CHAPTER - 3
AUTOMATION AND IMPACT OF
INFORMATION TECHNOLOGY
ON LIBRARY SERVICES IN
COLLEGE LIBRARIES

3.1 Introduction

The automation is economically feasible and technologically desirable in modern libraries to provide accurate and instant information, and to cope up with the demands of new knowledge, the enormous increase in the collection of documents, problem of their storage, dissemination and retrieval of information. Every modern library, sooner or later, should adopt automatic or semi-automatic devices for its repetitive jobs and operations, for dissemination of information as well as literature search and other library and information services.

The computers are being increasingly used in library and information services for information processing and repackaging of information, and on improving products, and services of Library and Information centers. The potentialities of computers have been realized in the libraries in the advanced countries. The application of on-line technology to library functions and services led to quantitative and highly significant improvements in the library activities such as information retrieval, automatic indexing and networking. Today the term 'Library Automation' is used to refer the extensive use of mechanical, electronic or micro-electronic equipments to perform the functions and activities associated with libraries such as acquisitions, serial control cataloguing and circulation, and also to library and information services.
and networking. The computers are of great significance with the advancement of telecommunication and reprography technologies in the Library Automation (Dhiman, 2003).

3.1.1 Why Automation?

There are several reasons for computerizing library activities. A machine readable record prepared at the time of acquisition may be used repetitively for several purposes. A considerable saving in effort, time and resources involved in manual processing can be achieved. For the following reasons the automation is required:

i) To improve control over collection.

ii) To have an effective control over the entire operation.

iii) To improve the existing services (from the view of quality, user friendliness, regularity etc. as well as to introduce new services.

iv) To share the resources among various libraries in a region effectively.

v) To avoid duplication of work.

vi) To use the services of the existing staff effectively.

Decision to computerize a library doesn't depend only on the size of collection. It depends upon:

a) Complexities involved in library operation.

b) Availability of staff to provide a variety of library services.

c) High cost of the hard copy (most of the documents are likely to be available in machine readable form at low price).
In the present day context, information technology is needed in libraries and information centers especially because of:

i) Explosion of knowledge resulting in numerous specializations and flow of almost non-stop information;

ii) Inability of users to explore unlimited literature and information of interest;

iii) Wastage of time in handling routine and repetitive library operations; and

iv) Impossibility of a single library to acquire and provide the entire published material (Devrajan, 1996).

3.1.2 Need of Automation

The need of automation of libraries in a developing country like India is a matter of serious consideration because of difficulties experienced in transfer of technology. The transfer of appropriate technology is seen as one of the crucial factors in the process of transforming traditional societies. Information is a truly international resource, available to all those equipped to receive and absorb it. Taking decisions regarding the adaptability of new technology, to devise national plans and to utilize available information most effectively, a strong information component and effective services of document provision, access and retrieval are required skills of management need to be backed up by information services (Sharma, 1977).

At present computer based information retrieval systems operate in online and tele access modes. Large-scale information retrieval systems use numerous databases generated by national and international abstracting and
bibliographic services. The promising networking of retrieval system, which makes optimum use of resources.

The great demand for information both by the individuals and the society coupled with decreasing cost of computers has enabled the building of very large computerized information systems services. Library Automation refers to the use of computers in the routine and important services of a library. The library operations get a quantum jump with the introduction of computers. The retrieval of information becomes much faster and accurate. Moreover, the application of computers in the day-to-day and repetitive jobs of library saves a lot of labour and time, speeds up the operations, and increases all round productivity. Precision and ability to store and recall information are the other advantages of computers. Thus, computer is not only used as a tool for data processing but also for data storage and retrieval. All those methods of managing which were impossible with conventional techniques, are now completely possible through computer by providing library information services. This technology poses challenge for the existing library personnel and call for the drastic change (Seshagiri, 1994).

Academic libraries have automated their operations with the huge amount of information and data, hence providing effective, accurate and quick library services to their users. More and more specially designed software packages for library operations are coming up and more areas are being covered under computerization. The major areas where computers are being used in the house keeping operations are acquisition, cataloguing, circulation and serials control. In the present day context, computerization of in-house library operations is not enough, participation in information
networks is also very important (Panda, Krushna and Chandra, 1990).

3.2 Computer

A computer is an electronic device designed to perform arithmetic operations. It can also perform several non-arithmetic operations on the alphabetic or numeric data used. These operations are performed at very high speed, with a high level of accuracy. The computer is able to do only whatever it is precisely instructed to do by its programmer within its capabilities. But it is not working on its own; it is merely carrying out the instructions given to it. A computer system consists of major groups of components—

(a) Hardware or equipment;
(b) Software or the programmes that cause the equipment to perform specific operations; and
(c) Data or the information that the hardware and software process, store, retrieve or otherwise manipulate (Saffady, 1994)

3.2.1 Computer Hardware

The term hardware refers to the physical components or a computing system, which can be seen and handled. On the basis of the operations performed by a computer, its hardware can be described in terms of I.P.O (input-processing-output) model. However, as the processing unit requires data storage capability, in addition to its internal memory, to store large amounts of data for long period, the auxiliary storage capability is provided which forms the essential component of computer hardware (Hagler and Simmons, 1982).

From hardware viewpoint a computer system consist of millions of electronic components. For a simplified description
a computer hardware components are generally divided into two broad groups:

(i) The computer itself, it is also called the central processor, the central processing unit, or simply the CPU; and

(ii) The peripheral devices, which are functionally associated with the central processor but are not a part of it.

3.2.2 Software

For a computer to work and provide solutions, certain programmes are required to drive the hardware. The hardware is of no use by itself.

Software is the general term used to describe the type of programmes or lists of instructions, which are needed to enable the computer system to carry out the necessary processing. In other words software is nothing but a collection of programmes (Agarwal and Dhanancjay, 1993).

Types of Software

There are basically two types of software:

(i) System software; and
(ii) Application software

3.2.2.1 System Software

The system software consists of standard programmes, which control the hardware and co-ordinate the running of various applications. The system software comprises of:

(a) Operating systems;
(b) Languages translators (compilers and interpreter); and
(c) Utility software.
3.2.2.2 Applications Software

Applications software denotes those computer programmes that are developed for specific applications like material systems billing and dispatch, financial accounting etc. These programmes are custom designed to suit the existing systems and procedures in the organization.

The common application softwares available in the market are:
[i] Word processor;
[ii] Database management system;
[iii] Integrated software packages;
[iv] Graphic packages;
[v] Statistical packages;
[vi] Decision support systems; and

3.3 Indian Library Software Packages

There are a number of indigenous library software packages developed by library professional or computer experts for in-house use of library automation for specific functions. Some agencies have developed library softwares on a commercial basis for general application in libraries. For developing small background study only a few softwares are reviewed below.

3.3.1 DELSIS

DELSIS is a fully menu driven package developed by the Developing Library Network (DELNET). This software is basically a networking software developed on Basis plus. The
features of this software are OPAC facility, provision to search by full or part of the name of author, corporate body, editor, joint author, title, series etc., duplicate checking and allowing Boolean search. DELSIS is having a powerful indexing technique. All DELNET databases, online Inter-Library Loan facility etc are based on the DELSIS. Index is generated automatically and there is online help available for every operation.

3.3.2 DELDOS

This package is developed by the DELNET for DOS environment. The speciality of this package is that it is easy to use. The MARC records of books in English as well as in other Indian languages can be created using GIST card. Salient feature of the software include deletion and printing of selective range of records in MARC format and user-friendly data inputting. Editing of records is very simple and fast. Global value can be defined during worksheet design. Export/import can be done in ISO 2709 format.

3.3.3 DEL-WINDOWS

This is the third software developed by DELNET. As the name implies it is basically for Windows 95 platform. It can generate MARC details of books published in English and other Indian languages using GIST card. Another feature of this package is that online help facility is available. OPAC facility as well as duplicate checking is also there (Vasanth and Mudhot, 2000).

3.3.4 LIBSYS

This package was developed by Libsys Corporation, New Delhi. It is an integrated multi-user library system designed to run on a wide spectrum of hardware/software platform in
client/server environment. It is easy to operate and the library staff can use it without having much computer skills. LIBSYS supports almost all activities in the areas of acquisition, cataloguing, circulation, serial control, articles, indexing and abstracting OPAC and union catalogues. It runs on various platforms like UNIX, NOVELL, LAN, and Windows/DOS etc.

3.3.5 ARCHIVES
It is an integrated software package developed in multi-user FoxPro based by Minilax Electronics Pvt. Ltd., Bombay. It is a comprehensive package offering acquisition control, serial control, cataloguing, circulation control, information storage and retrieval and SDI.

3.3.6 E-GRANTHALAYA
E-GRANTHALAYA is easy menu-driven user friendly DOS, UNIX, LAN version software package for library automation developed and distributed by INDODOC. It is a flexible package to suit any type of library.

3.3.7 LIBMAN
LIBMAN software was developed by Datapro Consultancy Services, Pune. It is an user-friendly package designed for small and medium libraries. The menu driven packages incorporate the functional features of automatic retrieval data files, handling books and periodicals, double level access, details of members, listing of fines and loan register facilities. The double level access information comprises: restricted one for members and unrestricted one for libraries.

3.3.8 LIBRA
It is multi-user, multilingual, user-friendly package available from Ivy System Ltd., New Delhi. It facilitates house-
keeping operations such as acquisition control, circulation control, serial control, cataloguing and on-line retrieval. LIBRIS generated the bar code labels at the cataloguing stage.

3.3.9 LIBRARIAN

Librarian is library management software package developed by computer professionals in consultation with experienced library professionals. This library management software is developed by Mudra Electronics, New Delhi. It is developed in Fox base and C and works on DOS, XENIX or Novell Netware. It is used for computerising, cataloguing, circulation, serial control, acquisition, budget control and bibliographic services.

3.3.10 UNILIB

This package is fully integrated, multi-user, easy to operate and menu driven package. It ensures maximum productivity, minimum data entry requirements and efficient search and query facilities. It has two level security features ensuring privacy to each user and library staff. It is developed by Hindustan Computer Ltd., Bangalore for medium and large size libraries run under UNIX/XENIX environment (Patel and Bhargava, 1995; Khan, 1998).

3.3.11 SOUL

Software for University Libraries also known as SOUL has been developed by INFLIBNET Centre, Ahmedabad as a total solution for library automation and management. This software was designed after a comprehensive study of different library related functions practiced in university libraries. The software contains modules viz. acquisition, cataloguing, circulation, OPAC serial control and administration.
The Online Public Access Catalogue (OPAC) of SOUL is a window to the library collection. Using its user friendly menu, user can search for an item available in the library by author, title, corporate author, conference name, subject descriptor, class number etc. The Boolean search enables the user to conduct the search using all combinations including type of materials, language, year, etc.

The SOUL is available free of cost to university libraries. It is a suitable package to work under university environment. Moreover, the network feature of the software allows multiple libraries of university to function together.

3.3.12 PALMS

Prasad Automated Library Management Systems (PALMS) software is developed by R.C. Prasad, Scientist (Library and Documentation) and is distributed by Nutan Software and Publishing, Almora, U.P. It is a menu-driven user-friendly single and multi-user networking package that runs under DOS environment. This package is used for database management and for information services such as SDI, CAS and Bibliographical services.

Other features of the package include report generation, automatic book number system, data protection, fast speed, query facilities, compatibility with other software packages, etc.

There are several other software packages available in India for library automation and bibliographic database management, viz., CALIBLAN, CATMAN, COLLIB, LIBERATOR, LIBRACE, UNILIB, LIBRES, LIBSOFT, LIST PLUS, MECSYS, SALIM, SUCHKA, ILMS, GODISBY, MEMLIB, ULIBYS, WILIBYS, MACTRAYEE, BASIC PLUS etc. The choice of any particular software by user should be based on the
specific applications, previous experience in computerization and the trained personnel available. The other considerations are case of training, easy to use, compatibility, system features, functions, performance, hardware requirement, cost, helpful in the context of library networks and resources sharing (Varalakshmi 1992; and Reddy, 1994).

3.4 Computer Networks

Computer network is a group of computer or computer systems linked together with the help of communication links. This enables different users located apart to have simultaneous access to the same information available at one point in the system. It consists of various combinations of computers, terminals and related equipment connected by data communication facilities. In computer network terminology, hardware components are called 'node' and communication facilities are called 'links'. The specific types and combinations of nodes encountered in a given computer networks will vary with the networks topology or structure. Computer networks also vary in their geographic spans and the type of communication facilities they use.

Computer networks are often categorized by their geographic spans as follows:
1. Local Area network (LAN)
2. Wide Area Networks (WAN)
3. Internet

3.4.1 Local Area Network (LAN)

Local area network is a communication network connecting devices in a local area, such as college campus, a school, an office building or a library. A local area network is a data communication network for independent device capable
of autonomous operation. In many local area network installations, designated nodes function as servers, which provide particular resources to other network nodes.

Local area networks typically utilize telephone wires, sometimes described as twisted-pair wiring or coaxial cables as communication links. Fibre-optic links can also be utilized (Sharma, 1996).

3.4.2 Wide Area Network (WAN)

A wide-area network is the counterpart of a local area network. It is a communication network that operates over a large geographical area, including worldwide. WAN may utilize a combination of leased telephone lines, fibre-optics terrestrial microwave, satellite microwave and other high-speed linkages that permit long distance communication. The best-known example of a publicly accessible wide area computer network is the Internet. It is actually a collection of networks that interconnect computers in universities, government agencies, scientific laboratories, corporations and other organizations. Some of the successful networks in the world are OCLC, INIS, AGRIS, MEDLARS, British library, etc.

3.4.3 Internet

Internet is a global network of networks. It is a world wide web of inter-connected university, business, defense and science networks. It is made up of Local Area Networks (LANs) and huge Wide Area Networks (WANs) of the world. The Internet has become not only an important search device of the research and development community but also of political activists, farmers, librarians, journalists, scientists, biologists and many others (Ojha, Dave, and Sharmam, 2000)

In fact, it is a network of thousands of networks, which communicate among themselves using a single set of
software, which are generally known as protocols. In Internet environment such protocols are termed as TCP/IP (Transmission control protocol/Internet protocol). When a number of computers use these protocols they are said to be Internet worked. The TCP/IP protocols can also be used on local area networks without actually being connected to Internet. Such networks are termed intranets. However, if they are connected, they can have access to all other computers and databases situated worldwide and use their resources. The computers, which are part of the Internet, are called hosts (Singh 1997).

The Internet, intranet and extranet are revolutionary in increasing effectiveness and knowledge of the use of information. Internet is a worldwide information net used for searches, communication and E-mail. The term 'intranet' refers to a computer network built taking Internet technologies in which access is restricted to a particular group of users, typically employees of a company. Extranet is a two-way net allowing customers and business partners access to company’s intranet (Watson, 1999).

3.5 Hardware Components of Network

Networking hardware includes all computer, peripherals, interface cards and other equipment needed to perform data processing and communication within the network. For successful transmission as well as receipt of data via network, it is necessary to have the following hardware's:

3.5.1 Bridge

A bridge consists of a computer with two or more network interface cards connecting two different types of networks. For example, one interface card might connect to an Ethernet System, while a second card connects to a Token
Ring System. These two systems speak two entirely different data languages that are recognized by the other.

3.5.2 Gateway

A gateway is used when simply transferring data between networks is not enough. Some network systems (in particular mainframe or minicomputers-based systems) require specific instructions on how data is to be managed once it is received onto the network. A gateway is also required to connect two or more networks that are running on top of different Operating Systems (OS).

3.5.3 Network Interface Card

It is the key component of the network workstation. Its chief purpose is to send data out, onto the network and receive data sent to the workstation in which it resides. Each network card is manufactured with a unique, permanent electronic address. The licensing system allows the manufacturer to encode a unique address on the card. This licensing system ensures that no address is ever duplicated.

3.5.4 Terminal

A terminal is a device that allows users to transmit data and receive data from a computer or other information processing machines. Terminals designed for interactive applications can be categorized in number of ways. With respect to their electronic circuit, terminals can be categorized as dumb, smart or intelligent.

3.5.5 Modem

The public telephone network has been routinely employed for data transmission for several decades. But it was originally designed to transmit the continuously varying
analog signals characteristic of the human voice. The discrete, digitally coded signals generated by online terminals and other computing devices must consequently be converted to analog form prior to transmission and reconverted to digital form following reception. This conversion process, which is termed 'modulation and demodulation', is performed by modem.

3.5.6 Hubs

Hubs are used to inter-connect the terminals and servers. All the networks (except those using coaxial cable) require a central location to bring media segments together. These central locations are called hubs. A hub organizes the cable and relays signals to the media segments.

3.5.7 Server

It is powerful computer, which runs special software to act as a file server and it is completely enclosed logical structure, which is secure against accidental or malicious abuse as it can be accessed only through Network Operating System (NOS) (Buman and Lal, 1998; Saffady, 1994; Dhiman, 2000).

3.6 Database

The term database broadly denotes an integrated accumulation of computer possible data organized in a manner suited to a wide range of applications. The data is stored so that it is independent of programmes, which use the data; a common and controlled approach is used in adding new data and modifying and retrieving existing data within the database. The intention of database is to allow the same collection of data to serve as many applications as useful. Databases may be classified into four categories:
1. Bibliographic databases
2. Numerical databases
3. Textual databases
4. Online databases (Varalakshmi, 1992; Reddy, 1994).

### 3.7 Impact of Information Technology

#### 3.7.1 Information Technology

Information technology is a recent pervasive and comprehensive term. For many people information technology is synonymous with the machines, microcomputers, automated equipments, word processors and the like. The significance of the introduction of a new term ‘Information Technology’ is the belief that the principles, practice and terminology of information handling can be treated on a unified systematic basis. Information Technology is a generic term used to denote all activities connected with computer based processing, storage and transfer of information. The words ‘documentation’ and ‘information sciences’ are considered synonymous to Information Technology. It includes computers, electronic media, satellite, telecommunication and reprography. Therefore, Information Technology is convergence of computers, telecommunications and information. Information Technology can also be described as the whole range of processes for acquisition, storage, transmission retrieval and processing of information. Information Technology is the science of information handling, particularly using computers to support the communication of knowledge in technical, economic and social fields. Information Technology could effect society, organizations and people in ways other than making jobs more interesting and improving productivity etc. (Rao and Sainul, 1999).
Information Technology can be regarded as a major economic factor in the development of post-industrial society. The production and sale of Information Technology goods has revitalized some sections of economy and to a small extent, replaced some of the losses, brought about by the decline in manufacturing. Information Technology is also an enabling technology. It can contribute to economic growth and development by reducing costs, improving and/or extending services, and strengthening competitive advantages. With the advent of Information Technology revolution and Information society, in the present era, information as an indicator of wealth or power has become a vital and dynamic resource for the socio-economic development of a nation. The growth and prosperity of a nation depends greatly on the timely acquisition, processing and transmission of information. Information has become highly tradable commodity enhanced by its easy access via information technology. Information Technology is the synthesis of computers and communication technology. The management of information forms a wide range of sources that is a basic ingredient in the success of any library (Srivastava, 1995).

The volume of information being generated around the world is increasing enormously that the libraries simply cannot manage the huge amount of information manually without the use of Information Technology. Libraries need to keep abreast of modern information processing technologies and sources of information for effective management of large information. The potent mix of improved digital computers, telecommunications networks, optical storage media, falling hardware and software prices enable libraries to gather, process, store, retrieve and disseminate huge quantities of information easily, quickly and inexpensively (Saxena and Srivastava, 1998).
The word Information Technology is a combination of two words. One is Information and the other is Technology. Information means knowledge, can be a bit or a para or a page. Technology refers to the use of computer and communication. Information Technology means the application of computer and communication technologies for gathering, processing, storage, retrieval and dissemination of information.

3.7.2 Definition

❖ ALA Glossary defines Information Technology as ‘the application of computers and other technologies to the acquisition, organisation, storage, retrieval and dissemination of information’.

❖ According to Albeit, Information Technology can be defined from the Library and Information Science point of view as ‘application of various technologies for the acquisition, processing, storage and dissemination of information. The term various technologies include micro-electronic based computers, telecommunications, reprography and printing’.

❖ UNESCO defines Information Technology as ‘The scientific, technological and engineering disciplines and the managerial techniques used in information handling and processing; their applications; computers and their interaction with men and machines and associated social, economic and cultural matters’.

Information Technology has been concerned with the use of computers and communications to gather, store, process, retrieve and disseminate information. The focus of the Information Technology has been on the speed, efficiency, economy and accuracy in processing information.
Technology used in libraries includes not only computers but also telecommunications, networks, storage and a wide range of their related technologies (Upadhyaya, 1997).

3.7.3 Advantages of Information Technology

A wide variety of advantages can be derived by the appropriate use of Information Technology. Information Technology advantages can refer to anything useful produced with the assistance of technology, which allows completing more tasks with greater accuracy and better quality in less time and for lower costs. It could be higher productivity, better quality or it might be less tangible like ensuring users to have a better image of the library, improved response time or improving staff morale and motivation. In certain nature of jobs, an hour of manual work is possible for completion within minutes through Information Technology. Perhaps, there may not be any area of operation or service where you cannot apply Information Technology and get benefits in the following ways.

- Information Technology helps to avoid duplication of effort and work in library operations.
- Information Technology facilitates cooperation and resource sharing through library networks.
- Information Technology helps to introduce new services and improve existing services.
- Information Technology allows integration of various library operations.
- Information Technology facilitates faster information communication.
- Information Technology helps to increase the quality and range of services.
> Information Technology increases morale and motivation of library staff.
> Information Technology facilitates easy and wider access to all kinds of information sources.
> Information Technology helps to increase efficiency and effectiveness in library operations.
> Information Technology helps to improve productivity and image of the library (Upadhyaya, 1997).

3.7.4 Relevance and Need

There are a number of reasons for which Information Technology is becoming a subject of wide-ranging discussion and study. From a social point of view, Information Technology promises in the way we communicate and reach decisions. For example, Telephone, Radio and Television opened out horizons for individual and society at large and so placed at the disposal of people information about distant events and new ideas. This has not only helped us to understand some of the complexities of the surrounding world but also in turn increased that complexity by making possible a greater degree of interaction among people.

If Information Technology is not going to be used, then the society becomes handicapped, because the socio-economic development of a nation depends upon the availability of adequate infrastructure to access the modern information, which is an essential ingredient in day-to-day decision-making process, necessary for some of the following reasons.

1. Advantages like speed, accuracy and reliability in the process of information due to introduction of Information Technology. This also helps customers in performing the search quicker and with precision.
2. Due to escalation of prices of periodicals and books, no library can afford to acquire all the publications. This necessitates an active resources sharing among libraries.

3. Literature in almost all the fields is increasing tremendously in a multidimensional way. It is posing a major problem to have bibliographic control on the basis of manual operations. This is only possible through computer application.

4. Information seeking behaviour of the users is also changing. To cater the needs of the users storage capacities of information as well as retrieval techniques should be applied to supply them with modern information.

5. The aim of the modern library services is to provide right information to users in appropriate time, form, cost and place to help them to take right action.

   The Information Technology has brought the people of the globe nearer. Although application of the information technology is only about 20 years old, yet it has revolutionized the information services. In libraries universal availability of bibliography is difficult to achieve, but Information Technology has made it possible in reality. Concerted efforts are on to adopt the Information Technology in all spheres of activities (Singh, 1980).

3.8 Information Technology in Academic Libraries

   The first and foremost Information Technology component, which can be adopted in an academic library, is the computer for library automation and to have an in-house database of library holdings in electronic form. As many primary journals are being published in CD form, it becomes necessary to equip the academic libraries to optimize the use of information. E-mail, Online retrieval networking, multimedia and Internet are the other important technologies,
which can be used for faster access to information. Information Technology enables one:-

a) To capture, store, manipulate and distribute information.

b) To introduce and provide new services, revitalize the existing services by providing faster access to the resources, by overcoming the space and time barriers;

c) To provide need based retrospective search services to the users.

d) To utilize the staff for providing better information services.

e) To encourage networking and resource sharing at local level.

f) To digitize the documents for preservation and for space saving.

g) To support library functions such as circulation, serials control, acquisition control, stock maintenance and other office works and developing in-house database.

h) To retrieve and disseminate the information in user denied format.

i) To access library catalogues databases of other libraries through library network.

j) To improve the efficiency of library function.

k) To improve the cost effectiveness of library operations (Rajgopalan, 1981).

Information Technology professionals and end users holds promises as 'productivity tool'. The real challenge comes in delivering quality information, the information that people really need and facilitating information sharing. IT has revolutionized the collection, storage and dissemination of
information in the libraries and information centers (Suiyanarayana, 1996).

3.9 Application of Information Technology on Operations and Services of College Libraries

The single force that has brought revolutionary changes in functioning of libraries is information technology. Libraries use Information Technology to increase the efficiency and effectiveness of their operations and services. Information Technology has virtually immense potential for a variety of applications in libraries. Information Technology helps libraries in creating databases of their collections and making them available for easy access to users inside as well as outside through networks. In an automated library, once databases are developed in the computer, many services like bibliographic service, indexing service, CAS, SDI etc. will be automatically generated from them and the users can have direct access to them. Information Technology offers a variety of computer based information products and services including access to external databases, CD ROMs etc. Networking has enabled libraries to share their resources more effectively, especially in the present days of increasing document prices and decreasing library budgets (Sehgal, 1998).

Information Technology enables libraries to provide most efficient and specialized information services. It has been fairly established that efficient information support and effective communication in an organization are closely associated with high performance, productivity and innovation (Rao and Sainul, 1999).

Computers can be used in performing most of the repetitive works of library in a desired number of times.
speedily and economically without fatigue and wastage of time.

Most of the operations within library are inter-related, inter-dependent and mutually supportive for the overall mission of the library. Use of Information Technology applications to interface and integrate each function with the other saves lot of staff time, as the same data need not to be entered at every stage. Data once entered in machine readable form can be used repeatedly in different operations for various purposes. The use of Information Technology with its immense capabilities of acquiring, storing, processing, retrieving and disseminating information with high speed and accuracy has made a tremendous impact on the overall functioning of libraries. Many libraries have already started using Information Technology for various library operations, such as acquisition, cataloguing, circulation, serials control and information services (Srivastava, 1995).

3.9.1 House Keeping Activities

3.9.1.1 Acquisition

Acquisition is a primary house keeping activity of any library which relates all operations involved in the procurement of information resources, starting from request to received ordered items to generate accession number through which books are accessed. Automated acquisition helps in selection, ordering, procuring books and other library materials. It also helps in preparing subject-wise budget allocations. In acquisition system three different files are used namely (a) order file (main file); (b) vendor file; and (c) request file. In this process, computers enable libraries in making use of the same data available in different files without entering it again each time. It helps in performing important activities in
A large number of booksellers and library suppliers are now offering online access to their databases. Book in print database is also available through several online search services. Online searching could easily do duplication checking and bibliographic searching. Order can also be sent electronically to any one at any time.

3.9.1.2 Cataloguing

The catalogue acts as the key to the resources of the library. It is working tool for using the library collection properly. It provides the principal interface between the user and library collection. Preparing catalogue cards manually is labour intensive and time consuming process, and hence it needs automation. Automated catalogue is the most efficient tool in retrieving information about the documents in a library easily and quickly. Catalogue of holdings can be prepared easily on the computer by importing the bibliographic details of the documents from acquisition file with additional data from library staff. Once the catalogue of holdings is available on the computer, the documents can be searched, retrieved and rearranged in any way as desired. The automated cataloguing system addresses two interrelated facets of cataloguing: descriptive cataloguing and the preparation and production of library catalogues. The automation of descriptive cataloguing depends on the availability of cataloguing copy in machine-readable form. The MARC project of the Library of Congress, which began in 1965, is the most significant development in the field of library automation. The
Library of Congress developed the MARC format for the communication of bibliographic data on magnetic tape and began distributing machine readable catalogue copy. Other national libraries and library organizations have established similar programmes. UNIMARC format was made in 1975 for universal user.

CD-ROM as cheap mass storage alternatives, today provides many national bibliographies and catalogues on it to economically download the required data for library automation and also to carry out quick and authentic cataloguing (Saffady, 1994).

Library automation has finally introduced Online Public Access Catalogue (OPAC). Such catalogues are playing a very important role in information retrieval. OPACs can be used in a particular library using either a multi-user system or a Local Area Network (LAN). Secondly, with the emergence of internet, OPACs can be accessed by other libraries or users. Availability of catalogues on internet allows anyone to see the contents of various library collections without moving from his desk (Singh, 1999).

3.9.1.3 Circulation

Circulation of information sources is one of the important operations of a library. This section deals very delicately with the user's community. Circulation procedure in conventional system is very lengthy and consumes much of the staff time in repetitive works. Circulation control is one of the most widely automated sections in libraries. The use of technological devices such as computers, barcode scanners and its software in circulation helps in performing these routine operations easily and quickly. It saves lot of time of the staff as well as users. It helps in maintaining up to date
membership records and in finding out latest status of documents under circulation. It involves operations like issue and return of books, renewal and reservation of books, sending reminder notices, calculation and collection of overdue, maintenance of membership records, circulation statistics, stock verification, etc. It also provides summary statistics on all transactions. The data files used in this system are: (a) main file (b) user file (c) document file (d) reservation file. Main file records all loans and contains the record of each book available in the library stock. The other files contain information about users, documents and reserved books.

A number of vendors offer turnkey system and pre-written software for the computerisation of circulation control. All pre-written circulations software packages and turnkey system support the charging and discharging of library materials, online file inquiries about the status of circulation items and borrowers and off line report production (Kannappan, 1996; Venkatasrama, 1998).

3.9.1.4 Serial Control

Serial control is considered one of the most complicated technical process carried by a library. It forms a primary function of the university library. Serial control is absolutely considered to be a sort of mini library, as serial control involves all the function of the library i.e., acquisition, cataloguing, and circulation. Automation in serial control helps in handling and processing of serials more easily, quickly and economically.

Computers help in periodicals subscription and subsequent monitoring of the receipts of individual issue. Computerized serial management is easier to detect and control the non-receipts of the periodical issues by sending
timely reminders to supplies. It helps in maintaining records of budget sanctioned and amount spent for different categories of serials. Automated serials control helps in creating a database of journals with all the details. It involves operations like processing new subscriptions, processing renewal subscriptions, order placing and invoice processing, receiving and recording issues, claiming missing issues, maintenance of list of periodicals and serial holdings etc. Current serials automation activities are directed towards two types of tasks: bibliographic control and the establishment of definitive bibliographic information about serial publications.

Among automated approaches to this task, Bowker offers machine readable version of its various printed guides to serial publications, including Ulrich’s International Periodical Directory. The Library of Congress has also developed a MARC format for serial publications and participates in the CONSER programme. The purpose of the CONSER programme is to establish and maintain a high quality, machine-readable database of serials cataloguing records. The objectives of automated serial control systems are to handle the serials and maintain holding lists. In order to achieve the objectives, the system should have the functions like entering serial data, ordering new serials, ordering of presently subscribed serials, cancellation of present subscribed serials if required, accession of individual issues and preparing the various lists.

Software’s like PROQUEST and ONDISC provide extensive facility to monitor and record usage of CD-ROM databases. The possibility of generating journals usage report in an alphabetical order in systems like that of PROQUEST enables one to build a library specific list of journals for collection evaluation (Sridhar, 1997; Venkataramana and Rao, 1998).
3.9.2 Information Services

The primary job of information professional is to link the user with the appropriate information. An information service aims to provide the answer(s) to a user's question(s) or information needed, regardless of its complexity or the length of time it takes to find the information. An information service is concerned with users and their needs. It is concerned with the utilization of resources. This means for a library both its own stock and what is available to it from elsewhere, for instance through computer networks. Computer based automation was initially incorporated into library operation as a mechanism for handling the routine functions of running a library. The array of electronic resources available in libraries today is an outgrowth of the changes in information delivery made possible through advances in both computer technologies and information storage and delivery mechanisms. Libraries are experiencing a significant impact of IT on information processing, sources and services. Development in IT made information sources available in different formats such as floppy, CD-ROMs, networks, databases and multimedia. Libraries have to make efforts to facilitate user's access to these information sources.

3.9.3 Reference Services

Reference service is considered as the hub of all library activities, the supreme and ultimate function of the library and the very essence of librarianship. It helps to maximize the use of a library. Traditionally, reference services were limited to the boundary of library walls, but over the past few years users have become increasingly involved in using information sources that are not limited within the library buildings and search services not necessarily intermediated by human beings, such as CD-ROM and remote online data bases and
more recently the virtual and digital libraries available through the web. Present libraries are passing through an exciting phase of transformation under the impact of information technology.

A number of reference tools are now available in CD-ROM form accompanied by sophisticated search and retrieval software and multimedia information. Search logic such as Boolean, Keyword, etc. with option to save and store search queries, download words on the discs for processing, highlight words for looking up corresponding dictionary part, consulting 'path to article', placing 'bookmarks to review', etc. are available in the CD-ROM reference tools. Like secondary journals, many reference tools are costly, often under used, bulky to store and involve lot of time and efforts to search by end user as well as library staff. Hence, reference sources on CD-ROM are much more useful than traditional printed books and provide services much higher in value and can be used with least interference by the reference librarian (Sridhar, 2000).

3.9.4 Information Search Services

The computer based handling of ready reference questions and literature search depends on the availability of machine-readable reference sources. Since the late 1960s, many publishers of printed indexing and abstracting journals and bibliographic reference tools have offered machine-readable versions of their products for use by libraries and other organizations. Historically, these bibliographic databases have been most widely encountered in scientific and technical disciplines, but much recent attention has been given to their availability in the social sciences, humanities and business. A growing number of reference services have
been developed specifically for use in computer-based systems and have no printed counterparts.

Today the Encyclopedia Americana, Encyclopedia Britannica, Everyman’s Encyclopedia and other encyclopedias are available as non-bibliographic databases accessible through the online search services. Several reference tools are also available in CD-ROM editions such as the Oxford English Dictionary, International Encyclopedia of Education, McGraw-Hill Concise Encyclopedia of Science and Technology, etc. (Saffady, 1994; Sambasivam, 2000).

3.9.5 Indexing and Abstracting Services

While organizing information services in a modern university library, the provision of indexing and abstracting services should also be made. Indexing is a method of document representation, the ultimate aim of which is to provide access to the users through the description used. Abstracts are great value to a user in quickly assessing the value and utility of a particular article to his work. An abstract saves the time of the user from going through the entire article to decide the relevance of an article.

The abstracting and indexing journals with their quarterly, semi-annual, yearly and sometimes even five-yearly communications and varieties of indexes cost heavily in terms of subscription price, binding changes and storing space. On the other hand, budget crunch faced by most of the libraries is forcing them even to cancel subscription to some of the secondary journals. The arrival of CD-ROM version of these tools in the market at this juncture with their versatile searching, efficient retrieving and post-search processing facilities is a timely boon to libraries. CD-ROM databases are
giving a good break in promoting the use of secondary journals.

A subject index can be produced using information retrieval software or a DBMS by reformatting the record layout and sorting on index terms in separate fields. Browseable thesauri are available in packages such as micro CAIRS and indexed terms can be scanned in DBMS software such as card box plus (Kochar and Sudharshan, 1997).

3.9.6 Current Awareness Services (CAS)

Current Awareness Services are those information services whose primary intent is to keep information users alert to advances in their fields. Traditionally, current awareness services have been provided by libraries and information centres simply by sending photocopies of the contents pages of all newly acquired materials such as books, journals, conference papers, reports, etc. to all the users of a library or by informing the users about recently added records in a library or in a database through in house publication called current awareness bulletins. Traditionally, CAS is mundane, less attractive, bulky and often obsolete and only adds to information overload of users. Tailoring them to small user groups, making them really current, electronic and online and creating a healthy competitive spirit among users having similar interest through these current awareness services is only possible by information technology.

Bibliographic databases including ‘current contents’ on CD-ROM with versatile software are the logical and efficient replacement of bulky and underused secondary journals. An innovative application of CD-ROM databases is providing regularly the contents (with abstracts) of costly and/or less relevant journals as well as those cancelled for various reasons.
Provision of increased opportunity to browse latest literature has become simple and easy with IT in both core as well as related/peripheral areas, and carrying current awareness services to the workshops and laboratories of otherwise busy (Sridhar, 2000).

3.9.7 Selective Dissemination of Information (SDI)

Selective dissemination of information is a procedure for supplying each user or group of users with the reference of documents relating to their centres of interest selected from the descriptions of all the documents received during the period in question. The main aim of SDI is to save the user's time by not providing materials, which is of no interest. In order to do so, a search strategy consisting of the users' interests (expressed in relevant terms) must be created and stored permanently, though with the ability to amend it as interests change with time. CD-ROM databases have made it a simple as developing as profile in the form of a search query and storing the query in the PC for execution with every update of CD-ROM databases received. SDI is also available direct from the large database producers and suppliers such as COMPENDEX, INSPEC, BIOSIS etc. Some of the online systems operate market online SDI, DIALOG, SDI searches give an automatic printout every time certain databases are updated (Kochar, 1997; Sridhar, 2000).

3.9.8 Document Delivery Services

Traditionally speaking document delivery service includes only lending service. This means the routine circulation job offered in any and every library. But with the extended concept of the document delivery service, the scope
of this service has gone much beyond the delivery of hard copies or the original documents. Thus, the general and broad form of document delivery service includes delivery of both the primary and secondary services. Generally, providing primary sources (full-text) is the circulation job through access to full-text databases (original) is available in a limited way.

The influence of information technology on library management and operations has resulted in changes in the mode of consulting and delivery of library resources. Access to information across borders in no time to browse/download has become a common practice. Electronic journals and other such electronic access to large databases have revolutionized the modes of delivery of information. Sitting at one's desk, information can be sought quickly and easily through the national and international networking. Today many users employ powerful microcomputers and workstations, which enable them to travel electronically through a variety of devices to reach other computers. Via matrix of interconnected networks, they transfer files to their own computers for their personal uses and exchange all types of information-bibliographic and non-bibliographic electronically with user worldwide (Amudhavalli and Florence, 1996).

The telefacsimile is ranked as the most sophisticated electronic system for the delivery of Inter Library Lending (ILL) requests and documents transmission. It facilitates an extremely rapid transmission of data. The most useful implication of this technology is the reduction of the turn-around time for ILL service to an absolute minimum. With the application of e-mail, libraries are able to make rapid transmission of ILL. Short messages, factual figures etc. can be transmitted to any place within a matter of few minutes.
The modes of document delivery services have not only become multi-faceted but sophisticated with the application of technology. The CD-ROM and compressed video, for example, provide a way of storing textual as well as pictorial data in a compact manner. Multimedia technology allows the incorporation of video and audio into the computer storage and reply facility. Electronic libraries that exist in virtual cyber space can use the multimedia to deliver data innovatively (Amudhavalli and Florence, 1996).

3.9.9 Information Retrieval Services

Catalogue is the key to the collection of library. It provides the principal interface between the user and library collection. Searching catalogue cards manually is a time-consuming process, and hence, it needs automation. Data processing or computerization can also be used for information retrieval. Computers help in compiling bibliographies and also in providing documentation services. The last few years have not only seen computers replacing manual methods of information retrieval, but also the introduction of many kinds of computer retrieval systems. Some of these are located far away from users but can still be accessed rapidly even by many hundreds of users simultaneously. Others are installed locally in the library.

Online Information Retrieval Systems (OIRS) has complete text of document, surrogates (such as abstracts) or bibliographic citations (such as title, author, imprint, collection etc.). A system that provides the user with full texts of documents is called a document retrieval system, whereas a system that presents only the bibliographic citations is called a reference retrieval system. A retrieval system has usually operated in several stages e.g. its first output may be in the form of citations from which the searcher can make a
selection. Subsequently, the searcher can go for retrieving the complete texts of these selected items and so on. A number of OIRS have been developed which provide for interface between the user and the database. This interaction usually consists of two parts: (i) search interface, which permits the user to input queries and receive results; and (ii) instructional interface, which aids in understanding and using the systems and the databases (Devi, 1998; Rashid, 1996; Sharma and Raina, 1995).

Information retrieval system can be grouped and categorized in several ways such as:

3.9.9.1 Online Public Access Catalogue (OPAC)

Online Public Access Catalogue are the keys to a library's collection because they allow users to find out about what books, journals, conference proceedings, reports and so on, are available in the collection. Online public access to a library's catalogue has over the last few years become an increasingly aspect of library service provision. The continued enhancement of search facilities has brought the benefit of library computerization directly to the hands of library user.

Users have facilitated easy access to library collections and indeed many libraries that have implemented on-line catalogues have quoted a substantial increase in levels of usage of library and this has often been a key argument in favour of their installation. The rapid retrieval and the interactive capacity with online systems which permits the search to be modified dynamically as the session progresses, through the use of standard online search capabilities such as keywords access, Boolean combinations, truncations and limiting search results by date, publishers, language or material format (Payen, 1984; Freiburger, 1983).
Many commercial establishments offer customized OPAC on CD-ROM with excellent search software, exhaustive and accurate coverage and improved catalogues. Users will have more efficient, versatile, accurate, user friendly OPAC which often indicates how to locate them on shelves and availability in other libraries including spoken help, browsing shelf list, closed access racks and branch libraries, auto help screen and logged record of searches made (Sridhar, 2000).

3.9.9.2 CD-ROM

CD-ROM has been developed as a medium for the storage and retrieval of large volumes of computerized information. CD-ROMs have an indispensable role to play in the dissemination of electronic information and are finding a special place in the rapidly growing digital libraries. Libraries use the CD-ROM for storage of a large set of information or retrieval of the stored information. Many databases like abstracting and indexing services are now available on CD-ROM. CD-ROMs with built-in simplified menu driven software provide easy access to most comprehensive database.

3.9.9.3 Internet

Internet is worldwide communication system, which links together a variety of computers with distinctive software and hardware. These computers are Internet worked to allow them to communicate by translating messages into a mutually understandable language referred to as communications protocol. The protocol used by the Internet is called TCP/IP.

The vast interconnection of computers provides an ideal infrastructure for sharing resources. The Internet allows users to transfer files between incompatible computers and send messages across the global and login to databases thousands of kilometers away with the blink of an eye. It offers a variety
of services used to create, browse, access, search, view and communicate information on a diverse set of topics ranging from the results of scientific experiments to discussions of recreational activities. The sources of information available on the Internet are electronic journals, electronic books, preprints, technical reports, library catalogues, e-mail based information services, scientific data sets, patents, standards, directories, dictionaries, encyclopedias, reference sources, content pages of journals, databases, online educational materials, Usenet news etc. All these sources provide a great wealth of information to the users (Obenaus, 1995; Seng, 1998; Kaur, 2000).

3.9.9.4 Networks

The combination of computers, databases and telecommunication has led to the creation of information networks. Since no library is self sufficient, libraries of one region/nation are coming together to share their resources and services by using modern telecommunication facilities. This type of facility helps to link up with the international information system. The participating libraries are termed as nodes. The most popular network systems are Wide Area network (WAN), Metropolitan Area Network (MAN) and Local Area Network (LAN). We can access the information from any corner of the world based on the modern telecommunication facilities available today.

UGC is contemplating INFLIBNET for College and University libraries in India, and efforts are being made for the success of the INFLIBNET programme (Kasirao and Babu, 1998; Varnalakshmi, 1992).
3.9.9.5 Electronic Mail

The term 'Electronic Mail' or simply e-mail has different connotations. However, its main characteristic can be said to be the transmission of material from place to place or person to person, using electronic methods of capturing, transmitting and delivering information. Electronic mail is a message service using electronics and telecommunication to deliver hard and soft copy information. The messages are composed and sent messages (Varalakshmi, 1992; Saffady, 1994).

3.9.9.6 Facsimile

Facsimile, also known as telefacsimile or simply fax, is the oldest of the image oriented message transmission technology. This enables the user to transmit the entire document faithfully to the other end (Gardner and Shortell, 1997; Bernam, 1999).

3.9.9.7 Online Searching

Online means the state of being in direct, immediate communication (online to) that the database one wishes to interrogate and to the computer on which this database is loaded. Online searching is the computer assisted retrieval bibliographic citations. It means searching, where in the search is processed while the user is connected to the computer, thereby allowing the user to interact with the computers and adapt the search according to the computer's responses.

Online information retrieval involves searching remotely located databases through interactive communication using computers and communication channels. The phrase online searching was originally used to describe the process of directly interrogating computer system to resolve particular requests for information. Now the phrase is used to denote
searches that are conducted by means of a local computer that communicates with a remote computer system containing databases. Users can access the database(s) via an online search service provider (also called vendor). The search process is interactive and the user can conduct the search repeatedly until a satisfactory result is obtained.

With the advent of the Internet and World Wide Web online searches can be conducted on information sources that are distributed all over the world. To search these information sources, users can go directly to the web address of an online service provider or URL (Uniform Resource Locator) to log in to the service. Web-based online search services such as Dialog Web, Ovid Online, OCLC First Search etc., provide fast and easy access to online databases with numerous search and retrieval facilities. The qualities of online search services coupled with the advantages of the web have brought significant developments to online search systems and have made online searching more directed towards the end users (Rowley, 1999).