Chapter - III

Review of Related Literature

3.1 Introduction

3.2 Integrated university system

3.3 Integrated system for housekeeping functions

3.4 Integrated system for Information services

3.5 Integrated systems: Few examples

3.6 Online Integrated Library Systems

3.7 Conclusion

3.8 References
3.1 Introduction

The main objective of this chapter is to understand the concept of "Integrated University Library and Information System" and review the literature as revealed in the published literature. It is found that, vast amount of literature is published in the area of Integrated systems designed and developed for meeting the university library requirements in different countries. Most of the papers published are based on commercial softwares/systems for integrated functions. These papers are mainly on the functions related to house keeping activities. However there are some articles on integrated system for information services also there is hardly any study to propose a combined model for university library and information system to act as one stop shopping or one library one system concept. There is no evidence of any comprehensive work in this area of research.


The central role of a university library is to promote and facilitate effective use of recorded information by its clientele. The library is committed to providing and making accessible the best possible information on educational, cultural, and recreational aspects and services to the citizens. The university library is
expected to support the functions of an integrated system by managing information technology. The library's most important technology goal is to give all citizens access to information regardless of format, and regardless of where the information is stored. The secondary goal is to make that access available from anywhere in the community insofar as possible, including from branch libraries, homes, and offices. A network is an essential partner in this exercise because it facilitates access to vast information services. Networks have potential to improve library services in several ways. The libraries and library users will be benefited from accessing databases, participating in discussion forums, access to other Internet resources. Constant improvements in the networking technology will also reduce the cost of information provision, thus creating new opportunities for academic institutions in the research and development.

The academic world is looking at the university libraries for a total solution or one stop shopping for their requirements. There are various issues, which are required to provide integrated solution by integrating all the activities into one system so that the Integrated University Library and Information System (IULIS), can act as a model for any academic library to provide integrated solution to their users.

An attempt has been made here to identify the related literature published in the area of study. Libraries have undergone a remarkable transformation over
the years due to introduction of computer-based information technologies. The literature is divided in 5 areas and is presented in succeeding paragraphs.

3.2 Integrated university system

Information technology has been one of the major factors causing changes in the way people communicate, locate, retrieve, and use information. Libraries and information centres have embraced the new information technology more profoundly than many other fields and most of them are currently using electronic products or services. Automation has created new types of work, prompted redefinition of certain functions, influenced interpersonal relationships, and transformed traditional organizational structures into new institutional entities. In recent years, the pace has accelerated.

The evolution of integrated systems started as early as 1977 by utilizing minicomputers, micrographics, and automated retrieval. It is the key to many mass record management problems. Zeh, covers examples of typical integrated systems now operating, and their benefits. He states that Information is considered valuable only when it is accessible. He also gives a brief overview of manual systems, computerised data based systems, and document based micrographics systems (Zeh, 1977).

In 1978, Beckman and Porter (1978) described the experience of the University of Guelph Library in changing to a new on-line access circulation system,
which was based on a minicomputer within the library and able to encompass different record formats facilitating entry to all files to all users without a librarian as an intermediary. He also suggested that such an integrated on-line library system shows that it is comparatively easy to avoid the limitations imposed on library access services by the Machine Readable Cataloguing (MARC) format.

Paper presented by Van der Linde Wesly (1978) aims to arrive at an integrated library system with the possibility of linking to the future national network.

The feasibility study of Richmond about an integrated statewide library network system consists of an introduction to the background and method of the study, the findings, and the modular plan for implementation; and supplementary materials presented in 7 appendices reviewing basic facts. These appendices cover library applications of automation, bibliographic services, network components and standardization, data management software, hardware, and turn-key systems. (Richmond, 1979).

Georgetown University's Library Information System (LIS) is an integrated library system designed and implemented at the Dahlgren Memorial Library, is broadly described from an administrative point of view. LIS functional components consist of 8 user-friendly modules: catalogue, circulation, serials, bibliographic management, acquisitions, accounting, networking, and computer-assisted instruction. The computer's networking capability brings the
library directly to users through personal or institutional computers at remote sites. The Integrated Medical Center Information System proposed in 1993 at Georgetown University was to include interface with LIS through a network mechanism (Broering, 1983).

The Health Science Library, University of Maryland, implemented the Integrated Library System (ILS), a minicomputer-based library automation system developed by the Lister Hill National Center for Biomedical Communications, National Library of Medicine. The process of moving a library from a manual to a computerised system required comprehensive planning and strong commitment by the staff. Implementation activities included hardware and software modification, conversion of manual files, staff training, and system publicity. ILS implementation resulted in major changes in procedures in the circulation, reference and cataloguing departments (Feng, 1983).

Epstein, considers an idea prevalent in library circles that most libraries should acquire or plan to acquire an integrated system although they may not be sure exactly what it entails. The study suggests that determining system requirements and writing specifications is one of the most difficult and most important aspects of automating a library function and asserts that librarians must realise that an integrated system, whatever its features, is not an end in itself, but a tool to serve the patron and the emphasis should be on developing systems to meet users' needs (Epstein and Epstein, 1984).
It was realised by 1984 that, the development of minicomputers and their role in integrated library systems. An integrated system is a multifunction system with a common bibliographic database, covering acquisitions, serial control, cataloguing, circulation and information retrieval (Nuotio, 1984).

According to Mullane, The Integrated Library System (ILS) is a minicomputer-based automated library system supporting technical processing, retrieval and bibliographic management activities using a single master bibliographic file, which supports all library functions. Describes the use of the circulation management, on-line catalogue, serials check-in and bibliographic file components of ILS at the Pentagon Library, Washington, D.C. (Mullane, 1984).

A description and evaluation of the characteristics of 2 library automation systems. DOBIS/LIBIS, developed jointly by the Universities of Dortmund (Germany) and Louvain (Belgium), is used by various types of libraries throughout the world. It is based on an integrated series of programs, each designed for a particular task: acquisition, cataloguing, loans, serials and information retrieval. SIBIL was developed at the University of Lausanne (Switzerland) for use by a network of libraries and has been adopted by various university library networks in Switzerland and France. In general DOBIS/LIBIS is a more sophisticated system, based entirely on computer techniques, but complicated to use, while SIBIL is simpler and more practical,
primarily because it is designed to connect already existing networks. (Francesc, 1984)

The US Defense Technical Information Center (DTIC) provides information services to the Department of Defense scientific and technical community by sponsoring the development of an integrated bibliographic information system. The prototype was used to demonstrate the concept of an integrated library system combined with an intelligent gateway capable of querying and updating simultaneously more than one heterogeneous bibliographic database (catalogue). Queries and updates of any database were performed using a common command language, relieving the system user of the need to learn and master separate languages and procedures for each database accessed (Cotter, 1985).

Helsinki regional libraries and their regional information centre together with the libraries of Turku and Tampere started a project, which aims to install up-to-date integrated computer systems in libraries. There were approximately 30 integrated ready-to-use systems and 1,000 users. Selection of the best system was difficult. Even the average computer systems offer more to the users than the manual approach. When estimating the usefulness of automation in a library, the database and the organizational structure are more important than the system itself. (Sinkkila, 1986)
Manson, looks at what is meant by integrated automated systems in libraries and provides an overview of the UK market for microcomputer-based products in this area. Some 17 products have been identified with a further 4 being marketed specifically to schools. Describes the hardware environment necessary for these systems along with details of the functionality provided by the various cataloguing, on-line enquiry, acquisitions and circulation systems (Manson, 1989).

Lim Chee Hong and Rashidah (1989) describes the implementation of the interactive DOBIS/LIBIS on-line library automation system at the University of Science, Malaysia Library. This study covers the background of the computerisation programmes in the university library, the university's mainframe computer systems, the retrospective conversion of the library catalogue under the MALMARC system and its transfer to the DOBIS/LIBIS system.

Martinez, hints on the planning and evaluation of integrated, computerised library systems with emphasis on choosing from the alternatives available (Martinez, 1989). The NOTIS Authority Control Module is based on the MARC Format for Authorities. In the integrated system, the functions of on-line create/edit, security, and indexing for authority records is very similar to that for bibliographic records (Kirby, 1989).
Weng Zu-mao, describes the Integrated Library and Information System, FILIS, developed by Fujian Teachers University Library, Chinese People's Republic. It includes interconnecting the CD-ROM, WORM and Hypermedia system with the integrated library system based on a local area network, creating the image data base, audio data base, and other data bases, and exhibits the multi-access paths of FILIS users. (Weng Zu-mao, 1989)

Merilees, Surveys the integrated library system installed in public, university, college, special and government libraries in Canada. Along with the diminishing rate at which libraries installing integrated systems, the market became concentrated in the hands of a couple of vendors of PC-based systems and just 3 vendors of large library systems which, at the end of the 80s, are totally different from the ones dominating the market at the beginning(Merilees, 1990). McColl and Pastine(1991) Focuses on the issues that academic library administrators must address when preparing for the integration of new technologies and electronic information into academic libraries. Discusses implications for the future integration of electronic information into libraries and impacts on current services and operations.

The Slovak National Library is the body responsible for the implementation of the Integrated Library and Information System (ILIS) project, carried out from 1985-90 within the framework of the State Information Policy. Examines the perspectives of the development of ILIS, the main objectives of which include: automation of library work, coordinated cataloguing, setting up of a national
union catalogue and creating conditions for establishing a new structure of information services, Discusses the role of the proposed Cooperative Library Association in the development of ILIS and the proposed schedule for setting it up. (Katuscak, 1992)

A report prepared by Taylor Graham (Loughborough University) provides the problems and possible solutions to the implementation of integrated information systems. (Brittain, 1992).

Brown describes the use of the integrated library system UNICORN, which runs under the Unix operating system, at the library of the Sports Council in London. (Brown, 1992). Describes Talis, an integrated system with acquisition, cataloguing, online public access catalogues and circulation control modules (Talis, 1992).

Further an integrated information system GRIBSINFO was introduced in 1983 in which computers were used initially for acquisitions, cataloguing and new monograph loans and also for periodical administration (Sapac, 1992).

By 1992 More than 1,300 large integrated library systems were installed in the European Community member countries. The number of suppliers of large integrated systems increased from 12 in 1986 to more than 30 in 1992. More than 3,600 small integrated systems were installed by some 40 different suppliers shown in a study carried out in 1991 as background for the
Commission of the European Communities action under the Libraries Programme (Larsen, 1992).

The concept of 'one-stop information shopping' becoming a reality at Columbia-Presbyterian Medical Centre. With the goal to provide access from a single workstation to clinical, research, and library resources; university and hospital administrative systems; and utility functions such as word processing and mail. This study describes the creation of a network, training and support, levels of use, costs and benefits of the effort (Roderer and Clayton, 1992).

Kertesz describes the Voyager integrated library system of Carlyle, California, which is based on the Ingres relational database system. It differs from similar library software because it is able to handle audiovisual information (Kertesz, 1993).

Stocklova presents a review of the library automation systems developed abroad, including: RAPID LIBRARY, ALEF, TINLIB, ALICE, DANTEK, DYNIX and MARQUIS. The information given for each system include: supplier name, address and number of employees; additional services and products provided by the supplier; total price of the system and prices of individual modules; payment terms; warranty terms; number of existing installations; main software characteristics and the library tasks which can be automated by the system in question (Stocklova, 1994).
Steenekamp (1995) and Pieters (1995) discusses the implementation of the PALS library system focusing on the building of the online public access catalogue, bar coding, training, data capture of the regional issue cards, and correction of installation errors. (Steenekamp, 1995), ( Pieters, 1995).

Kwaznaplis, gives a brief description of the PALS integrated library system at KwaZulu-Natal Provincial Library Service, South Africa. PALS is a cooperative library management system whereby many libraries can run as separate institutions on the same system, while being able to share and view data from each other. Features of the system include an online catalogue; MARC editor; authority control; acquisitions; reference database; serials control; circulation; interlibrary loans; inventory control; and electronic mail. (KWAZNAPLIS, 1995)

The PALS Library System is designed to handle a consortium of libraries all linked to the same server and is marketed and supported in South Africa by Unidata, its central database being situated in Cape Town. Sets out the rationale for the choice of PALS software by the Provincial Library Service of the Western Cape-(LSWC) and provides a profile of PALS and its modules including the online public access catalogue, acquisitions, circulation, allocation, interlibrary loans, serials modules and the authority files (Viliers, 1995).
Lehoczki, examines the use of the integrated library system ALEPH for producing library statistics. Using subprograms of the integrated library system ALEPH, retrieval aspects of order records can be determined according to needs, and lists or reports can be printed using proper data. Utilizing fields, accession registries and annual reports can be produced automatically. The use of acquisition subprograms is very substantial for the processing of ordering data, because with UTILs the data to be displayed can be defined by the user (Lehoczki, 1996). Cibbarelli, describes integrated online library systems software that runs on Windows NT operating system. Existing systems covered are: Maxcess Library Systems, Inc., Follett Software Company, ILS International Library Systems Corporation, Inmagic, Inc., Fretwell-Downing Informatics, Ltd., Keystone Systems, Inc., Nichols Advanced Technologies, Inc., Ringgold Management Systems, Inc. Forthcoming systems covered are: Data Research Associates, Inc., Endeavor Information Systems, Inc., LIB-IT GmbH, Information Dimensions, Inc. Electronic Online Systems International, Cuadra Associates, Inc. (Cibbarelli, 1997)

The basis of the integrated library systems Voyager is the Ingres relational database management system. It is incorporated in the API, written in C and C++ language and using the possibilities offered by the Solaris operating system. API supports modules with Xwindow surfaces. The 5 basic modules are: online catalogue for retrieval of bibliographic data and circulation state;
cataloguing module for bibliographic data entry and authority control; circulation module for lending, loan extension, advance notes on loan requests, reading room services; acquisition module for filing the purchase of various documents, from ordering to payment and for stock taking; journal module for filing incoming periodicals. These modules have distinct functions but their databases are interlinked, providing a high degree of integration for the entire system. The functions offered by the online catalogue and the structure of the database makes it possible for the online catalogues to become the central control element of an electronic library to be created. (Gyure and Koltay, 1997)

During recent years, the sophistication of integrated library systems (ILS) has improved dramatically, and many libraries changed automated systems several times. Outlines the factors for selecting a new ILS and describes state-of-the-art developments in system functionality such as digital imaging, interfacing with the Web, electronic reserves and patron initiated document delivery. The successful acquisition of a new system will largely depend on the ability to assess local needs against system capabilities (Machovec, 1997).

The Library of Congress (LC) plan of an Integrated Library System is to serve the nation’s libraries. Lamnolinara (1998) opined that when fully implemented, the Integrated Library System will improve productivity and the use of resources more efficiently. For libraries in and around the nation, this
will mean a vast improvement in processing inter-library loan requests. The new Integrated Library System will improve the situation by providing interlibrary-loan staff with online-inventory records to reduce costs and speed up the process of identifying and locating materials. And also making this online inventory data available to the world as part of the library's catalog on the Web (Lamnolinara, 1998).

According to a report published in Information Today (1998), BASIS Techlib is a fully Web-enabled integrated library system. Library users may access library collections, digital documents, and Internet and Intranet resources using OPAC for Intranets. Library staff can also perform cataloging and circulation tasks using the browser. The company says that the Web-enabled data entry forms make it easy to catalog and verify links to electronic resources (Information Today, 1998).

Article included in a special issue partly devoted to the theme: Integrated library management system reviews the development of Integrated Library Management Systems and examines some broad trends in their development. Increasing numbers of functions and special features have been integrated into library systems and there has been a move towards industry standard databases, operating systems and architecture. The second part of the article looks at more aspirational library system designs, that reflect libraries' new
needs in the light of the electronic publishing revolution and the open source software movement (Akeroyd and Cox, 1999).

The Northwestern University Library migrated from its locally developed mainframe NOTIS online catalogue to Endeavor's Voyager. A history of the migration is discussed and includes choosing a new integrated library system, planning for the new inter loans system (ILS), work flow analysis, impact on staff and the resulting reorganization in technical services (Stamm, 2000).

There are many articles on CDS/ISIS, which describe projects in which conversion techniques are used. Keyser discusses some of the reasons for converting downloads and other data into a CDS/ISIS database. Some issues considered include the quality of the source material, dBase, comma or tab delimited format, text material, ISBD and the constants and limits of the software. This paper reviews the conversion process and gives brief descriptions of some of the available programmes. (Keyser, 2000). Duan and Lang have introduced an integrated book information management system. The system includes 10 subsystems which are data entry, book catalogue, borrowing circulation, voice and video management, technology data management, material management, multimedia demonstration, Intranet retrieval information, system management and leader office management subsystems (Duan and Lang, 2000).
3.3 Integrated system for housekeeping functions

Automated Library systems have been in application for more than two decades. It seems that librarian first began automation in record keeping and Inter library loan services using the early punched card systems. As Salmon (1975) "Ralph Parker installed a Hollerith punched-card system for circulation control at the university of Texas in 1936 and by the middle of 1940's had also experimented with its use in serials control system." After the primary experiments, librarians did not become serious in applying the new technology until 1960's when they began using computerised services along with improvements in the technology. The introduction of minicomputers and their microprocessors made automation much easier and at the same time generated more sophisticated services in libraries. MARC was developed during the same period. Later the introduction of online interactive systems played a great role in making library and information services more public in a shrinking world. Many library and information centre's are now linked together enjoying the capabilities of networking and data transfer on information super highways. The ILS is a minicomputer-based library system developed by the Lister Hill National Center for Biomedical Communications at the National Library of Medicine for use in medium-sized libraries (Lovelace, 1979).

The acquisitions module of NOTIS (Northwestern Online Totally Integrated System), implemented at Northwestern University Library, is 1 part of a
system, which also includes cataloguing, circulation, and patron access. The module is comprehensive and provides for the full range of acquisitions activities including ordering, receiving, posting payments, claiming, and issue-by-issue check-in of serials (Ashley and Reed, 1982).

Contributing to a special section on library automation and software, Marrable's discusses the functions which an integrated library housekeeping system from acquisitions through inter-loans and reservations to serials management and on-line public access catalogues (OPACs) (Marrable, 1988). Tamkang Automated Library Integrated System (TALIS) is the modified version of IBM's DOBIS/LIBIS, jointly developed by Tamkang University Library and the Information Processing Center of the University. Its searching, cataloguing and circulation subsystems were implemented in 1986, with the acquisitions and serials control subsystems implemented (Li-min Cheng, 1988).

Hwa-Wei Lee describes the applications of CD-ROMs, on-line databases, and other computerised information searching tools (such as the OCLC data base) at Ohio University Library. The foundation is an on-line locally integrated library system. ALICE interfaces with OCLC for on-line shared cataloguing and inter-loans and offers on-line public access catalogue, acquisitions, circulation, and periodicals control. Through microwave and telephone lines, ALICE also serves libraries at 5 regional campuses in a network mode. In addition, Ohio University Library offers a computerised information retrieval
service to provide on-line access to over 400 major data bases worldwide through DIALOG, BRS, and STN. The use of facsimile transmission for electronic delivery of information between libraries is now common practice. In cooperation with the university's computing service, and extensive computer laboratory is provided in the main library facility. Selected CD-ROM based data bases of general interest have been purchased and made available to library users. (Hwa-Wei Lee, 1989)

Marrable, looks at the advantages and modular structure of integrated library systems, which aim to cover most aspects of a typical library's housekeeping functions, both monographs and serials. He is explaining the important considerations when buying a system, including standard of support services, speed of system response, and the opinions of present users of the system (Marrable, 1989).

For purpose of the Fifth annual survey, integrated library systems are defined as library management systems capable of performing 3 or 4 major functions, these being acquisitions, cataloguing, on-line public catalogue, circulation, serials management, and audiovisual booking (Merilees, 1991). Johnson, discusses Galaxy, an integrated library system. Describes its acquisitions, cataloguing, circulation, online public access and serials control modules and other features (Johnson, 1992). Sattar and Rehman evaluate PLIMS (Pakistan Library Information Management System), a locally developed integrated automated library system under headings: acquisitions, cataloguing and
indexing, catalogue searching, circulation, periodicals control, and documentation. The study concludes that PLIMS has great potential and offers suggestions for enhancements to the system (Sattar and Rehman, 1992).

A library automation software package (SANJAY) developed in the CD/ISIS V2.3 environment extensively using the Pascal interface to meet the requirements of a model library. Using SANJAY a user can get instant access to information, responses to queries and reports from multiple databases. It is an interactive, menu driven and user friendly package which carries out routine functions of a library. The software is capable of inter-relating 2 or more databases for a single application like acquisition or circulation. This identifies some of the problems in the CDS/ISIS V2.3 package and presents the features of the SANJAY package that overcome these problems and discusses its implementation in a government library (Bhargava and Srivastava, 1993).

Saffady provides a state-of-the-art survey that explains the concepts of integrated library systems, reviews the history of integrated systems and describes the characteristics and capabilities of available products for minicomputers and mainframes. Discusses computing environments; cataloguing; the online catalogue; circulation control; acquisitions and serials control; other modules; installations and competitive considerations. (Saffady, 1994)
Shelling reviews the operational features of Athena, the integrated online cataloguing and circulation control system, adapted to work in Windows and Macintosh environments and produced by Nichols Advanced Technologies Inc., Canada (Shelling, 1996). Lively and Compton, discusses the progress in some areas and lack of progress in others in the design of serials control systems and their integration into complete library systems. They cautions against a lack of specificity on the part of the library in describing its requirements for serials systems and the dangers of unwelcome surprises and strained relations with suppliers unless this is avoided. (Lively and Compton, 1998). Cooper, outlines the advantages and disadvantages of conducting acquisitions within an integrated library system. He describes the system at the University of Illinois, Law Library, where ordering, cancellations, and reinstatement requests are made by the University Acquisition Department. He opines that this system save time due to decreased internal workload, but also demands greater commitments to increased external communication. He opines that the integrated systems can create confusion and delay for the department, but enhances uniformity, cooperation and knowledge (Cooper, 1997).

The Agricultural Library Network of Sri Lanka (AGRINET) has developed an integrated information system for library operations, based on the micro CDS/ISIS software. The system, which is named PURNA, handles major library operations such as acquisition, cataloguing, indexing, circulation,
serials control, current awareness and SDI. It is suitable for small and medium sized libraries with limited financial and personnel resources, which are looking for low cost integrated software. (Yapa, 1997). In 1998, there were approximately 50 vendors worldwide marketing integrated multi-user, multi-function automated library systems or library applications software packages for minis and supermicros, more than half of them active in the United States.

SIRS Mandarin is a fully integrated library system that includes functionality for an online public access catalogue (OPAC), circulation, cataloguing, inventory, statistical analysis, and report generation. Optional modules include acquisitions, serials, and Z39.50 functionality for the client and server. There are approximately 1,600 Mandarin installations in the US libraries, about 92 per cent of which are in school libraries. This study presents the results of a questionnaire survey of 85 Mandarin users who were asked to rate the product. A selection of comments from the survey respondents cover topics such as ease of use for staff and students; cost; technical support; searching capabilities; and system flexibility (Cibbarelli, 1998).

Rowley discusses the nature of the information and control that a library management system might offer. The standard features of library management systems described are: ordering and acquisitions; cataloguing; OPAC and other catalogue forms; circulation control; serials control; interlibrary loans; and management information (Rowley, 1998). Pittsburgh University,
Pennsylvania, have chosen the Voyager integrated library system offered by Endeavor Information Systems, Illinois, to replace its current NOTIS system. The University has purchased the full Voyager system, including cataloguing, circulation control, acquisitions, online public access catalogue (OPAC), media scheduling and the citation server.

Leeson, reviews the INNOPAC system at Hull University Library, UK, introduced to replace the GEAC 9000 system. Various features of the modules used with general information on system administration and performance: hardware/operating system; cataloguing/database maintenance; circulation; acquisitions and periodicals; online public access catalogue (OPAC); management information; system performance and system support are described (Leeson, 1999).

Horizon is a relatively new integrated library system with sophisticated serials functions. Its serials module consists of two separate but tightly linked workspaces that load in separate windows. It is a predictive system capable of handling a wide variety of publications. It gives an overview of the system and describes aspects of Horizon's approach to serials work that are unique to the system. These include authority work in the cataloguing module; copy, holdings, and prediction record management in serials control; and basic workflow using these records through the serials check in module. Also discusses that, the most significant aspects for future development are
automatic updating of holdings between serials check-in and control modules, links with Acquisitions module, and some factors related to public display of holdings. (Savage, 1999).

Paper by Schubert (1999) proposes an integrated web based – inter-library loan system to replace the existing manual based ILL system used by Singapore libraries. It describes the system requirements that must be supported in order to make it a viable and acceptable solution to all participating libraries. The study also presents the client server web based system architecture, database design and Java development platform that are used to implement the system. The Madrid University Libraries Consortium has adopted SIRSI Unicorn to create a joint catalogue allowing shared access and management of all holdings. Founded in the US in 1978, Sirsi launched internationally in 1997 with Arabic, Chinese and Spanish versions. Unicorn, a library management system with web interface and OPAC manager, also offers workflows, a series of wizard user tools. It is to be integrated with Hyperion, a tool for creating catalogues of document resources available through the Internet, based on international standards (Senso, 2000).

Integrated University Library System in Indian Context

The review of the related literature revealed that there are few attempts done in India relating to Integrated University Library and Information
Systems. However some noteworthy mention can be made about the library in-house activities and development of softwares viz. LIBSYS, LIBRIS, SLIM, SANJAY, MAITREYI, TLMS etc.

Harinarayan considers the options for libraries acquiring software; developing it in-house, procuring customized software, or purchasing commercially available software. Discusses the use of Libsys at Indira Gandhi National Open University Library. He reports on experience in using the acquisitions module of the software. (Harinarayan, 1997). Jose describe the usefulness of LIBSYS, the integrated multi user automated system. He summarizes the advantages of the software, simplicity in use, networking capabilities, etc. (Jose, 1997). Uma and Gangu describe the conversion of acquisition operations from manual to automated using the LIBSYS acquisition module.(Uma and Gangu, 1998). Agarwal and Gupta offers a critical appraisal of serials management and control through the library management software, LIBSYS.(Agarwal and Gupta, 2001).

INFLIBNET in the initial stages developed a software called ILMS (Integrated Library Management System) in collaboration with DESIDOC. The software had features of integrating all the library housekeeping operations. Since the software was developed using COBOL Language it did not attract many and was discontinued after
Design and development of activity of library software packages in India began during mid 1980's with the introduction and promotion of UNESCO’s CDS/ISIS by the National Information System for Science and Technology (NISSAT). With the experience of using CDS/ISIS some libraries subsequently developed their own software. There are few studies covering comparative study of software packages. Based on the published literature, demonstrations in conferences, personal discussions etc Saxena and Srivastava, recommends Sanjay for small libraries, Suchika, Granthalaya and Libsys for large libraries. (Saxena and Srivastava, 1998).
Paper by Francis enumerates the important issues to be considered while selecting the library software along with the names of the major library softwares available. He also suggests the establishment of a constant mechanism to make the library professional aware of developments in the field, issuing guidelines for standard library software; preparation of a list of standard softwares and evaluation of the software by a software evaluation committee at national level. (Francis, 1998).

Mishra (1999) discusses the aspects of the process of selection of an appropriate library software package and attempted to define the selection criteria for libraries. These aspects are; system analysis; identification of key areas for computerization; guidelines for software selection; evaluation and comparison of software packages, etc. (Mishra, 1999).

3.4 Integrated system for Information services

In the past university information service units such as libraries, computing, and media centers functioned as separate entities. Traditionally, libraries were responsible for managing collections of scholarly documents and for providing
access to external bibliographic databases, while computing centers managed administrative and/or academic information and numeric databases, and media centers. Instructional audiovisual facilities have provided diverse media services. Clearly, then, an integrated information service unit is called for, first to satisfy campus information users' increasing needs, and second to make the administration and implementation of technologies more efficient and effective. Concurrent with this conceptualization, the call for integrated information services within academic environments has already been set in action in a number of instances. Inter-Library Loan service enables a library to request another library through the network for one or more books on Inter-Library loan basis for meeting the demands of its users. This may include the facility for reserving a book, if it is on loan in the lending library. An efficient and effective mechanism for physical delivery / electronic delivery of materials need to be developed. Success of this service depends on the cooperative spirit of participating libraries. Inter-library loan code is to be generated for adoption by all libraries.

William Rouse and Sandra Rouse(1977) discusses the performance of interlibrary loan networks improved when location and availability information can be accessed; existing computer technologies are capable of providing this information. A procedure for quantifying the impact of such technologies as shared cataloguing networks and automated circulation systems, and their various combinations, on interlibrary loan activities, taking
the Illinois Library and Information network (ILLINET) are explained. Cranfield Institute of Technology has completed the testing of an inter loans module from SLS (Information Systems) Ltd, which forms part of the LIBERTAS integrated library system. Its significance is that it is one of the very few integrated inter-loans facilities. This paper describes the workings of the module and discusses some of the implications for libraries. Describes the main problems, both in the installation and in the system itself and the advantages, are explained. (Bevan, 1990).

Academic researchers face a difficult situation as they experience problems in personal management and handling of information during their research but they are under pressure to increase research output. Pienaar, presents guidelines and a framework for the design of an information system to support academic researchers in their tasks.( Pienaar, 1991). The paper of O Pesch, discusses the advances in electronic storage and delivery of information are changing the nature of libraries. This paper provides the proliferation of CD-ROMs, the ability to load databases on a number of Integrated Library Systems (ILS) and the Internet make an incredible number of databases and information sources available electronically(Pesch, 1994).

The Cranfield University Internet Site Explorer (CRUISE) http://www.cranfield.ac.uk/library/subjects/webinfo.html has been developed, which is a gateway to Internet resources. Discusses the provision of such a service, the future of local gateways, and technological threats and
opportunities. (Bains and Bevan, 1998). Burmeister and Varga, gives an overview of the history of shared cataloguing in German Federal Lands, and presents the Land network of Baden-Württemberg SWB (Sudwestdeutscher Bibliotheksverbund), controlled by the Bibliotheksinformations-Zentrum, Constance, Germany. Baden-Württemberg has been cooperating with other Lands and with the Deutsches Bibliotheksinstitut to select, purchase and install together advanced systems and equipment. They selected the Horizon integrated system produced by Ameritech Library Services. The new system meet challenges set by modern services, it is based on open system and standards (Burmeister and Varga, 1998).

The Sapporo Medical University Library, Japan, is promoting the development of an integrated Internet-based medical information retrieval system. The aim is to unify library services to make them more convenient and accessible for users. Authors opine that, developing this type of in-house system is very difficult and there is scope for commercially developed systems. (Konno and Ikezaki, 1999).

Paper presented by Larbey at the conference: Document delivery beyond 2000, held at the British Library, September 1998, explores the potential of networked systems to improve managed access to remote document stores using as an example the EDDIS (Electronic Document Delivery, the Integrated Solution) project, an eLib project managed by a consortium comprising universities, document delivery services and a software company
(Larbey, 1999). Librarians at Cornell University Library (CUL), New York, launched the first system-wide integrated gateway to networked resources, services, and library information in January 1998. The system was created and introduced in just 17 weeks. The Library Gateway was launched on the World Wide Web in response to a confusing CUL online presence; Working together on a project of this complexity and on such a fast time line was an important organizational learning experience that moved CUL a step closer to mastering the process of innovation. (Calhoun, Koltay, 1999).

Since the early days of science, researchers have sought the ability to both identify and acquire the literature that answers their questions. At the same time document acquisition has progressed with the speed and efficiency offered by new electronic delivery methods. With the proliferation of desktop computers and the concomitant emergence of the Internet, researchers are expecting secondary and primary information providers to provide World Wide Web linked, value-added services (Boyle and Shanbrom, 1999).

The Brocade software package has been developed at Antwerp University in Belgium as an integrated library system serving both librarians, users and library management. In contrast to commercial systems Brocade has been developed largely with direct assistance from librarians and with considerable cost savings. The system supports full or abbreviated cataloguing, database compilation, loans and user control, and serials administration (Philips, 1999).
Oosthuizen offers some advice for searching the PALS comprehensive library information system within the Library Service of the Western Cape in South Africa. (Oosthuizen, 2000). Bordoni and Colagrossi propose a unified library network and information system based on innovative technologies for the distribution of the largest number of advanced services to an increasing number of users. He explains the functions which characterize a unified network, describing the different levels of interoperability and application cooperation services needed to realize the library's unified information system (Bordoni and Colagrossi, 2000).

Library users of electronic information sources face a large and confusing variety of information environments, due to multiple formats, varied user interfaces and the fluid nature of the online medium, particularly the World Wide Web. Wyoming University at Laramie offers a wide range of online services to its students and faculty and supports over 2,000 distance learning students (Nelson, 2001).

The library catalogue plays equally important role in an Integrated library system as most libraries now have an OPAC (Online Public Access Catalog), which is accessible both within the library and outside, listing all the materials such as books, journals and other materials. The access to information about library holdings is practically universal, with no restrictions for those who are not part of the primary user-base.
3.5 Integrated systems: Few examples

All Library and Information Centre activities (acquisition, cataloguing, classification, circulation and other administrative management activities) are closely connected with regard to common data and their functions. Therefore, the LIC needs an integrated library program system.

During the years 1984-85, the arrival of an integrated automated library system (NOTIS) forced Auburn University Libraries to reevaluate the status of its name authority system. Central to the evaluation process was the preservation of the major investment made in the card name authority file as a result of AACR2. To achieve this, a process of migrating the valuable information from the card file into an on-line environment was developed (Goldman and Smith, 1989). BIBOS is an integrated On-line Realtime Library Cooperative System. The version, BIBOS 2.1, involves cooperation between a central IBM computer at Vienna University computer centre and local computers. Innsbruck University has an IBM 9377-90 computer with 25 terminals in user areas and internal departments. Staff training for BIBOS began in 1988. Periodical administration was included when the Austrian periodicals data bank was changed its format into BIBOS. The card catalogue had already been replaced by microfiche so new BIBOS accessions are regularly cumulated on microfiche. More terminals provided in user areas and an integrated data network is planned for the 400 personal computer (Hauffe, 1989)
Iyobe, describes the AURORA (Aoyama Gakuin University Library Resources Online Retrieval Assistance) system, which has been available since 1990. It is a unique integrated system with 4 functions viz. access to the National Center for Science Information System (NACSIS) and OCLC; campus networking by host computer to maintain the total cataloguing information; circulation control of each campus library by non-host computer; and retrieval system using a home-made CD-ROM catalogue (Iyobe, 1991).

Hryciw-Wing, describes the methodology followed in an investigation of online integrated library systems carried out in 1988 on behalf of HELIN, a multi-type consortium of academic libraries in Rhode Island, USA, with the aim of recommending one or more systems that could be implemented by the consortium. He presents criteria for selection of systems to be studied and shows how vendor demonstrations and on-site visits, checklists and a vendor requirement matrix were used in the research. He summarizes the post implementation activities (Hryciw-Wing, 1992).

Matthews and Parker review the Columbia Library System designed for small and medium sized libraries providing an integrated library system. Alexandria, an integrated library system that contains the modules viz. circulation, cataloguing, and purchasing and subscription etc, the Precision - one integrated, automated library system that uses CD-ROM technology, Mandarin - an integrated library management system that includes modules
viz. cataloguing, online catalogue and circulation, Image 2- an integrated library management system developed in New Zealand by Contec Data Systems for corporate and governmental libraries.

The CROLIST integrated library system was developed in house by the National and University Library in Zagreb to meet both its own needs and those of the wider library community in Croatia. It has been distributed to over 150 libraries in the country and an English language version is now available under the name of UNILIB. Describes the standards on which the system is based and highlights key features of each module (Willer, 1994). Kosek outlines the Dutch integrated library system PICA, its history and methods of introduction into German libraries in Saxony and Lower Saxony. (Kosek, 1994). Success and effectiveness in automated library systems are two related issues that all users are normally looking for when buying or designing a new system. On the basis of the available literature and opinions of automated library systems experts, 26 factors (Hossein Farajpahlou, 1999) were identified as criteria for the success of automated library systems. Attitudes to these criteria of Australian university librarians and systems managers were examined in a survey conducted in 1993; 23 of these criteria were approved by the survey sample, and the other three were rejected.
3.7 Online Integrated System

On-line integrated library systems in the USA and UK can serve as models for Polish libraries where automation is to be introduced. Grabowska, describes the cataloguing, acquisitions, serials and lending modules of such a system. He describes the module for communication with users an the type of computer which is required for running such a system. (Grabowska, 1989).

The creation and development of a gateway interface at Cornell University's Mann Library is well documented in the library literature. A major multi-campus project to provide one-stop shopping for academic library patrons has been undertaken by the California State University system. These are just two examples of a trend toward better-integrated access. Interest within the library profession regarding gateways is reflected in the devotion of several conference programs to the issue.

HELIN, a multi type consortium of several academic libraries in Rhode Island in 1988 undertook six months investigation of online Integrated library systems for the purpose of recommending one or more systems that could be implemented by the consortium. It presents the criteria by which online systems were selected for study. A special section on integrated online library systems discusses graphical user interfaces for online catalogues, enhancing catalogues with contents tables, and small automated library systems (Hulser, 1993).
Sales of IOLS software to special libraries increased in 1995; however, the major vendors remained the same. In the microcomputer marketplace, Inmagic, Inc. and Data Trek, Inc. dominated. Ameritech and IME led the minicomputer marketplace.

The article by Cibbarelli (1996) profiles the top-selling software for integrated online library systems (IOLS) for special libraries. A chart provides rapid comparison of key features and functions of IOLS software that is appropriately designed for special libraries. All of these packages include functionality for both circulation control and an online catalog. Cibbarelli's Surveys are a series of surveys in which users of the various software packages rated the software and the company providing the software in eight areas: documentation, service, training, product reliability, product capabilities, ease of use, vendor's integrity, and overall satisfaction. The user-ratings articles were published in Computers in Libraries, Information Today, and OASIS. The surveys have been compiled into a user-ratings monograph available from Cibbarelli's. He also described the usage of different packages viz. Inmagic, Data Trek, Ameritech, IME systems, Cuadra Associates, Endeavour Information Systems, GEAC Advance IOLS, Information Dimensions TECHLIB plus, Sirsi etc (Cibbarelli, 1996)
Jefferson County Library, Colorado, USA, has implemented a customized integrated online system that enables shared holdings. When an item is checked in at a branch, the location of the public catalogue automatically changes to that branch. Describes the development of the system, and its advantages, which include: cost cuttings, less deliveries, and improved collection development and ordering of materials (Commings, 1997).

Education reform in higher education in China has initiated many changes in academic libraries. Developing information technology has enabled academic libraries to move from traditional paper-based environments toward networked-electronic ones. Tsinghua University Library, Beijing, China, has built an integrated library information system including CD-ROM online searching. In 1998, the university was the First one to be connected to the Internet in China (Sun and Rader, 1999).

3.8 Conclusion

There is no system of function in today's library and information world is ever truly finished, the fast pace of change renders us in a constant state of flux. Challenges remain, of course, chief among them is the ongoing struggle to keep with and manage the implications of, what some have called a paradigm shift – moving from print based world to digital one. Despite all the progress the libraries have made progress towards providing access to digital / electronic resources comparable to that provided to print. Still there is a long
way to go in facilitating truly integrated and seamless access. Known-item retrieval of full-text articles is cumbersome enough that typical novice and even experienced library user more often requires assistance.

The capabilities of systems like the Voyager system will hopefully allow to link database records in systems, and holdings, locations and possibly implement the search services. With the dedicated staff, an adequate computing infrastructure, and careful attention to the needs of users, it is possible to improve over time the integration and simplification of access to library resources.

Academic libraries have long desired one-stop shopping for their customers and, in this electronic age, their customers are demanding it a way to search from a single point at any physical location, and retrieve information from the library catalog, citations from journal indexes, and full text information from electronic resources. The one system, one library concept by working together as a coordinated university library system will provide students, faculty, staff and citizens with access to truly great university library collection and to a global network of electronic information resources (Wisconsin System, 2001).
3.8 References


49. KWAZNAPLIS (1995). Library Service to get PALS. 11(4), 10


94. Steenekamp, T (1995). See computer, see also screen: as a last resort, see scream. Cape Librarian, 39(2), 14-17.


