance of accounts

- Checking of duplication of entries

- Checking of library holdings

- Overdue order checking

- Creating records of items in order

- Creating record of the vendor related data including received and non-received items and receipts to the vendor

- Use order file and invoice through items verification

- Creating item wise inspection by concerned departments

- Preparation of the payment after accessioning process

- Creation of item-wise subject-wise and chronological final report

Data Entry

Database entries have to be made for books, serials, audio visuals, CD-ROMS, Electronic data storage devices, periodicals, gifted items, reports and most importantly for the clients or members associated with the library.

Classification and Cataloguing:

- Preparation of catalogue cards
- Online -cataloguing process
- Checking for duplication in catalogue cards
- Creation of duplicate catalogue cards in case of loss or damage
- Authority file preparation with subject heading list
- Generation of automatic added entries like author, title and series
- Monthly accession list generation

Circulation Control:

- Registration and cancellation of memberships

- Issuance, renewal, return and reservation of the documents and producing slip for the proofs

- Producing penalty slips for charges for late return, loss of materials, binding and production

- Maintaining circulation statistics

- Handling Inter library loan.

- Implementation and managing bar code system.

- Preparation of Reports
- Preparation of statistics of circulation.

Serial Control:

- Serials data Input
- Creating Order list of new serials.
- Finalize and implementation of the Mode of payment and prepare for payment.
- Creation of receipt and record updation
- Creation of receipt to vendors or publishers.
- List preparation for present holdings, additions, missing, cancelled serials chronologically and subject-wise
- Managing the renewal and cancellation of present subscriptions
- Manage reminders and follow-up of missing issues
- Implementation of binding control.
- Creation of accession register for bound serials
- Preparation of budget and maintenance of accounts/statistics

Documentation and allied services:

- Mange the Indexing and abstracting of micro and macro documents in the library
- Construction of the Thesaurus
- Union catalogue construction
- Managing the bibliographical control
- Creation and management of the Current Awareness Services.(CAS)
- Managing the Literature search
- Management of Selective Dissemination of Information.(SDI)
- Collection and storage of newspaper clippings

Information Retrieval:

- Creation and maintenance of the database

- Creation of interactive searching

- Saving in-house and external databases

- Searching and creating print outs of the queries on specified requirements

- Complete Information on books member-ship, inter library loan, penalty charges, periodicals, newspaper clippings, and reports

- Arrangement of keywords in accordance with number-wise, author, title, call number and edition

2. Communication Technology:

The process of transforming the information from the information source to destination is precisely what communication is all about. As it is the exchange of information, and its transmissions being the very essence in a social system its relevance is relatively high. It has become imperative for organizations to ensure that the communicate the information in a more efficient, effective and timely manner by using the communication technology. The major areas included in communication technology are:

- Online search
- Tele conference
- Voice Mail Box
- Satellite Technology
- Cellular telephones
- Audio-visual technology
- Fax
- CD-ROM
- DVD
- Video text
- Tele text
- Internet
- Intranet
- Extranet

3. Reprographic Technology:

Reprography otherwise referred to as micrograph is a reproduction process. Reprography has made a great impact on the document delivery system by making it possible to record micro images in microforms including microfiche, microfilm computer output microform and Ultra fiche. Reprographics technology covers the following process.

Printing Technology:

Printing plays an important role the information and communication process. Printing technology has made evolutionary changes from the stage of making paper to invention of modern printing levels to the days of laser printing and the future of 3D printing. Printing technology covers the three processes:

- Technical Writing
- Editing
- Publishing

Impact of ICT on Libraries:

With the invention an intervention of Information and communications technology in the library their functioning has improved for better than ever. The rapid inventions in ICT based technology on a constant basis has made sure that the libraries are constantly improved on multiple aspects. The way how libraries use to access, store, retrieve, manipulate and disseminate information have been totally reshaped with the continuous development in the following areas.

- Computing technology
- Communications technology
- Mass storage

Since its inception the academic libraries have always been integral part of the higher learning institutions and have got their due importance and never been considered as appendix or an adjunct institution. With the introduction of the ICT based technologies the following changes are evident in the libraries.

- eorganization
- Change in work patterns
- Demand for new skills
- Jon retraining
- Reclassification of positions

The following are the spheres of impact of ICT on academic libraries

- The electronic database, CD-ROMs and most importantly the introduction of the internet has made it sure that the access to information has been totally transformed.

- Every sphere of library activity including library collection, library building and consortia have been impacted by ICT.

- Academic libraries in particular are using modern ICTs for the following:
  - Automation of core functions
  - Implementation of effective and efficient library cooperation
  - Manage resource sharing networks
  - Implementation of Management Information Systems
  - Creation of institutional repositories of local contents
  - Creation of Digital Libraries
  - Initiation of capacity building programs

- The conventional LIS such as OPAC, the users and reference services , bibliographic services and Current Awareness Services (CAS) has been brought under unprecedented changes due to the implementation of ICT.

- ICT offers convenient time, place, cost effectiveness and most up to date information dissemination making the document delivery, inter-library loans and audio visual services and consumer relations functions to be provided more efficiently.

- ICT has been instrumental in creating an impact on the characteristics of information which is through changes in format, contents and methods of production delivery.

The impact of ICT characterized on information services by changes in format, contents and method of production delivery of information products.

Hence it is imperative that the adoption of ICT in libraries would ensure betterment in the information services being provided by them.

Digital Library:

The society has seen significant chances thorough the transmission on information and information technology aiding in archiving and accessing the knowledge in the digital form as well as helping in the preservation of traditional knowledge. The demand for the need of electronic information is increasing on a daily basis and with the exiting traditional systems it will become complex to manage the huge information. This major challenge for libraries in this scenario is to capitalize on these challenges and find ways to meet the demands and expectation of the new age digital users. The user community's needs have to be catered to by the libraries through some value addition in their existing services.

A digital library is a source which is used in order to rebuild the knowledge and helps in supporting the conventional library in a digital form. Using a network that can be used for retrieval of data a digital library is an organized assortment of data and information together with its supported services and a place where in the digital information is being stored. It is made up of two things:

- Digital content which is interconnected by establishing a link, query based relationship or a meta link
- A software based upon HTML or on a database management system

A single web page separately or a huge collection of digital data alone cannot be called as a digital library. Moreover a digital library is not something which can replace a traditional library rather they are seen as the future of the conventional libraries (Seadle, 2007). Many services which are to be disseminated to the users require a digital library to provide the technological support to link them. The collection of information is not only restricted to the document storage but extends up to the digital artifacts which are stored in the digital format. The contents of a digital library can be stored locally or can be accessed remotely also. The term 'Digital Library' first came in to use as early as 1988 as a published record but the concept was idealized by Bush (1945) who created a vision based upon experience called as a digital library.

The association of digital libraries worldwide called as the Digital library Federation defines digital libraries as ' The organizations that are providing the resources to ensure the persistence overtime of collections of the digital works to make them readily available for the use of a defined community or a set of communities by the inclusion of specialized staff used in to select, structure, offer , interpret, distribute and preserve the integrity of the digital works' (Shiri 2003) . The following is a comparison between digital and conventional libraries:

Conventional Libraries	Digital Libraries
Collection confined to print format	Collection majorly in digital formats
Collections are stable with slow evolution	Collections are more dynamic and ephemeral
Individual collections are not linked to each other	Consists of multimedia and fractal objects
Minimal contextual metadata providing a flat data	Richer contextual metadata and scaffolding of data
Scholarly content is stored with validation	More than scholarly data is stored with multiple validation
Access points are limited with a centralized management system	Access points are unlimited, more distributed collections and better access control
Correlation between the physical and logical organization	The physical and logical organization are virtually present
Transactions are usually one -way	Transactions are more dynamic and real time
Access provided is free and universal	Access provided is free and fee based

Source: Dr Mayank Tripathi- Library Philosophy and Practice-2010

Digital Library - Characteristics:

Lancaster's idea of a paperless society have been made a reality due to the recent developments in the library technology and practices (Jebaraj and Deivasigimani, 2003). The following are the effects of digital technology in libraries.

- A digital libraries constitutes of permanent documents

- Enabling of quick handling and ephemeral information

- Individuals working alone can use digital libraries

- The physical boundaries of data which existed have been eliminated

- Collaboration and support for communications is enabled

- Publication and storage of digital information is enabled by compression of data storage

- Telecommunications are used for facilitating storage, retrieval use and exchange of the digital resources

Functions of a digital Library:

The following are the functions of a digital library:

- To provide access to large volume of information to the users wherever they are and whenever they need it

- To provide access to primary information sources

- To support the text and multimedia content

- To provide accessibility through intranet and internet

- To provide an user friendly interface for use

- To provide easy access through hypertext links

- To work on a client-server architecture

- To provide options for advanced search and retrieval

- To enable the integration with other libraries

Purpose of Digital Library:

- To expedite the systematic development of procedures so as to collect, store and organize information in a digital form

- To be able to provide efficient delivery of information in an economic way to all users

- To be encouraging the cooperative efforts in research resource., computing and communication networks

- To strengthen the communication and collaboration among the educational institutions

- To establish a leadership position in the generation and dissemination of knowledge

Major components:

The major components of a digital library include:

- Infrastructure

- Digital Collection

- Systems function

- Telecommunication facility

- Human resources

Plann ing for Digital Library

: A digital library can be formed in either of the two ways:

- Developing a digital library from a traditional library
- Direct development of a digital library

It includes coordination between multiple departments and individuals to ensure a digital library in place. The following are the steps in the development of a digital library.

- Create the IT infrastructure

- Plan for digitization process

- Plan for access and access control

- Plan for staffing

- Planning for furniture, equipment and space

- Plan for associated service

- Planning for funding

Creation of digital resources:

The following are the steps in the creation of digital resources in a library

- Creation of a database consisting of digital materials which is open to all users over the campus' LAN

- Creation of a hand bandwidth internet connectivity

- Develop focus on the acquisition of digital resources

- Subscription to electronic journals and gradual elimination of print subscriptions

- Subscribe to licensed databases

- Creation of a local digital content which is available in the universities and institutions

Advantages and Limitations of digital libraries:

The following are the advantages of a digital library:

- Provides unlimited storage space at a much lower cost
- Reallocation of funds from traditional methods to digital means
- Creates a situation of no boundaries
- Availability round the clock
- Provides multi-user access
- Provides enhanced information retrieval
- Older print materials can be preserved

The following are the limitations of digital libraries:

- There is a lack of personal screening and validation
- There is a lack of preservation of a fixed copy being used for recording and duplication of scientific research
- Lack of preservation in the best in class literature in the form it was created
- There is a lack in differentiating between the valuable information from useless information
- Leading in to job loss for publishers and librarians
- Lack in differentiating the hidden costs

The challenges faced by the computer science professionals and Library information professionals will require more streamlined digital systems. Libraries would be having more departments and programs in the digital arena. It has been accepted that the digital libraries are effective in distributing the learning resources to students and other users. While planning for a digital library it requires a thoughtful analysis about the organization and its users and more importantly the cost required for infrastructure and maintenance has to be acknowledged (Adams, Jansen and Smith, 1999).

4.3 Technology and Library Software:

Libraries after a long period of gestation have started to adopt the automation and modernization with taking in to account of their financial and technical inabilities which act as hindrances to the adoption of the same. Even though financing appears at the outset to the major problem, in actuality it is the technical issues such as the procurement of hardware and the necessary software, the database and the manpower requirements are the serious issues in adoption of automation. In spite of these the adoption of library automation and library management software has seen a huge development over the years. From the Mid 1970's library management softwares came to existence in almost all parts of the world. Library management softwares can be broadly divided in to four different generations.

Generation I:

LMS which were developed and classified as the first generation LMS were majorly module based catering to one specific function of a library and had very little or no integration between the modules. The major modules developed during this stage are circulation module and cataloguing module. They were developed to run on specific hardware platforms only and on proprietary operating systems.

Generation II:

The second generation of LMS which were developed saw that there was portability between various platforms and had seen the introduction of UNIX and DOS based systems. The LMS developed during this stage were developed in such a way as to offer links in between the specific functions. These systems were majorly command driven as well as menu driven systems.

Generation III:

The third generation of LMS were those which were fully integrated library systems which are based upon relational database structures. These systems embodied a range of standards which were considered to be a significant step towards setting up of an Open System Interconnection (OSI). They also developed colours and Graphical User Interface Systems (GUI) with specific features such as windows icons, menus, and direct manipulation which became standards and norms in this generation of LMS.

Generation IV:

In the fourth generation of LMS the software's developed are developed on completely web-centric architecture and facilitate the access to other servers over the internet. These systems were developed to allow access of multiple sources from a single multimedia interface (Mukhopadhyay and Parthasarathi,2002).

 The concept of library automation was in this infancy stage during 1954 to 1970 and during the first half of the period it saw a trend of developing applications basically for the benefit of the users. The second half on the other hand saw applications being developed which used computer for performance of routine tasks of the library.

The period from 1970 to 90 is known as the adolescence period of library automation and during this the library automation helped in the development of technical specifications, requirement analysis and functionalities which are desired from an automated library system. The introduction of Internet in the late 1980's saw a completely new set of dimensions to the world of information. Libraries have started to prefer completely web compatible softwares which consist of all functionalities based on web. Recently the open source softwares have also emerged as available alternative to the commercial systems (Mukhopadhyay and Parthsarathi,2006) .

4.4 Library Automation Standards:

The following are the international standards which are as follows:

Metadata standards:

- Dublin Core

- EAD

- LOM

- VRA

- Core Categories

Information exchange standards:

- AACR
- LCSH
- ISO10160
- 10161
- ISO2709

Communication Standards:

- MARC
- UNICODE
- TCP/ IP
- Z39.50
- Z39.71
- OPEN URL

Content representation standards:

- PDF

- HTML

- WORD FILE

- XM

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- L

Interoperability standards:

OAI-PMH and others

Some of the literature available on these standards are as follows:

- Metadata is called as the "data about data". Meta data is dependent on a large part on the resources for which they were created. This particular standard is widely used for cataloguing in an electronic environment and whenever meta data standards are used with cataloguing it provides consistency and exhibits tremendous flexibility (Sherbini and Klim,2004).

- When automation process was started, when there was absence of approved standards the professionals started using roman numbers for documents as the computers were using only binary digits of roman script to represent the English language. Over the years ISCII which was a new technology developed as an extension of ASCII with values form 126 to 155 was used by library professionals to develop bilingual data bases and text files on DOS and Unix systems. The next was the development of fonts for windows based applications which aided in developing websites and document files. Now the requirements of multiple languages to be used a Unicode was developed which helps in the solution of localization of the problems of the world language. It is a multilingual standard which is also used for localization of Indian language materials (Chandraker, 2004)

- The centralization of the resources shared by the libraries worldwide are promoted by Z39.0 protocol. This protocol is used by personal bibliographic managers such as reference managers, End note, Procite etc, which are used to access the bibliographic protocols (Wu,2004)

- The recent growth of electronic information calls for standards to be used for development of architecture and organization of the electronic information. Open URL solves majority of this problem by providing a standard format for the transportation of bibliographic metadata about the objects between the information services. It is used effectively in libraries mainly because it provides for appropriate ways to link across information sources.

- MARC 21 standards are very helpful as they are encoded in individual character sets which include the ASCII, ANSEL and Unicode also. MARC 21 allows for the use of Unicode without any constraints on the structure and data content (Aliprand,2005).

LMS-Databases:

In the initial days of computing the data was kept in to the data files with programs being written to interact with these data files in order to produce the reports. This actually required a complete development of programs every time which was solved by the creation of a file management system which solved most of these of writing programs every time. A database a systematic approach towards the database management system was developed. Database is defined as a organized collection of structured data or a unit of information or data records which is independent of any application in a computer memory which is used to serve the need of multiple users. This implies that the database management system comprises of a collection of programs those of which enable an user to store, modify and extract information from a selected database.

The success of any information centre lies not only in the resources but also but more importantly in the identification and enlisting of various information sources together with the development of the requisite tools for maintenance of these information sources. For making this work it is essential to work on the bibliographic databases (Ravindran, 1997). The different national and international databases such as UKMARC, USMARC, CCF, UNISIST etc have to managed through international standards established for generation of the exchange standards (Mishra, 1997).

Character encoding is another important aspect of database management as the web and everything associated with it requires character encoding by the developers. When there is a creation of multi-script databases, character encoding becomes a most important criteria to be taken care of (Chandraker,2002). When there is a need for storing and managing many different types of digital content the relational database management systems (RDBMS) is the best suitable for providing solutions for XML. There are certain relational databases which provide for special mechanisms for accommodating XML, there are also other technologies which have emerged which facilitates the use of XML representation of data which is housed within an RDBMS.

Technology interface in Library Management Systems:

The following are the components of technology interface.

- RFID
- API
- VRS
- PDA
- Computer integrated telephony
- Smart card readers
- Biometric devices

Radio Frequency Identification Device (RFID):

RFID is used to checking the stock circulation, and security systems in a library wherein the RFID tags are increasingly been used replacing the traditional barcodes and magnetic strips to identify and track items

Application Programmer Interface (API):

API is a is one of the features of Integrated Library Management systems which are used to help the systems staff in libraries to modify the vendor's software to fit local requirements. They also help in faster upgrading of software.

Virtual Reference Service (VRS):

A relatively new component of the ILMS, VRS is associated with the Web OPAC to connect to a librarian for a reference related service. Some cases it houses a chat technology which is used to interact with a reference librarian in real time.

Personal Digital Assistant (PDA):

A computing and storage device which is handheld, PDA's are used for information access and dissemination without the use of the desk or study cartel.

Computer Integrated Telephony*:*

Computer integrated telephony is used for sending reminders and information on reservations to users, for all the circulation-related transactions such as book renewals, checking of account status and cancellations or reservations over the telephone.

Smart Card and Reader:

Smart cards embedded with an intelligent, single-chip microcontroller facilitates the implementation of a very high level of data security. and means that data can be securely updated or written to the card after it has been issued. Recent developments include the integration of reusable memory–Electrically Erasable Programmable Read Only Memory (EEPROM)–onto a single-chip microcontroller.

Biometric Devices:

The usual biometric devices being used are

- Finger print reader
- Voce recognition
- Face recognition
- Retina recognition

Security Measures used in Library Automation Software:

As the libraries have been increasingly using network based systems which help in smoother communication as well as increase in outputs, the emergence of security threats are also ever increasing which might lead in to breach of network security and resulting in costly damages. So it is imperative to secure the perimeter of the network for which the following are used.

- Firewalls
- Routers
- Intrusion detection system (IDS)
- Virtual private network (VPN) mechanism
- Screened sub-nets

Networking Architecture used in Library Management Software's

Networking used in libraries is of the following types:

- Single-user system
- Multi-user system
- Local area network
- Client- server architecture

Benefits of LMS:

Implementation of LMS in a library provides multiple benefits among which the following are the major benefits.

Improved Customer Service:

Implementation of LMS reduces the workload off of librarians and other staff acquisitions, cataloging and circulation, making them serve their patrons in a better way. This extra time provided by processes speeded up by LMS can be sued by the library staff to answer reference questions and helping patrons in researching or finding the right information.

Cataloging Improvements:

MARC (Machine Readable Cataloging) and other automated catalogues which allow for cataloging of library items there by allow the librarian more time to dedicate to improving customer service, but it help in ensuring the sharing of materials from one location to another at a much easier and affordable rate.

Easier Access:

When a LMS is being used it is not only easier for finding books and journals in the library but also online from a home computer or elsewhere. The automation of library collections also more flexibility as demand increases.

Collections:

Improvement in the variety, amount and quality of materials library's collection is enhanced by the use of a LMS. LMs helps in weeding out old, outdated and irrelevant books and materials from the collection making it streamlined and relatively easier to find the right item.

Lasting Effects:

LMS helps the library collection to be more sustainable by adhering to needs of a technology-based society, through information dissemination, paired with the ever-decreasing amount of funding for libraries. Using LMS would allow libraries to add on features when they become available in the future, thereby reducing the effort to overhaul their collections and cataloguing methods.

Current state of Library software:

Technavio (2017) published a report on the status of the Library Management Software (LMS) market in the world. The following are the key points of the report.

- The following are the companies which are key vendors in the global library management software market. They are

  - Civica
  - Innovative Interfaces
  - ProQuest
  - SisiDynix

- The global library management software market is poised to grow at a CAGR of more than 3% till 2021.

- The APAC region is identified as one of the most important growth market for library management software.

- Growing markets such as China, India and Japan are showing an increased interest in spending towards library automation and library management software's.

- The next development in the Library management software arena is the Cloud based integrated software systems which is already being developed by CR2 technologies which they have developed as a knowledge platform for education and healthcare sectors.

- Apart from the traditional addition of books and research papers to their collection the public libraries have started adding digital newspapers and magazine contents.

The report also identifies three major trends which are driving the global library management software market. They include:

- Increase in the use of open source library management software
- Increase in platform support for library management software
- Evolution of digital newspapers and magazines

Increase in the use of open source library management software:

One of the major trends in global library management software is the development of Open Source Library management software. An open source software is one whose source code is available usually under a license or under public domain which permits the users to study, change and improve the software as well as redistribute it in a modified or a unmodified form. Usually developed in a public or a collaborative manner it is similar to a user developed content. An open source software is characterized by sharing and collaboration which are basic elements of open source. There has been different kinds of open software solutions which are embraced by libraries. They include

- The basic operating system
- Document processing systems
- Library Management softwares
- Digital library software

Some of the most renowned library management software's used globally are KOHA, NewgenLib, Evergreen etc., Among them KOHA is a full feature based LMS used across the world by libraries. KOHA is a perfect alternative to the commercial LMS as it is build on the ILS standards and also uses the Open Public Access Catalogue without any vendor lock-in which provides access to technical support as and when required.

4.5 Increase in platform support for library management software:

Even though the current technology demands a cloud and web based LMS yet most of the LMS used is offline, which requires platform support owing to which there is an increase in platform support for the software. It is also seen that vendors who are providing more solutions for cloud-hosted and web-based library management software also provide support for the platforms., CR2 Technologies a software vendor has developed their LMS for four major platforms which include **LIBRARIAN**, **webLIBRARIAN**, **Cybrarian**, and **MobOPAC**.

Evolution of digital newspapers and magazines:

With addition to the earlier discussion it is seen that there is a trend towards private and public libraries providing digital newspapers and magazine in addition to popular books and research papers.

List of LMS:

The following is an Exhaustive list of LMS software's being available at a national and international level.

S No	LMS	Vendor
	Library Management Software	
1	Insignia Library System	Insignia Software
2	Destiny Library Manager	Follett
3	Atriuum	Book Systems
4	Koha ILS	LibLime
5	OPALS	OPALS
6	Handy Library Manager	PrimaSoft PC
7	Koha	ByWater Solutions
8	Accessit Library	Accessit Library
9	MODERNLIB	SAKTHI Technologies
10	LIBERO	Insight Informatics
11	SirsiDynix Symphony	SirsiDynix
12	LIBSYS7	LIBSYS
13	Millennium	Innovative Interfaces
14	LPT:One	EnvisionWare
15	Readerware	Readerware
16	All My Books	Bolide Software
17	Auto Librarian	MC2 Systems
18	Genesis G4	Library Resource Management Systems
19	Soutron	Soutron
20	VERSO	Auto-Graphics
21	LIBRARIAN	CR2 Technologies
22	Aleph	Ex Libris
23	Aura Online	Aura Software
24	Autolyb	Databiz Software
25	Bibliotheca	Ansell Productions
26	Book Collector Pro	Collectorz.com
27	Boopsie for Libraries	Boopsie
28	CyberTools for Libraries	CyberTools
29	Deeksha Library Management System	Deeksha Systems
30	Easylib Library Auotmation Software	Easylib Software
31	Eprints	EPrints Services
32	Evergreen ILS	Evergreen
33	FIRST LMS	FIRST Software Solutions
34	FlashScan-MAX	Library Automation Technologies

35	Journal Finder	WT Cox
36	KLAS	Keystone Systems
37	Lexwin	LEX Systems
38	Lib-Portal	P-DOT
39	LibAnswers	Springshare
40	Libdata	Libdata.com
41	Liberty	Softlink America
42	LibGuru	Spring Time Software
43	LIBMAN	Spring Time Software
44	Library Solution	Sabinet
45	Library Vision	Vision Forecasting
46	Library.Solution	The Library Corporation
47	LibraryPro	Primetech Software
48	LiBRARYSOFT	New Generation Technologies
49	LIBSOFT	Environ Infotech
50	M2L	MINISIS
51	MindLibrary	Mindmill Software
52	OpenText Library Management	OpenText
53	PC Card Catalog	Library Concepts
54	Progen Lib Junior	Limrose Group
55	Reademption Library EcoSystem	Reademption Solutions
56	ROVAN LMS	Rovan Software Solutions
57	Schookee	Virgosys Software
58	Series-M	Tek Data Systems
59	SignUp	Demco
60	SLIM21	Algorhythms Consultants
61	WorldShare Management Services	OCLC

i.   Mirja Ryynänen, "The role of libraries in modern society"(1999),7th Catalan Congress on Documentation

ii.   Phadke, D. (2010). Granthalaya Sangnkikaran Aani Aadhunikikaran (4th ed.) Pune: Universal Prakashan, pp. 52-54

iii. Raina, Roshan (1980), "Degree College Libraries in Kashmir: A Survey", Annals of Library Science and Documentation, Vol. 27, No. 1-4, PP. 12-19.

iv.   Rao, N Y J and Ramchander, M : Books to Bytes : Library Information Technology in the New Millennium. New Delhi, Ess Ess Publications, 2000

v.   Reddy, E Rama; Rao, K Nagatja and Burhanuddin, Mhd. : Computerization of University Libraries : A Case Study of Library of Hyderabad University, ed. C.P. Vashishth. Delhi: ILA, 1991. Pp. 5-7.

vi.   S. D. Vyas (2003), Application of Information Technology in University Libraries of Rajasthan: A Survey Report, Caliber 2003 , P 1-7

vii.   Sean Burns.(2014) Academic Libraries and Automation: A Historical Reflection on Ralph Halstead Parker, Libraries and the Academy, Vol. 14, No. 1, pp. 87–102

viii.   Taher, Mohamed (1994). Encyclopedia of library history. New York: Garland, 272

ix.   Vashisth, C P : Library Services for All by 2000 AD. Presidential Address at 39th All Indian Library Conference, Department of Public Libraries, Govt, of Karnataka, Bangalore, January 7-10,1994

x.   Verma, I. N. and Agarwal, U. K. (Editors) (1994). Public library services in India.Udaipur: Himanshu

Webb, P. J. 2007. Providing effective library services for research. London: Facet Pub.