Chapter-1: Introduction

The purpose of this chapter is to present an overview and nature of research study undertaken and the key factors that were influential in its inception. The chapter commences with the introduction explaining the statement of the problem; concept; background; definitions; usage; scope and purpose of the study. The chapter further describes the hypothesis and differentiation between library mechanization and automation. This is followed by the scenario of automation in United States, Europe and developing countries. The chapter moreover details about most popularly used Library Software Packages in India.

1 Background Information

The term library is understood to have been reaped from the Latin word ‘liber’ connoting book(s) placed in an organized manner for the purpose of use. The term traces its lineage back to preservation of written records to preserve human communication and is considered to have begun in the historic age. The library in historical terms is assumed to be collection of graphic materials arranged for easy use, taken care of by an individual(s), familiar with that arrangement and available for use by at least some persons. However, with the trends of time libraries turned to an organized collection of general information and literature for the purpose of their utilization (Johnson, 1965). Libraries were assumed to be responsible for harboring the functions of collection, organization and circulation of their meager sources and services, but the phenomenal progress in technology and exponential growth in information made it obligatory for librarians to adopt new techniques and technology in order to cope up with the emerging circumstances.

Like any other field, libraries were also at the threshold of information communication technology. The developments of which made the role of otherwise unused libraries, multi focal and multipurpose. Since centuries, Libraries have been most vibrant agents in transforming knowledge usually organized in print form; however, the application of machines to process and transfer this knowledge in a better way represents modernization of libraries.
Modernization, nonetheless, with itself brings the new challenges that creates issues and concerns and lay added stress on any questionable area of prevailing structures. Although, there is high degree of cooperation between the prevailing and current technology primarily dominated with the computers, but the later one have an advantage over the old as it is equipped with qualities that better accommodate current circumstances. (Webb, 1987).

The introduction of computers in various sections of libraries such as acquisition; cataloguing; circulation and periodicals offered libraries a new look. The primary interest of automating such operations does not designate elimination of man in favor of machines, but the choice of both in the tasks best suited to each. Computer technology offered hardware and software and conceptual foundations to build automated library system, where optimum use of man and machines is exercised to enhance the library operations and services (Heiliger & Henderson, 1971). Thus technology, hardware and software only provide a sketch that frames automation, but does not imply elimination of manual effort in libraries for disseminating knowledge. Automating rather, is primarily aimed at effective and efficient utilization of resources in minimum duration with least cost and effort, yielding maximum output and benefits both for library and their patrons. Since, technology has been producing wonders and will perhaps continue to renew and redefine every discipline and activity. Similarly, the unending development of computer technology brought library world to a new horizon where user friendly and economically flexible software packages are readily available; thereby, making librarians judicious to compare the strengths and shortfalls of different packages and choose the package for installation that is most appropriate to suit the requirement of both librarians and their end users.

1.1 Library Automation: Concept

Library automation refers to a technical phenomenon of computerizing or automating the traditional library activities and services such as acquisition; cataloguing; circulation; serial control; information services and other related activities. Thus, the application of computers to perform various routine,
repetitive clerical functions and services of libraries in an efficient and automatic manner is designated as library automation.

Throughout 20th century, Librarians have practiced with technological devices to help libraries in improving their in-house operations and services to their patrons. Library automation has been exploited both narrowly and broadly to the devices and efforts that consolidate the foothold of technology in library operations and services. Some have paralleled it with library mechanization while others used automation in the context of close co-operation of computers and libraries. Library automation as known now, has come a long way since mechanical devices notably typewriters, telegraphs, telephones and other accessories followed by punched cards and sorters were exercised in libraries. The purpose of applying these accessories was to eliminate the burden of muscle movement in the libraries, while the revolution that computers had in other fields was left to be realized in future. However, the elevation in mechanization and simultaneously the development in computer and communication technology steadily replaced the application of mechanical accessories with computers. Significantly, the growing exercise of these computers in libraries restructured and remodeled their operations and services (Wedgeworth, 1993).

The concept of automation has a long history. The early Greeks, seeking freedom from the routine toil and drudgery of labor, conceived of devices that might take over certain tasks. The word automation has been derived from Greek word ‘automatos’ meaning “self acting”. It refers to an apparatus, process, or system that is capable of operating by itself in an unassisted manner (Savage, 1996). Library automation is the performance of an operation, a series of operations, or a process by self activating, self controlling, or automatic means. Automation implies the use of automatic data processing equipment such as computer or other labor saving devices (Young, 1983). While mechanization eliminated the muscle movement in libraries, automation on the other hand exploited machines in process and transmission of information. The remarkable progress in computer technology resulted in the development of
more efficient hardware and software. The application of such hardware and software in libraries differentiated the concept of library automation and served as a breakthrough in processing and communicating information in a networked environment.

1.2 Definitions

Though there is globally no accepted connotation of library automation as some people call it as Mechanization some Computerization, while some prefer to recognize it as Automation. Nevertheless, due to its broad spectrum of coverage library automation has been variously defined by number of authors, the notable among which are encapsulated hereunder:

**The New Oxford American Dictionary (2001)** is of the view that automation is “the use of largely automatic equipment in a system manufacturing or other production processes.

**The New Encyclopedia Britannica (1973)** visualizes automation as a system in which there is significant substitution of mechanical, electrical or computerized action for human effort and intelligence and put forth an operation is commonly described as automated, if it is substantially more automatic than its predecessor.

**Swihart, Stanley and Hefley, Beryl. F (1973)** describes library automation as the processing of certain routine clerical functions in the library with the assistance of computers or other mechanized or semi-automatic equipment.

**Halsey (1987)** in collier’s encyclopedia reflects library automation to industrial movement that started in US in early 1950’s and defined it as a concept of production (integration of machine tools into a fully automatic and in some cases self regulatory system) automation which he defines as means considerably more than the clever coordination of a series of machines.

**Wedgeworth (1993)** envisions Library automation as a “term applied both broadly and narrowly to the tools and activities that incorporate technologies into library operations and services.
Dutta (1993) connotes “Library automation” as “computerization of house keeping activities and information retrieval function generally carried out by a library”.

Bazirjian (1995) however, visualizes library automation as the migration to second generation library system.

Tyre (1995) defined Library automation as “flexible new muscle” extending its reach and making connection.

Head and McCabe (1996) connote library automation as the flexibility of a system that managements can choose to use them in ways that occurred with their wishes. Zubbof however, is of the view that library automation is a process that helps to reduce various library operations to the smallest possible components.

Cohn, L. Kelsey and Keith (2002) are of the opinion that library automation no longer reflects only to computerize operations in a discrete, physical place, but has assumed a wide frame of reference namely that of enabling the library user to reach beyond what is merely local to an information and knowledge base that is truly global and interconnected.

Feather and Sturges (2003) in international encyclopedia of information and library science, exemplifies library automation as a blurring of the notion of the library collections as seen as located in physical place.

The design and implementation of ever more sophisticated computer systems to accomplish tasks originally done by hand in libraries is what Reltz (2004) feels about library automation.

The invention of mechanical means like telegraph and typewriters followed by the major breakthrough of punched cards and sorters, improved the otherwise limited functions and services of libraries. The application of these mechanical devices played a key role in attracting wide attention of users towards libraries. Henceforth, the accomplishment of manual operations and services by mechanical accessories forged the new concept that came to be known as library mechanization.
Library mechanization was endeavored at handling complications and burdens of bulk, weight and distance at redeeming muscle and movement with machine, while automation is the name given to automatic or self controlling system of working environment (Riaz, 1992). Viewed on this background, mechanization is practicing with mechanical devices with chief intervention of mental and manual effort to accomplish repetitive clerical activities and services of libraries. However, due to its shortfalls it could not sustain for long, but paved the way to the development of an advanced concept of library computerization. The advancement in communication technology, computer hardware and software packages globalized library computerization which often in modern terminology is taken as library automation.

Library automation is an automatic or semi-automatic means of processing certain clerical functions, operations and services with the patronage and support of computers; hardwares; softwares; online products; CD-ROMs and LANs; etc. (Swihart & Hefley, 1973). Against this background, library automation differs from that of mechanization, in a way, where in place of principal intervention of manual and mechanical effort, computer systems; hardwares; softwares; communications facilities; online and networked environment are practiced to execute different library operations and services.

1.2.1 Historical Background of Library Automation

Libraries have long sought technological aids to facilitate and enhance their services and to provide broader and more convenient access to traditional form of information processing. The impact of automaton on librarianship has long been an inviting subject in professional literature. In this regard, the innovations ranging from printing press to typewriters and then to micro computers had affected wide spectrum of library operations and services which extended from the description of an item to its circulation (Voight, 1956). Though, Automation in libraries is said to have begun in 1930s with the use of punch cards in circulation and acquisition sections. However, the focus of this period was that information could be stored and re-used and that machines could take these punch cards and can be programmed to perform predetermined
operations. The overall automation had begun with a librarian ‘Herman Hollerith’ of US Census bureau who invented punched cards which were first used in University of Texas for Circulation control. Another development in this direction was book charging machine used by Montclair Public Library in 1942 in New Jersey.

Library of Congress in 1950, developed book catalogue with the aid of punched cards, but till 1960 most of these were used in special libraries. During the decade of 60s, a small number of Universities, corporate and large public libraries in US and UK put their efforts in the development of in-house library automated system. This period gained the idea of computers in libraries and led to the explosion of library automation in 60s and 70s. In 1961, HP Luhn experimented computers in libraries to provide Keyword-in-Context (KWIC) index for articles in Chemical Abstracts. In the same decade, libraries ushered in the era of standards for exchange of data. By the mid 60s, library of congress used computers for producing Machine Readable Catalogue Records (MARC) with the purpose of creating bibliographic databases of library catalogues, which led to the development and adoption of MARC practices and established shared cataloguing cooperatives (Saffady, 1989). Quickly after MARC, Library of Congress begun MARCI followed by MARC II project for venturing in shared cataloguing among the number of US libraries.

The decade of 1960s gained the momentum of computer application in libraries, the following decade ushered in an online era. It has only been in 80s that automation has become feasibility, rather than a goal for future for large number of libraries. During the decade of 70s, a range of online services became available offering access from a computer terminal in library to bibliographic databases on remote computers. In 1974, a significant development took place when MARCII became basis of a standard, incorporated by National Information Standards Organization (NISO) USA. During the same period, US Department of Defense and Advanced Research Agency developed ARPA.net to link centers working on military research. By the end of the year, computers at the University of California and University of
Utah were connected to ARPAnet. In the following year, the University College of London and Norwegian Royal Radar Establishment became first international sites to connect ARPAnet. The original applications of ARPAnet were Telnet, FTP and email for exchanging messages. The people recognized the usefulness of sending messages among themselves, thus turning email into “Internet”. Although, it may not have been ARPAnet’s main priority, it ensured that internet became entrenched in the daily lives of millions of persons (Keefer & Tomas, 2001).

The internet had revolutionized communications in academic and research communities in the developed world by about 1990. But, its breakthrough into wider world was a development of mid 1990s associated with the World Wide Web. The emergence of private sector Internet Service Providers (ISPs) was another aspect of Cyber revolution of late 1990s. From 1995 onwards, the Microsoft Network (MSN) was integral part of windows operating system which dominated the personal computer market around the world. The companies such as Freeserve in UK and America Online (AOL) in USA were competitors in this direction (Feather, 2004). Now, widely utilized by libraries of all types and sizes, online search services were divided into multidisciplinary services that include DIALOG; BRS; ORBIT; WILSONLINE; DATASTAR and ESAIRS that provide data range of varied range of subjects for broad clientele and specialized services like National Library of Medicine (NLM) Search Service, STN International; LEXIS and WESTLAW that provide online access to one or more databases relevant to a single subject discipline, profession or activity (Saffady, 1989).

With the substantial increase in the use of micro computers, the commercial system for searching reference database such as DIALOG and Bibliographic retrieval services begun. By the early 70s, some major breakthrough like Online Computer Library Center (OCLC’s) cataloguing project which went online in 1971 and similar project by University of Toronto Library Automation Systems (UTLAS) occurred in library technology. The OCLC’s project was remarkable development that facilitated technical

These BALLOTS were designed to integrate closely with technical processing of library and contained wide search and retrieval capability by using truncated words, keywords and Library of Congress Subject Headings (LCSH). The decade of 70s, brought another trend in library automation which consisted growth of storage capability; expansion of telecommunication capability and development of computer industry. This decade also witnessed the emergence of other online networks like RLIN, WLN and development of In-house circulation and existence of ‘Turnkey’ systems that allowed libraries to obtain hardware and software from vendors for automating their library systems (Reynolds, 1985).

With the rapid development of low cost micro computers, the library automation during 80s became possible for all sizes of libraries. At the same time, technology provided faster chips, additional Random Access Memory (RAM) and storage capacity leading to decrease in the size of computers which expanded use of micro computers tremendously into home, schools, library and offices. A significant invention has been Online public access catalogue which replaced card catalogue in the early 80s (Riggs, 1992). By the same decade, a number of automation packages became commercially available for standard functioning of acquisition, cataloguing, circulation and serials control, all in one software package which helped to spread library automation in countries other than US and UK. The micro computers of 80s became useful tool for libraries, which put them to use from word processing to reference, circulation and serials. With the rise of computer networking by late 80s and early 90s, libraries begun to set up and purchase their own computers as well as to connect with other established networks. Many of these networks were not developed by librarians, but vendors, who supplied libraries with systems from
cataloguing to circulation. Additionally, various other software like: spreadsheets; word processing; data managers; dBase; Lotus 1-2-3; desktop publishing and searching for information through CD-ROMs became common during this period (Wallace & Joan, 1989). By the introduction of CD-ROMs containing softwares and databases, libraries in late 80s gained information in variety of options and remain connected to outside databases such as OCLC, DIALOG and RLIN. In this decade, information through CD-ROMs became more accessible than previously possible through print.

The decade of 90s, saw significant development in library automation systems. It is by this decade, that widespread use of computers and internet was witnessed in libraries. Now, wider choice integrated library automation systems consisting Acquisition; Cataloguing; Circulation; Serials control and Online Public Access Catalogue (OPAC) modules were offered by vendors. The training and maintenance services provided by these vendors further eased automating library procedure. By this decade, the use of networks for e-mail; ftp; telnet; internet and connections to online commercial systems saw remarkable growth. The World Wide Web (WWW) begun to use at large scale in libraries. Libraries became able to connect to inter library loan systems with ever improving telecommunications. The expert systems and knowledge systems became available in this decade as both software and hardware capabilities have improved. The application of these expert systems improved productivity of processing more books, conducting more searches and serving more users each day. With the approach of new millennium, Integrated Library Management Systems offered user friendly Graphical User Interface (GUI), and through hypertext technology, users are referred to other resources like electronic journals and other full text materials from in-house bibliographic or online public access catalogue records (Intuitive Products International, 2011).

Now-a-days, most of the major academic, special and public libraries of the world have installed integrated systems or are planning procurement and implementation of such systems to help librarians in providing effective access
to information resources held within the library or elsewhere. Technological developments will perhaps continue to open new opportunities for libraries to provide efficient, exhaustive and expeditious information services and to link them worldwide irrespective of any barrier (Lynch, 1991). But at the same time, librarians have to be ready to face the challenges that technology with itself will bring to the working environment of libraries. Against this background, it is said that technology has empowered libraries and has achieved all time success in improving their operations and functions for the sole purpose of better information delivery to users.

1.3 Significance of the study

The research study undertaken here to assess the “Usage and Effectiveness of Different Software Packages” in the Libraries of Indian Institute of Technology (IIT); Delhi, Indian Institute of Technology (IIT); Kanpur and Kashmir University will be useful in addressing the obstacles and problems of automation in these libraries. The study will instill, inculcate and stimulate the libraries and research centers which are yet far away to foresee the certainty of great deal of progress and development that automated systems had on libraries.

In addition, the study will be useful and instrumental for librarians, library and information specialists and other inter-disciplinary persons who somehow in one or the other way are engaged or interested in planning for automated library systems. The study will furthermore be useful and helpful for future researchers and students to foothold their knowledge base and will provide roadmap in guiding them in the areas that impinge their interests. The comparative study will moreover find its utility for faculty of the field in remodeling the curriculum by paying attention to the software packages that to a large extent meet most challenges of library world in present scenario. Hopefully, the study will also be useful in keeping the library profession and its professionals vibrant among other professions in the contemporary technology driven world.
1.4 Scope and Limitation of the Study

Libraries, like other fields have also adopted computers for providing better and efficient services to their users and subsequently, the application of computers altered and remodeled the whole structure, scenario and working environment in libraries. Since, it was not possible to cover all the universities or all the IIT’s in the present work, the researcher has therefore chosen a topic covering IIT Delhi, IIT Kanpur and Kashmir University in this study. An attempt has been made to carry out an in-depth study of the above mentioned institutes’ library.

1.5 Purpose of the study

The purpose of the study undertaken by the researcher is to assess the “Usage and Effectiveness of different software packages” that are being used in the Central Libraries of Indian Institute of Technology (IIT); Delhi, Indian Institute of Technology (IIT); Kanpur and Kashmir University. A comparison will enable to find out the strengths and weaknesses of different packages used in these libraries. In addition, the purpose will also be to assess whether the packages used by the select libraries are catering the needs of these libraries and their heterogeneous users in present technology dominated world.

1.6 Objectives of the Study

Library automation constitutes an important aspect of large public and academic libraries on which the efficiency and effectiveness of various housekeeping activities of the whole library system depends. As such there are many automated libraries in India which play a key role in disseminating the information to their users at their desktops. However, the present study revolves around the three prominent libraries, namely Central Library, IIT Delhi; P. K. Kelkar Library, IIT Kanpur and Allama Iqbal Library, Kashmir University.

The study has been undertaken with the following objectives in view:

➢ To provide a critical analysis of library softwares used by the select libraries and their operations to make specific suggestions for improvement.
➢ To examine the status and application of various modules of library automation software in the surveyed libraries.

➢ To investigate the staff competency in handling different applications of library software in Central Library, IIT Delhi; P. K. Kelkar Library, IIT Kanpur and Allama Iqbal Library, Kashmir University.

➢ To assess the impact of training provided by the vendors on the staff of select libraries.

➢ To highlight the role of library software in the enhancement of services of libraries under study.

➢ To investigate the role of OPAC in the increased usage of library resources in the surveyed libraries.

➢ To examine the satisfaction level of users with the overall services provided through automated library system.

➢ To suggest the scope of improvement in library services through library automation software.

1.7 Hypotheses

Libraries of IITs and Academic Universities are regarded as heart and hub of the intellectual activities of their entire institution. The importance and necessity of these libraries in a country like India cannot be underestimated as various research and developmental activities in different disciplines like: Engineering; Computer sciences; Material sciences; Biological sciences; Chemistry; Physics; Astronomy; Humanities; Arts; Social sciences; etc. are being conducted in a favorable environment.

To study the Usage and Effectiveness of different Software packages in the Libraries of Kashmir University, IIT Delhi and IIT Kanpur, the following hypotheses may be formulated.

1. There is a significant difference in the awareness of library softwares among the users of IITs and Kashmir University.

2. The usage of OPAC is higher in the libraries of IITs than in the library of Kashmir University.
3. The users of IITs are more well-versed with the advanced search techniques in OPAC than the users of Kashmir University.

4. The library staff in IITs is more equipped in handling the software than their counterparts in Kashmir University.

5. All the surveyed libraries are using all the modules available in LibSys and Virtua softwares respectively.

6. The user satisfaction level with respect to the overall services of automated library system is higher in IITs than in Kashmir University.

7. More training is required by software vendors for the effective usage of all modules of both the softwares i.e. LibSys and Virtua.

1.8 Library Automation: Worldwide

Library technology like other fields, witnessed the supremacy of United States and United Kingdom. Though the lineage of term ‘library automation’ is traced back to 1930s, when punch cards developed by ‘Hollerith’ were first used in Acquisition and Circulation systems, but in actual practice computer application begun to use in libraries in 1960s. The application of computers ushered American and British libraries in the era of computerization. Against this background, different techniques were introduced during mid 20th century for streamlining circulation system, but the efforts taken during this century were by and large revolving around improving the manual system. However, some attempts were aimed to introduce mechanization to reduce the work of charging system (Martin, 1949). In addition, Texas University used photo charging system by making use of punch cards and Unit Record System of IBM which focused on machine readable data.

During the subsequent quarter century, a number of other libraries incorporated IBM’s Unit Record System into their Circulation procedures. In this regard, IBM’s Montclair system which resulted in most sophisticated automated Circulation system in pre computer era was an outstanding exception. But despite its proven success, the use of automated circulation, because of its non-cost effectiveness never reached great proportions in libraries. Till 1950s, the practice of automation in terms of machine readable
records had not become widespread, as they were in limited use in circulation section. However, their use in Illinois Public Library made greater impact on acquisition section. The interest of computer application in libraries surfaced during 1950s and reached broader level in 1960s. Later, in this decade computer application introduced off line batch processing in libraries to enhance acquisition; cataloguing; circulation and serial control sections. By the mid 60s, more than 80 American academic libraries which shortly extended to 150 libraries, computerized their circulation system. Similarly, acquisition section was also computerized. During early 60s, several libraries like University of California and San Diego attempted to go beyond the listing of serials by implementing procedures for check-in and clearing (Salmon, 1969). One of the most important landmarks of this decade was the evolution of Library of Congress MARC format.

The decreasing size and price of computers lead to the development of mini-computers. The emergence of mini computers ushered libraries in the era of online automation. Between late 60s and 70s, three trends like in-house projects, ‘bibliographic utilities’ and pre packaged ‘Turnkey’ automated systems evolved in the development of online library system. The first of such system was Illinois State library system. In 1967, Midwestern University in Wichita Falls Texas implemented online circulation system and in 1968, the Booth library at Eastern Illinois University in Charleston operated its own version of online circulation system. In the same year, Washington State University (WSU) library designed acquisition system, while university of Laval in Quebec set up online serials control system. By the decade of 70s, a number of academic libraries begun to incorporate mini computers in their circulation operations. The outstanding example was that of Ohio State University that facilitated users to search the item by all numbers, title key and a combination of author title key (Reynolds, 1985).

There were other large research libraries interested in online integrated system during this period, but actual implementation could be done only after several years of design, planning and experimentation. The Northwestern
online Total Integrated System (NOTIS), the Chicago Library Data Management System and Stanford University’s Bibliographic Automation of Large Library Operations (BALLOTS) were three famous large scale efforts. The impact of BALLOTS, because of its adoption of RLG on American librarianship during 70s and 80s has been greater than any other system (Wayne, 1974). By the mid 70s, automated efforts in technical processing turned to shared systems. Ballots remained exemplary illustration of in-house system and became basis of networking system first among California libraries and then to wider area of western America (Fayllot, 1972). The evolution of OCLC, RLG, WLN and UTLAS in 1967 extended their use by early 80s to several thousand North American libraries. Although, some libraries continued to develop their own in-house system for certain library functions, it was apparent by mid 70s that automated cataloguing was evolved in different directions and basis of this transportation was OCLC. In 1971, OCLC went online and though during its first year of online operation, OCLC remained a cooperative venture of Ohio academic libraries, but within four years, the number of libraries using OCLC increased to 800 (Research Libraries Group, 1978).

### 1.8.1 Library Automation: An Indian Scenario

After witnessing great deal of progress and development that computers brought to the libraries of developed countries, a number of developing countries also envisioned the importance of computers in libraries and subsequently efforts were made for implementation of Information Technology (IT) in libraries.

In this regard, Indian Statistical Institute (ISI), Calcutta was the first to install computer system in 1955, but as far the application of computers in Indian libraries is concerned, Indian National Scientific and Documentation Center (INSDOC) was possibly the first to computerize author and subject indexes of Indian Science Abstract (ISA) in 1965. However, in 1967, INSDOC brought out roster of ‘Indian Scientific and Technical Translators’ with the help of computers. In 1973, INSDOC with the help of computers brought out first
union catalogue by the name of “regional union catalogue of scientific serials” Bombay-Poona. In 1978, it initiated SDI service as a National Information System for Science and Technology (NISSAT) project with chemical abstracts and INSPEC databases with the use of CAN/SDI software of Indian Institute of Technology (IIT) Madras. In 1970s, many libraries ventured in preparing computerized databases. Through the initiative and financial assistance of NISSAT, many library networks like: CALIBNET; DELNET; INFLIBNET; PUNNET; NICNET; INDONET and SIRNET were notable networks that became operational (Sharma, 1995).

Nevertheless, presently many institutions are engaged in imparting training for application of computers in library work through number of sponsored, ad hoc and regular refresher courses. Against this background and with emerging technologies and falling price of computer hardware and software, special libraries attached with research and development organizations along with College and University libraries attained prominent place in India. Though the progress towards automation initially received lukewarm response, but with the adequate grants from University Grants Commission (UGC) and respective State Governments, the number of academic and public libraries to automate their operations and services have been increased (Sharma, 1995).

1.9 Software packages popularly used in India

Software is a set of programs written or developed to enable the computer to do desired operations. Application software is a software, developed or written to enable the computer to carry out specific functions required by particular group of users. Library automation software package are application softwares that contains modules for all the specific activities that may concern a particular user group like a software containing modules for Acquisition work, Cataloguing, Circulation, Serials control and Documentation, etc. (Sharma, 1993). Although, research centers and special libraries of the nation were in the forefront in developing library software packages, but most of the packages developed by them did not met library and user needs effectively, and hence
did not last long. Though number of library software packages are available both at national and international level. However, the most popularly used software packages in Indian libraries are discussed here:

1.9.1 SOUL

Software for University Libraries (SOUL) developed by an inter university center Information and Library Network (INFLIBNET), is an integrated library management software for College and University libraries of India. The software is used to automate academic as well as other types of libraries. The centre (INFLIBNET) responsible for design and development of this software provides downloading and mailing list facility to address the problems associated with installation and operation.

➢ Modules

SOUL is known for its following user friendly modules:

- Acquisition
- Catalogue
- Circulation
- Online Public Access Catalogue (OPAC)
- Serials control and
- Administration.

➢ Standards

SOUL is user friendly software, designed on Client-Server architecture. The software is compliant to international standards like: AACR 2; CCF; MARC21 and ISO 2709 standards for bibliographic formats, networking and circulation protocols.

➢ Platform

SOUL operates on Windows 98/2000/XP/NT operating systems. The software supports multi platforms for bibliographic databases such as MYSQL, MS-SQL or any other popular RDBMS.

➢ Users

SOUL is most popular library software, being used in more than 2016 libraries in India. University, College, Institution, District and Public libraries across the
country use this software for automating their housekeeping operations to provide better and efficient services to their users (INFLIBNET, 2010).

1.9.2 LibSys

LibSys is an integrated library automation software package developed by Info Consultants Software Company, New Delhi. Its continuous growth and global recognition popularized it as standard package for Indian academic and special libraries. The open system architecture and continuous transition from host multiuser to client-server and finally web based solution makes LibSys an advanced multi dimensional library system. The powerful and user oriented web OPAC along with Windows based OPAC makes it an outstanding option for library environment. The software with its multi-lingual nature handles both Indian as well as international scripts. The package with continuous growth and development has generated LibSys suite comprising different LibSys products like LSEase; LibSys7; LSPremia; LibSysX and LSDigital for digital libraries.

- **Modules**

As integrated library management software, LibSys package contains following Modules.

- Acquisition
- Cataloguing
- Circulation
- Serials control
- Article indexing and
- Online Public Access Catalogue (OPAC)

- **Standards**

LibSys is built around its own centralized bibliographic database on MARC format supporting various types of materials in print as well as non-print form. The software is compatible to international standards such as CCF, USMARC, OCLC, MARC and non MARC formats. Being Indian in origin, LibSys is also compatible with CCC.
Platform
LibSys package operates on Windows NT, UNIX, Linux and NOVELL operating systems. LibSys can be made available on any preferred RDBMS such as Oracle or SQL Server.

Users (international)
The package as an integrated library management software has got global acknowledgement and is being used in some foreign countries like: National de Universidad, Cost Rica (USA); University of Moratuwa, Sri Lanka; University of Jaffna, Sri Lanka; and University of Kelaniya, Kelaniya Sri Lanka.

Users (National)
LibSys is another popularly used library software package in Indian libraries; more than 1000 Indian libraries are using this package for better and efficient services to their users in an automated environment. Some of the major Indian libraries that use LibSys for automating their operations and services are: IGNOU, New Delhi; AMU, Aligarh; Madras University, Chennai; Allahabad University, Allahabad and Rajasthan University Jaipur (LibSys Corporation, 2008).

1.9.3 Alice for Windows
Alice for Windows is an integrated library automation package that effectively and efficiently manages and controls library operations performing all functions that a modern library system requires. The vast experience of Alice has proven it reliable and achieved the status of leading library automation software of the world.

Modules
Alice for Windows is globally known for the robustness of its modules. The software contain following modules:

- Acquisition
- Circulation
- Management
- Periodicals
- Journal indexing
Besides the main modules, the software have some sub modules like Union catalogue; Inter library loan; Rapid retro; SDI; Z39.50 server and Library services.

➢ **Standards**

Alice for Windows supports USMARC format; however, the software does not support Unicode standards.

➢ **Platform**

Alice for Windows operates on Windows NT platform. Alice for Windows; however, does not require Relational Database Management System (RDBMS) as it runs on its own database.

➢ **Users (international)**

Its international association has around 17000 installations all around the world and more than 80 offices around the globe. Softlink Asia which markets and promotes Alice for Windows has installations in countries like Sri Lanka, Bangladesh, Maldives, Nepal and Pakistan.

➢ **Users (National)**

At present the Alice for Windows has about 250 users in India which makes it one of the popular software used by Indian libraries for automating their operations and services. Some of the major Indian libraries that use Alice for Windows are: Union Public Service Commission (UPSC), New Delhi; Centre for Environmental Planning and Technology University, Ahmadabad; Central Marine Fisheries Research Institute Cochin, Kerala; Dhirubhai Ambhani International School, Mumbai; Indian Agricultural Statistics Research Institute, New Delhi; Indian Institute of Management (IIM) Ahmadabad; Indian Institute of Petroleum Management (IIPM), Gandhinagar; NIRMA University, Ahmadabad and many more *(Softlink Asia, 2007)*.
1.9.4 Granthalaya
It is a complete library automation package, designed and developed in FoxPro by Indian National Scientific Documentation Center (INSDOC) New Delhi. INSDOC is marketing and promoting this package for library automation in Indian libraries and research centers.

➢ Modules
Granthalaya software contains seven modules. Since the package has different modules, the library can implement either complete package or acquire stand-alone module depending upon the needs of the library. The modules of package are:

- Data Administration
- Query Circulation
- Acquisition
- Serials control
- Technical processing and
- Library administration

➢ Standards
Granthalaya is compatible with CCF and facilitates import and export of data from ISO 2709 and ASCII format is also possible.

➢ Platform
Granthalaya package operates both on MS-DOS platform and UNIX platform.

➢ Users
The package is used by many Indian libraries. However, some of the major libraries that use Granthalaya software are National Science Library, INSODC, New Delhi and Nuclear Science Center Library, New Delhi (Saxena & Srivastava, 1998).

1.9.5 Suchika
Suchika is an integrated software package for library automation, designed and developed during 1996 by Defense Science Information and Documentation Center (DESIDOC), Delhi for its Defense Science Library and other libraries
and Technical Information Centers of Defense Research and Development Organization (DRDO), scattered all over India.

- **Modules**

Suchika comprises different modules, either all modules may be implemented at one time, or modular-wise implementation can also be made depending upon the needs of the library. The modules comprise:

- Acquisition
- Circulation
- Online Public Access Catalogue (OPAC) and
- Serials control

- **Standards**

The package is compatible with international standards like CCF, ISO 2709 and AACR 2 and allows data conversion from Computerized Documentation System/Integrated Set for Information Systems (CDS/ISIS) etc.

- **Platform**

The package has been developed in C++ language and is available on MS-DOS and UNIX version platforms keeping in view the requirements of big and small libraries of DRDO.

- **Users**

The package is used in many Indian libraries and Technology Information Centers. It’s both DOS and UNIX versions have been implemented at Defense Science Library, New Delhi. DESIDOC has also decided to offer this package to non-DRDO libraries at nominal prices to help them in their automation (Saxena & Srivastava, 1998). DESIDOC has also developed Defense Library Management System (DELMS) for use in its library and libraries of DRDO. It has facilities for all housekeeping activities and services.

- **Platform**

DELMS is available on UNIX, Xenix and DOS platforms. The Package uses COBOL programming language (Sharma, 1993).
1.9.6 Maitreyi
This package has been developed by Computer Maintenance Corporation of India (CMC) for Calcutta Libraries Network (CALIBNET) with the support of NISSAT. It is the first package which has been developed in India for library network program, providing specific network and communication facilities.

➢ Standards
The package uses TCP/IP as communication software with X.25 protocol in addition to library management functions.

➢ Platform
The package has been developed on INGRES as the underlying framework and works in UNIX platform (Saxena & Srivastava, 1998).

➢ Users
CMC Calcutta is marketing and promoting this package for automating housekeeping activities and services in Indian libraries. This package is also used by many Indian libraries for automating their operations and services.

1.9.7 Sanjay
This library software package has been designed and developed by DESIDOC, Delhi with the support of NISSAT, by augmenting CDS/ISIS (Ver 2.3) to cater the needs of library management.

➢ Platform
Sanjay version 2.0 operates on MS DOS Version 3.2 or above (developed by augmenting CDS/ISIS (Ver 2.3).

➢ Users
The package is marketed by NISSAT, New Delhi at nominal price. Sanjay software has been implemented in many Indian libraries. However, Technology Bhawan Library and Indian Oil Corporation (IOC) (R&D) libraries, New Delhi are some of the major libraries, where this software is being used (Saxena & Srivastava, 1998).

1.9.8 Virtua
Virtua is a Windows based Client-Server library automation software package application developed by Virginia Technology Library Solutions (VTLS) Inc;
the first library automation vendor at Blacksburg USA. The software is an Integrated Library System and is acknowledged by more than one thousand eight hundred libraries in forty two countries across the globe. The software is based on six technologies: Relational Database Management System (RDBMS); Rapid development tools; three tier Client Server architecture; database ware housing; Unicode support and ATM network optimized applications. These technologies facilitate database management handling, software development and network delivery.

➢ Modules
Virtua has achieved global recognition by virtue of its robust features and modules. The software is versatile with following modules.

- Acquisition and Fund Accounting
- Cataloguing
- Circulation
- Serials control
- Online Public Access Catalogue (OPAC)
- Statistics and Reporting
- Chameleon Gateway.

➢ Standards
To provide robust foreign language capabilities, Virtua uses the Unicode standard which is designed to support all major languages. The software supports all formats. It accommodates different versions of MARC standards such as USMARC; UKMARC; CANMARC; SEWMARC; etc. Besides above, Virtua is also compatible with MARC 21 format.

➢ Platform
Virtua is a Windows based Client-Server architecture. The software operates on UNIX and Linux operating systems and uses Oracle Relational Database Management System (RDBMS).

➢ Users
Although Virtua is one of the leading library software in the world; however, because of its non-cost effectiveness, it is not as widely used in Indian libraries.
as the above mentioned softwares. Nevertheless, some Indian libraries like National Library, Kolkata; Jawaharlal Nehru University (JNU), New Delhi; Central Institute of Indian Languages, Mysore, IIT Madras and Kashmir University, Srinagar are using Virtua software for better and efficient automation of their operations and services (VTLS, 2008).

1.9.9 LIBRIS

LIBRIS is a comprehensive library management system optimizing the utilization of library facilities by members and management of library functions by the library staff.

➢ Modules

This package consists of different modules like:

- Acquisition
- Cataloguing
- Circulation and
- Periodicals

➢ Platform

LIBRIS is available on INGRES, ‘C’ languages and can be used in single user version on MS-DOS platform, while as on Multi user version; it can be used UNIX platform.

➢ Users

LIBRIS software package is used by many Indian libraries; however, State Bank College, Jawaharlal Nehru Technological University, India International Center, Physical Research Laboratory, Sri Venkiteswara Central library and Electronics Corporation of India Limited are some of the major institutions that have used LIBRIS package for their library automation (Ravikumar, 1995).

1.9.10 TULIPS

Tata Unisys Library Information Processing System (TULIPS) is a comprehensive library package developed at TUL Bangalore Center for better and faster information dissemination to users as well as computerization of certain housekeeping activities of libraries.
Modules

This package like other packages also has different modules like:

- Acquisition control
- Cataloguing
- Circulation
- Serials control and
- Utilities

Platform

TULIPS software package is developed under Oracle and uses RDBMS. The package operates on UNIX platform.

Users

This package is also used in some Indian libraries for automating their library system. American Studies Research Center, Hyderabad and Ramakrishna Institute of Culture, Calcutta had also installed this system (Ranjan, 1995).

1.9.11 Librarian Ver 3.0

This software package is a codeless library management package developed by Soft-Aid, Pune. It is a menu driven and user friendly software used by persons having little or no previous background of computers.

Modules

Librarian software package has following modules:

- Cataloguing
- Circulation
- Serials control
- Acquisition
- Budget control, and
- Bibliographic services.

Platform

Librarian package operates on DOS (Ver 3.2) and above in single user mode. While as multi user mode operates on Xenix and Novell Network (Ravikumar, 1995).
1.9.12 WINISIS

WINISIS is a Windows version of Computerized Documentation System/Integrated Set for Information Systems (CDS/ISIS). It is information storage and retrieval software developed by UNESCO to satisfy the needs of many institutions, especially in developing countries. The software supports three languages: English, Arabic and French. No conversion is needed when moving from CDS/ISIS DOS TO CDS/ISIS for windows

➢ Standards

Data interchange function is based on the ISO 2709 international standard used by leading database producers. CDS/ISIS for windows (WINISIS) fully supports MARC 21 format.

➢ Users

Though the earlier versions of this software was MS-DOS based, but still it was used in many small libraries and corporate libraries, as well as some sections of large academic libraries in India for their automation. However, due to the availability of standard integrated library management software in Indian market, a very few libraries are still using WINISIS.

1.10 Resource Sharing through Automation

In 1974, Research Libraries Group (RLG) comprising Harvard; Yale; Columbia and New York public library was set up with the objective of resource sharing, collection development and preservation and conservation of library materials. However during 70s, Washington State library designed an online bibliographic system which went Online in 1977. By 1978, the Washington Library Network was used in 12 public and 9 academic libraries in the state and 2 other libraries in Alaska, while 3 libraries in Idaho and 1 in Oregon later joined WLN (WLN Reports, 1979). In the same year, University of Toronto Library Automation System (UTLAS) was established in Canada, but its impact on United States has been limited. By the end of the decade, UTLAS increased its membership to 200 libraries and later extended to US and Japan.
Though, WLN, OCLC and RLIN made tremendous impact on American librarianship during 70s in providing Online cataloguing, but their impact on Circulation, Acquisition and Serials check-in was negligible (Reynolds, 1985). However, commercial vendors of automated library system in the area of online circulation handled other technical processing. In this regard, Computer Library System Inc. (now CLSI) at Cleveland public library in 1972 was the early commercial vendor. The first effort involved Acquisition system but soon it turned attention to Circulation with the development of LIBIS 100 system which came to known as “Turnkey system”. By 1975, five commercial vendors were offering Turnkey automated circulation; however in 1977, several new vendors like DataPhase, Geac and Universal library system entered the market. But, CLSI was more powerful with 177 installations and more than 300 other libraries using it. The fastest growing competitor was Data Phase with 50 installations, followed by Geac with 22 and Gaylord, active since 1978, had 11 installations by 1981. In 1977, the Plessey Online Circulation system became popular in Great Britain and had 9 users in USA and Canada (C. L. Systems, 1981).

The early 80s represented an intense period in the development of online catalogue. However, since mid 80s, Online catalogue implementation have been dominated by Integrated Library Systems (ILS) which combine database management and catalogue access capabilities with Circulation control, Acquisition, Serials control and other operations. Such systems may be implemented as complete turnkey configuration of hardware and software or as prewritten software packages designed to operate on library-owned mainframe, mini-computer or micro computer. Vendors in this direction include CLSI; Geac; NOTIS; Dynix; OCLC; Virginia Tech; Data Research Associates; Carlyle; Comstow Information Systems; Universal Library Systems; George Town Medical Library; Washington University; IBM; Sirsi; UTLAS and many more recently designed systems have been active in marketing and promoting library automation. The newest and most widely publicized approaches to
online catalogue implementation were the growing number of vendors offering Public Access catalogue systems on CD-ROMs (Saffady, 1989).

As more libraries obtained online catalogue, interest turned to retrospective conversion of bibliographic records. Thus, many retrospective conversion projects in 1980s resulted in explosion of MARC records in union catalogues like OCLC and RLG. Also in the 1980s, MARC broke out of the ASCII and extended Latin character sets when one of the major networks, RLG, developed standard character sets for many languages. During 1990s, MARC format evolved in reaction to the exciting possibilities of internet technology. This format addressed several major issues including the need to provide linking to actual resources from bibliographic record. An additional development in this period has been an attempt to separate MARC data elements from MARC structure (ISO 2709) to represent highly developed MARC data elements in Standard Generalized Mark Language (SGML) or Extensible Mark Language (XML). Further in 1990s, the strong availability of systems that fundamentally support MARC 21, and the MARC 21 orientation of several of the large record repositories like OCLC, have been an incentive for countries to rethink and realign this formats with MARC 21. This globalization of original MARC format has moved the international MARC community towards a new level of consistency through standardization of content designation that was not possible in early years. The complete alignment of MARC format used in US with CAN/MARC from Canada in 1997 has been beneficial to North American libraries that already corporate in many ways. The decision of British library in 2001 to cease the maintenance of United Kingdom Machine Readable Catalogue Records (UKMARC) in favor to MARC 21 also had major impact on global MARC standardization for library automation (McCallum, 2002).

More recently the application of expert systems made great impact on library activities such as reference services, indexing, cataloguing, Decision Support System and front end systems for database searching. These expert systems serve more patrons, especially at peak hours resulting in more user
satisfaction and without having to hire more reference librarians. With the development of more advanced silicon computer chips; enlarged storage capacity; faster access; ever improved telecommunication links and ability to quickly process, store, disseminate and retrieve information has made the current information delivery services to flourish (Aluri & Riggs, 1988). All these developments and landmarks played a vital role in automating American and British library system and served as a road map for developing countries to automate their library system for better and efficient services to users.

1.11 Conclusion

Libraries since human civilization have been most vibrant agents in transforming knowledge usually organized in print form; however, the application of computers to process and disseminate this knowledge to users represents modernization of libraries (Kimber, 1974). Like other professions, libraries also witnessed the threshold of information communication technology for their modernization. Libraries harness these technologies to enhance their operations and services to meet the needs of heterogeneous users promptly at their desktops as most library functions are closely related to search and retrieval purposes. The phenomenal progress in these technologies and exponential growth in information along with users technical competency made libraries and librarians obligatory to adapt new techniques and technology to cope up with the pressing problems of libraries in technology dominated world.

The application of computers/computerization followed by easy availability of library automation software packages and dynamism of technology metamorphosed the role of otherwise underused libraries multipurpose and multi focal. The frequent use of library software packages with Alice for Windows; LibSys; SOUL and Virtua in particular, redefined restructured and remodeled the whole library scenario. These software packages emerged as effective, efficient and automatic replacement to manual and prolonged library operations and services. The application of these softwares in libraries reduced time lag; negligence; sub standards and
inefficiencies. Their frequent usage made library collection living and promptly accessible and simultaneously raised the status of librarians and library profession vibrant on par with other professions.

1.11 CHAPTERIZATION
The study consists of seven chapters each of which deals with various aspects of the research work as discussed under:

CHAPTER-1: Introduction
This chapter introduces the whole study undertaken. The chapter starts with the introduction explaining the background behind the research. It discusses the genesis of library automation, definitions, purpose, objectives, hypothesis, scope and limitation of the study. The development of automation in US, Europe and developing countries are also discussed here. In addition, it also explains the popularly used library software packages in India.

CHAPTER -2: Review of the Related Literature
This chapter reviews the literature that was scanned to study the various trends of library automation, library software packages and integrated library systems. It deals with the various aspects of library automation with respect to Acquisition, Cataloguing, Circulation, Periodical control, and OPAC, etc.

CHAPTER -3: Institutional Profile
This chapter discusses the detailed account of three select libraries with respect to their history, collection, membership, and services. The broad objective of these libraries is to make better and effective utilization of their resources by enhancing the operations and services of their automated library system.

CHAPTER -4: Methodology
In this chapter, a detailed discussion has been carried out on how sampling has been done; data has been collected, different techniques and methods that have been used for data collection and the problems that were faced during the data collection. In the end, discussion on data analysis and interpretation has also been described.

CHAPTER-5: Staff perspective of Library Software
In this chapter, the investigator has analyzed and interpreted the data obtained
from the library staff of all the surveyed libraries. Notably, the different modules of LibSys and Virtua software packages that are in operation in the surveyed libraries have been discussed in a broader way.

**CHAPTER-6: Opinion of Users about Automation**

Here the data analysis and interpretation are discussed in a broader way. Various tables, graphs and figures have been drawn to explain the different aspects and activities of central libraries of IIT Delhi, IIT Kanpur and Kashmir University related to library automation. In addition, users response regarding the usage of library software and OPAC in particular has also been analyzed in detail.

**CHAPTER -7: Summary, Findings and Conclusion**

This chapter gives the summary of major findings and suggestions recommended for the improvement of status of library automation in the central libraries of IIT Delhi, IIT Kanpur and Kashmir University. The findings are deduced from the study undertaken and the one based from the results of data collected.
References


