

2.1 Introduction:

A literature search is essential for conducting any research studies. Literature review gives an idea to researcher what is already published in the area of research and missing links to identify working areas. Literature review builds new concepts in the mind of researcher and also useful to support the facts deduced in research on the opinions given by others in the literature. Similarly literature review helps in avoiding duplication of research concepts and supports to views of researcher to record firmly.

While conducting the present research study an attempt was made to identify literature published in different types of information sources like research reports, articles, books, thesis and other information sources, related to the topic of research. The secondary sources in the discipline are also reviewed related to similar and related topic, which helps in developing new concepts to researcher and stating the different nature of the research covered in the study.

It is necessary for every investigator to review the literature for better presentation of the work. It also helps in building or designing research process and concludes with new approaches. Research literature review acts as supporting evidences to the facts deduced from the study. Internet resources are also used in this study by researchers. The literature referred is also properly cited by the researcher in the text and bibliographies. Secondary sources including Vidhyaidhi (Indian Digital Library of Electronic Thesis), Shodhganga, Proquest and EBSCO databases were also reviewed on the following facets:

- Changing Environment in Libraries
- Applications of Information Technology (IT/ICT) in Libraries
- Management Education
- Resource Sharing and Networks
• Library and Information Networks and Network based Services
• Network Infrastructure
• Network Security and Maintenance
• Role of Libraries and Librarians
• Network Models Suggested by Scholars

The literature collected from different sources are analyzed, synthesized and presented in the following facets briefly.

2.2 Changing Environment in Libraries:

Changes are taking place in all the fields including education, teaching, learning, research, industries, trade, business and in libraries also. Due to revolutions libraries have witnessed the changes and from the traditional practices libraries are shifted to automated libraries. To modernize the libraries, information professionals are adapting technologies as well as to satisfy user’s expectations from libraries. The scholars presented views in their communication regarding the changes and its impact on users, libraries and information professionals. The scholars have emphasized the need of modernizing libraries as well as achieve maximum resource sharing among group of libraries using ICT and developing library networks for easy exchange of information.

De Gennaro (1983) discussed the benefits of library automation and networking. The author narrated the experience of automation and developing networks as well as maintaining the networks. Hildreth (1987) also highlighted issues related to library automation, development of networks and 'transition' of computerized library into networking based environment. The author suggested that decentralization and commercialization of the networking environment at regional and different levels is essential in information world.

Pandey (1999) in ‘Encyclopedia of Library Automation Systems and Network’ highlighted applications of computer technologies for information management. The discussions are completely integrated presenting library automation and networking of libraries to achieve resource sharing. Aswal (2003) discussed the revolutionary changes taking place in LIC’s, and generation of library and information networks for resource sharing purpose. The author made a remark that electronic and telecommunication
technologies have made an impact on the functioning of libraries by developing networks at different levels and benefits of information networks to the information society are many.

Bourke (2005) in his communication “Public libraries: building social capital through networking: how public libraries can be more than repositories of information”, in which author emphasized the relevant and vital need of building networks among libraries of different types to support the users and communities of public libraries and employing the latest technology, provide a wide range of services. Author concluded study commenting building networks and developing partnerships which is essential for serving better through libraries.

Devarajan (2005) in his book ‘Applied Research in Library and Information Science’ illustrated applications of information technology in libraries and its benefits to all. Wayane (2005) reported on technology developments in libraries and explained the use of networks and concept of networking libraries to get advantages of wireless networking technology system to enhance the resource sharing among libraries.

Benjamin P.N. (2006) studied in detail the Google search engine and its impact on the library services and found that Google did not pose any threat to the manner in which traditional library services are delivered. The librarian may continue to function as mediator and facilitator between the patron and the information and Google can be acting as information repertoire useful within the library.

Esmail and Kanakaraj (2008) explained that in developing countries most libraries, including academic libraries face financial and resource constraints in building up adequate collections of information sources and therefore are not able to fully satisfy the information needs of their users. They gave solution of resource sharing using networking systems. In recent years libraries in India also have focused more on resource sharing using shared cataloguing, online searching etc. Due to increasing cost of serials, academic library networks in a consortia mode offer essential subscriptions to more journals to the participating libraries at a relatively lower cost. This paper discusses three models of networking and network design for engineering college libraries in Tamil Nadu (TECLIBNET) also.
Singh and Kaur (2009) have presented a paper ‘Future of Academic Libraries in India: Challenges and Opportunities’ in which the assumptions made were related to future of academic libraries and librarians. Authors emphasized the need for change in academic libraries in the context of the emerging knowledge economy. It underlines the mandate of the National Knowledge Commission (NKC) and gave the present scenario with regard to higher education and access to knowledge and information. It also highlights the impact of ICT and paradigm shift in academic libraries, library consortia, institutional repositories, and open access archives as strategic response to the paradoxical situation of growing digital documents and declining library budgets. It also enlists the challenges and opportunities facing the academic libraries.

Dhar (2010) in ‘Research and Technical Libraries’ explained basic aspects of libraries, development of resource sharing, networking and automation etc along with planning and acquiring library equipments, personnel management, budget and finance etc. Peter (2010) described in his paper changing face of librarians and challenges dealing with issues of the mediated space of social networking sites and its role in libraries. Five recommendations are given to assist librarians in expanding their traditional commitment to privacy into the realm of social networking sites.

Alzaza and Yaakub (2011) discussed the awareness and requirements of mobile learning services in higher education environment. Higher education environment now necessary and mobile technology infrastructure is required to utilize m-learning benefits.

Schwarzwalder (2011) discussed that libraries are not only managing warehouses of books but are heart of profession which involves providing needed information to users in a time frame and solve their needs. Now a day’s information is available in digital format and access to books, journals and data is available at any time 24/7. In the past providing a limited access to information was the concept but now users can access more information than they can process, through more channels and more interfaces. Most academic libraries budgets are shifting toward digital collection. Corporate libraries have long realized that their survival depends upon providing needed services, and they have adapted well to the new digital environment. In academia, the trend is initiated. Library services depended on information resources and use of advance applications of information technology. Library spaces need to be redesigned with new technologies for
the benefits of users. Information technology has brought changes in organizational structures and methods of working and availability of information in new forms.

Asproth (2012) has studies few problem domains of long term preservation and how ongoing research matches these domains are presented in his communication. It shows that there are many challenges associated with digital preservation which are strategic, organizational and structural and not only technical, the research mainly solving the technical issues. Due to exponential growth in information and communication technology (ICT), more and more information is available to scholars today, more quickly than ever before. The development of the digital technology and its applications in library and information centers has changed the information management system. Mandal et al. (2012) discussed the challenges in special libraries, importance of knowledge management and the role of library information professionals, vital competencies and skills of staff if profession wants to survive in the digital era. It is predicted that M-learning is the next generation of e-learning using mobile technologies and libraries have to support such trends in future. Raval (2013) has discussed ICT tools like wikis, blogs, Web 2.0, information commons, instant messaging etc. The main challenges faced by libraries are acquisition, organizing, making available information, preserving the information and providing effective services from libraries. Librarians have to change their practices to provide good service to students, researcher and users.

**Summary:**

From the different articles contributed by the scholars in the LIS it is founded that libraries are continuously changing their roles due to information explosion, crunching budgets, use of technology, networks, webs and internet, similarly users expectations are also changing due to availability of e-resources. The faces of libraries are drastically changing due to applications and adaptations of technology and techniques. The information society especially libraries are joining resource sharing activities to meet the demands of users. In the IT era it is also possible for both users and libraries to share their resources. Hence new phases like developing consortium and information networks for keeping free flow of information is visualized. The different authors have suggested the need of developing resource sharing by suggesting models using networking of libraries at different levels to achieve economy as well as support the need of users to maximum level.
2.3 Applications of Information Technology (IT / ICT) in Libraries:

Users need right information at right time in right format to increase their knowledge and develop their activities. Libraries are the places where one can fulfill the needs. To provide better and efficient services the libraries are adapting new technologies and hence libraries are changing their status from traditional to digital. The tools and technologies used in libraries are computers and communication technology as well as many other technologies suitably used in it like library software’s, OPAC, databases, networks and networking etc. ICT and e-documents are more useful and many libraries are connected with each other for achieving resource sharing. Many scholars communicated in different communications the changing roles and trends in libraries.

Singh (1975) in ‘Automation in Libraries’ explains concepts of use and impact of automation over libraries including data processing equipment. It also describes the state of automation in number of libraries and information centers in several countries and serves as an introduction to subject of automation and application as viewed from working of modern libraries. The views presented by the author are very useful for those who are in process of automating libraries. Tedd (1977) provides background of rapidly increasing use of computers in libraries and Information Retrieval Systems. Author indicated in his communication how use of computers produces different type of automated indexes and assist in managing library activities to reduce repetitive tasks.

Harinarayana (1991) states the scope of library automation which involves automation of routine works, services, office work and scientific management of libraries. Molholt (1996) focused on the benefits and concerns that arise due to application of technology and developing library networking. Author also highlighted on history of library networking, technology and networks and challenges to be faced in future.

Moorthy and Karisiddappa (1998) reviewed the literature on impact of internet on library and information centers using the information communication technology and reported that use of internet would have a positive impact on the way the information was generated, processed, stored, retrieved and disseminated. Authors concluded indicating that the availability of email and file transfer capabilities was expected to improve the dissemination of the information across the continents.
Subbarao (1998) studied the impact of information technology (IT) on the knowledge and skills of library staffs in IIT Mumbai and reported that IT had radically changed the nature of work, and as a consequence the context and skill base of many jobs in a library require evaluation and redefinition. The IIT Mumbai library staff responded positively and accepted to changing environment, and hence maintaining a satisfactory balance with traditional print based information sources and services as well as e-resources effectively.

Venugopal (1999) discussed the role of networks in library management. He explained a summation of the contemporary professional thinking about historiography in LIS, innovations and modernization of LIS using IT.

Agrawal (2000) in his book explained the importance of libraries and their improvements using information technology and the infrastructures required for the development of networks. Bansode and Perirean (2000) in their paper ‘A Survey of Library Automation in College Libraries in Goa State India’ studied and reviewed the status of automation, and impact on related areas. The authors suggested that automation in library is required to perform all the functions carried out in libraries. The authors also stated that the college libraries in Goa are automated to some extent and advanced technological systems need to be adopted.

Whelan (2001) pointed out that the world of the library is rapidly evolving, and using new and emerging technologies, thus librarians and other information specialist’s gets new opportunities to moderate libraries. No longer are library services (or library tasks) restricted to hard-wired connections and in-person activities. The wireless age has arrived, and offered many exciting alternatives for providing ever-improved service to library patrons. This defines ‘wireless’ as the transmission of data via the use of electromagnetic waves (radio or infrared) rather than wire. This is the indication to use technology in libraries.

Satyanarayana (2003) made an attempt to appraise the librarians, information workers, students of library and information science to become aware about the basics of new technologies and their applications to various activities in library and information centers, so that they can adapt the use of new technologies to their day to day work. The basic concepts of library automation and computerization have been explained in simple language with a number of illustrations and examples to initiate networking activity.
Cholin and Karsiddappa (2004) are of the opinion that for meeting the genuine needs of users, libraries need to take active part and provide access to on-line resources. Authors discussed the role of OCLC (Online Computer Library Centre) and the services offered by OCLC in different packages.

Kumar and Kanamadi (2004) evaluated IT based services on the basis of user requirements and satisfaction. Their study was conducted in the university libraries in the Karnataka state. In their findings, researchers noted that out of seven universities only three have full time librarians and further the existing staff strength, both professional and others, is highly inadequate compared to magnitude of the work. These libraries have traditional and modern infrastructure and IT facilities and network facilities are available in most of the university libraries. Most of them were participating in the one/other network system for sharing the resources and manage the user needs in limited funds using ICT applications.

Sinha (2004) studied the scenario of automation and networking of libraries of North Eastern region of India. The researcher has evaluated nearly twelve libraries for assessing automation and networking services and also focused various aspects of library automation and networking practices, use of technologies, use of databases, OPAC and internet services on-line search of databases, along with normal housekeeping services. This is an evaluator review of network and ICT development in the region.

Kanamadi and Kumbar (2006) in their paper ‘Impact of Information Technology Innovations on Resources and Services of Management Institute Libraries in Mumbai’, presented the outcome of the survey of management institutes and investigated present ICT infrastructure available in the libraries, also studying the impact of IT over library resources and library services in management institute, libraries in Mumbai city.

Mahajan (2006) conducted a study on ‘Internet use by Researchers: A Study of Punjab University, Chandigarh’, and pointed out that the science researchers were more positive towards the use of internet. It was recommended that faculty members encourage students towards use of internet and librarians can provide appropriate training for making proper and fruitful use of internet for data collection on the required information for various purposes.
Plemnek (2006) in his book ‘Electronic Library’ presents perspectives of libraries, and discussed how library networks can be beneficial to libraries. Author also elaborated the role that networking plays in library functions, and the role that the internet and the World Wide Web play in contemporary networking. The discussion concludes with predictions about networking. Singh (2008) in his study entitled ‘Library Automation in Modern Age’ and highlights library automation to convert traditional library activates such as acquisition, cataloguing, and circulation etc. in changed ICT environment.

Mahapatra (2010) elaborated the need of capacity building to face the emerging concept applied to the revamping and restructuring libraries. The management experts have also considered the concept of ‘capacity building’ as the most effective tool in developing the enterprise activities using modern trends. In the emerging technological environment the libraries need to develop various systems and services for which the greater need for manpower, infrastructure, finance, ICT application, collection building, services, resource sharing, digitization, new trends, subject gateways, open access initiatives, institutional repositories, electronic publishing, networking and continuing education activities are to be strengthened with the help of ICT.

Rajasekaran (2010) gave an importance to the digital library development issues, which may be a foundation for the network based information sharing. Acquiring digital objects and retro conversion of print data is useful in network based environment. Hence author suggested that libraries must go on for the digital collections and organize them to make them accessible over the internet, anywhere, any time in the world (24/7). Digital libraries and e-document collection helps users in searching information online and easy for networking of libraries.

Kadiri and Adetoro (2012) described in their paper, the use of IT for the information and knowledge mergers in confronting the menace of the information explosion. ICT has helped in selection, ordering, process, preservation and packaging for delivering the information. Authors also pointed out that the drawbacks among different entities like awareness of ICT among knowledge users, limited knowledge of ICT, insufficient funding, infrastructure problem, high cost of information and communication facilities and lack of policies etc.

Mairaj (2012) described that automation or computerization is an important application of ICT in libraries. It facilitated speedy library operations, services, access to and delivery of
information. Author has also described the different issues which affect automation and modernization of libraries like status of automation and the availability of internet, Higher Education Commission (HEC), digital library resources, and websites in medical libraries in Lahore. Lack of hardware, partial automation, absence of websites, inadequate funds, lack of cooperation from higher authorities, few training opportunities for medical librarians etc.

Pradhan (2012) in her study elaborated the modernization aspects of management libraries using technologies. The study is focused towards resource sharing and automated services in management libraries.

Vijaykumar and Thomas (2012) discussed use of ICT in changing the work of libraries and information centers. Librarians are ready to accept the challenges of ICT and they have acquired adequate knowledge about the hardware and software etc. All libraries have to be automated and databases are to be created to facilitate the exchange of bibliographic records away libraries. There is need for continuous monitoring of automation activities for improvement of the situation and for meeting the future needs. Hema, Nagarajan and Vanathi (2013) presented the findings of a study performed to investigate the different aspects of ICT based resources, user behavior of students, research scholars and teachers. The study identified purpose of use, awareness approach, experience of use and usefulness of ICT based resources among professionals and users.

**Summary:**

The aforesaid literature review highlighted that ICT is being popularly used in libraries as a tool for developing libraries towards better services. Since ICT is used extensively in libraries. Automation phase has already been over and libraries are migrating towards digital / virtual libraries. Further use of internet is increased as voluminous data is available over the net. Hence users and librarians both are using IT for better activities. Earlier resource sharing is now practiced due to computers and communications which help to share data by establishing library networks. The scholars and authors have indicated the need for development of library networks and also stated different reasons.
2.4 Management Education:

Education is an important and basic need for development of any society. The main role of management science is to provide managers, technologist for a business world and also includes management, business, mathematics, accounts, economics, marketing, human resource management, branding, advertising and many more subject disciplines in it. Management education is started from 1961 in India and progressed continuously due to globalization and industrialization. Management education has received prime importance in knowledge based society. The libraries in management field are also well developed using ICT and supported the management education system, and libraries become heart of management education.

Margaret MacNamara et al. (1990) put stress on management education as management institutes are often criticized for focusing more on theory and on quantitative analysis while neglecting interpersonal relationship and quantitative finding. It is often stated that management education need to be experience-based, active, problem oriented and modified by feedback and action learning serves the purpose. Engwall and Zamagni (1998) in their book ‘Management Education in Historical Perspective’ narrated the development of business schools in Europe, and assessed the role played by American business schools in the context of national models of management education. Authors highlighted a comprehensive view of development of managerial education in the various countries. The book also incorporates the latest assessment of American-type management education.

Mello (1999) in ‘Management and Management Education: A critical Appraisal’ suggested to re-orient the curricula of Indian management studies. There is a need to break out neo-colonial mindset that choose subjects in conformity with what is going in the US, rather than considering the Indian context. Albach and Bloch (2000) studied, ‘Management as a science: emerging trends in economic and managerial theory’ which considers the scientific development of business education on the basis of five criteria. The emphasis was placed on emerging scientific and societal trends which influence scientific research and the paper is aimed primarily at academics. The study concluded with specific themes like interdependence problem, uncertainty, dynamics, the development of various theoretical paradigms and trends such as globalization and ecological consciousness.
Mudbidri (2004) conducted study ‘An Empirical study of Institutions of Academic Excellence in management in Pune City’ in which researcher had pointed out that good management institute not only possess good building but also good computer and IT facilities and well equipped libraries along with education system. The study further states that the good management institute stimulates the thinking of the students and makes them think creatively and differently.


Philip (2008) described the growth in management education and management institutes and importance to management education due to globalization, industrialization, economic integration, collaboration etc. The author concluded the study by narrating challenges and opportunities for improvements in field of management education with the support of management libraries.

Kumar and Dash (2011) reported that management education attracts young generations which are usually motivated by the positive consequences associated with management education. In India higher education especially management education is witnessing an exponential growth in terms of number of institutes and causes to explore the present situation of management education in India. Authors further tried to study emerging issues of management education, and to find implementation of possible direction and policy towards improvement of management education in India.

Rai (2011) highlighted the need of value added courses to be conducted by management institutes and have to be equipped with certain core competencies, like quality curriculum, admission of students, teaching faculty, teaching methodologies, teaching aids, infrastructures, evaluation system, industry-interface, placement, research, management development and consultancy, which relate to the main functional areas of any management institute.

Sahney (2011) in her study ‘delighting customers of management education in India: a student perspective, part I’ presented the results of an empirical study conducted on
students of selected management institutes in India. The study was an attempt towards the integration of multiple methodologies to identify customer requirements and evaluate service quality; prioritize improvement of service; and guide and develop educational services by incorporating the voice of the customer. The results of the study are useful to policy makers, educational planners and administrators in developing an education system based on customer satisfaction.

Gill (2012) studies the historical background of management education, factors affecting Business school was studied with the help of various B School surveys already done. In this study author perform comparative study of Business Schools, opinion of faculty, students and the HR executives who recruit the students from the B- schools is studied and assessed.

Oak (2012) presented status of management institute libraries. The primary objective of the study is to find out the status of the management institutes libraries under the jurisdiction of University of Pune with reference to resources and services.

Lynch (2014) has discussed the classroom management which is balance between learning within the classroom and discipline. Strategies that come to mind include Wong's Pragmatic Classroom, which stresses the need to define expectations of students, and Canter's Behavior Management Cycle, which emphasizes a distinct discipline model. There is a need to expend change to classroom management and discipline strategies in public education classrooms. The change is reporting slowly in e-learning and teaching but libraries have to support. This environment is providing proper services to user community.

**Summary:**

Education is an essential and all the branches are equally important for the human progress and developed but recently management education received value due to globalization and communication. It is observed that more than 65 branches in management education are introduced in all over management education institutes to prepare strong mangers. It is also visualized that management institutes are growing at an alarming speed since 2005. Thus management education has received prominence and the libraries attached to these institutes also have played different roles to satisfy user needs. The libraries are also implementing ICT and trying to reduce the issues and managing the changes effectively.
2.5 Resource Sharing and Networks:

2.5.1 Resource Sharing:

Information overloading and low library budgets are main issues in library and information centers. It is not possible for every library to purchase each and every document, books or information available either in print or as well as in electronic format. To solve these problems libraries have come together and share their information with each other and work together to develop resource sharing projects and solve the problems faced successfully. Resource sharing is very necessary for libraries. Whatever information user need if it is not available in the library then can be made available from the other libraries and provide it to the user. The technologies added values in resource sharing by applying ICT and digital formats for easy exchange and subscribing to resources in networking libraries and consortium activities etc.

Raina (1997) proposed a model for establishing a network among the IIM libraries for sharing the resources. Author opinioned that to meet the future demands it is possible through only resource sharing. Sujatha (2000) opined that resource sharing through networks is an essential activity as information explosion is reported in all the sectors of knowledge. The use of technologies helps in sharing the resources and finds economical methods for sharing the library activities and resources. It has facilitated for resource sharing among the libraries though they are separated by miles of distance. The concepts of virtual libraries, OPAC, IR’s hypertext and teleconferences supported resource sharing and information exchange have become common.

Cholin and Karsiddappa (2002) discussed in their paper ‘Consortia Approach for Academic Libraries: Emerging Solution for Optimum Utilization of Resource’ needs of users and libraries and suggested to take active part in providing access to on-line resources. They have discussed the role of OCLC (Online Computer Library Centre) and also discussed the services offered by OCLC in different packages to their members and represented as best example of sharing resources among the member libraries effectively.

Pandian, Jambhekar, and Karsiddappa (2002) mentioned that there have been many cooperative efforts made up to 2002 among the Indian libraries for resource sharing, but it is hard to find one successful program that could use as a benchmark to replicate in other libraries. But authors opined the need of resource sharing among libraries for economical
and resourceful collection development by networking libraries. Authors also suggested a framework for the internet based consortia model approach for facilitating information access by providing a single web enabled window to the information users for the participating institutions like IIMs.

Kanamadi and Kumbar (2006) discussed the ‘Impact of Information Technology Innovations on Resources and Services of Management Institute Libraries in Mumbai’ in which they expressed the efforts made for assessing the strength of libraries in developing networks by its addition. The study considered management institutes in Mumbai.

Korobili, et al. (2006) examine the use of library resources, and focused on e-resources development by the members of faculty of higher educational institute in Thessaloniki, Greece. The frequency of use of resources mainly e-resources, examine the impact of demographic or situational characteristics are examined. The researcher found that the majority of faculty members use printed resources, but they also use e-resources frequently. They also noticed that use of e-resources is increased in higher education (Schools of Business Administration and Economics). Further they added that the use of e-resources is positively indicated by the researchers as convenience of access.

Azeez (2007) in his study discussed the existing conditions of the libraries in engineering colleges in Kerala and suggested development of library consortium for engineering colleges in Kerala which might be helpful to enhance the qualitative collection and provide services to users. Thus emphasized on consortium based resource sharing and providing services. Ali, Owoseye and Ansai (2010) opined need of resource sharing among libraries using Information and Communications Technology (ICT).

Rezaul and Mirza (2012) discussed library cooperation, library co-ordination and interlibrary loan and its need in their communication. Authors reported the status of collection of information resources, networking, resource sharing, and automation of libraries of Bangladesh. They observed that majority of libraries are not taking part in resource sharing, network and library cooperation programme. This paper suggested ways of web-based library cooperation initiation among libraries.

ALA’s Interlibrary Loan Fact Sheet (2013) described five things every new librarian for resource sharing and know guidelines and laws of technology, customer service, assessment, education and networking. Knowledge of current trends laws and guidelines governing resource sharing which helps librarians in providing standardized services that enhance performance of their library's roles. Using appropriate technologies, which saves
staff time (and thus money), results in fewer errors, shortens patron wait times, and helps to integrate. Having a strong customer service philosophy that makes inter library loan easier and more pleasant for patrons and organizations. Resource Sharing is a rapidly changing field requiring ongoing familiarity with a wide range of topics, from scanners and software to copyright law.

Summary:

It is observed that resource sharing is not new concept and its expansion of traditional inter library loan, library cooperation, resource sharing, and now the technology has added value in resource sharing and developed networks. Earlier though efforts were made but they were localized however using information technology in resource sharing the networks played major role in effective development in the LIS area. The technology only changed traditional resource sharing to library and information networks. Many resource sharing networks are local, national, regional, international levels are operative. However the resource sharing trend has further developed towards consortium and management consortia in which maximum resource sharing efforts have been taken care off. It is pointed out by the scholars that networkings of libraries are now essential due to many factors already discussed.

2.5.2 Networks:

Network development is very necessary in digital era for many propose, which saves time, space and money. For developing library networks needs hardware and software support from computer and information technology staff. In hardware adapters, switches, hubs, network cables, fiber optic cables, routers etc are necessary and software’s needed like operating systems, network operating system different software used for information download and storage etc. For the network security purpose firewall device is essential along with Anti-virus software’s for protecting the networks from different attacks.

Hallberg (2005) in his book explained wired and wireless networking at introductory level. It explored full details of on network design and configuration, hardware, networking protocols, security, backup, recovery and many more issues related to
network design. It is a step by step guide to install setup and administrator Windows server 2003, Windows 2000 server, Linux and Apache based systems.

Thu-Thuy et al (2005) in their article, ‘An Evolvable Operating System For Wireless Sensor Networks’ discussed low power consumption, small code and size, evolvability as design criteria. Above all, the most important features are the concept of evaluability with which the operating system itself can be easily configurable and upgradable.

Mahajan (2005) presented a paper ‘Academic Libraries in India: A Present Day Scenario’ which explained the primary objective of academic libraries to provide access to information and only the methods have changed along with the formats. Academic libraries are considered to be the nerve centers of academic institutions, and must support teaching, research, and other academic programmes. The situation in academic libraries of India is the same as that of academic libraries world over. Indian libraries must provide maximum information in limited resources. It has been observed that in the present scenario of declining budgets and higher costs it is becoming very difficult to meet the demands of the library users and need felt for networking.

McClure (2006) discussed in “Information Use Management and Policy Institute’, Florida State University”, and identified the characteristics of the Successfully Networked Public Library (SNPL) and in particular explores the impact of technology on both library advocacy and networking in the political system. This paper identifies the factors that are critical to a public library's success in advocacy, community support, government relations, and ultimately the perceived importance of the library in the community. This perspective on the SNPL is reinforced by the examination of Cuyahoga County Public Library's program to use the strategies of the SNPL.

White and Twomey (2006) studied the interlibrary network and document supply service of National Health Service (NHS) in UK. The study presented a comparative analysis of the same with the service models in five countries USA, Italy, Australia, Iceland and Canada. Authors identified the issues related with interlibrary network and document supply. Fortz (2010) in this article ‘Applications of Meta-Heuristics to Traffic Engineering in IP Networks’ describes Intra-domain routing protocols based on ‘Shortest Path First’ (SPF) routing, where shortest paths are calculated between each pair of nodes (routers) using pre-assigned link weights, also referred to as link metric. These link weights can be modified by network administrators in accordance with the routing
policies of the network operator. The operator’s objective is usually to minimize traffic congestion or minimize total routing cost subject to the traffic demands and the protocol constraints.

Lata Suresh (2011) discussed the importance of library networking in the state of Rajasthan. She also discussed the importance of information, which is available and shared among the member libraries to facilitate the user commodity. A networking concept of libraries in the state of Rajasthan “RAJLIBNET” is proposed in her proposal for resource sharing.

Sheshadri et al (2011) discussed the concepts of library consortium, resource sharing, and networking in United Arab Emirates (UAE). This article elaborates upon the notions of the library and information professionals working in UAE towards the consortium, resource sharing, networking etc. Authors suggested the possibility of initiating the consortium and identify the thrust areas for resource sharing and networking which results in benefiting all participant library users.

Tanenbaum (2012) presented latest and new and most important networking technology concepts with a special emphasis on wireless networking. It also includes fixed networks, ADSL (Asymmetric Digital Subscriber Line), Internet over the cable, gigabit Ethernet, peer-to peer networks, NAT and MPLS etc.

**Summary:**

The network means computer networking. Computers are networked for sharing resources. The development of networks needs hardware, software, netware and qualitative manpower for effective networks. Though development of networks is a task of computer expert but librarians should understand the basics of networking. A network helps in sharing resources and in present situation library networking is an essential factor.
2.6 Library and Information Networks and Network Based Services:

Library networks are essential for resource sharing. Using information technology, library networks can be developed. Library networks are developed on various levels to achieve resource sharing like national library networks as well as international library networks, local library networks etc. There are many library networks developed in India which are provides enhanced library services based on network.

Avram (1980) described bibliographic control before and after MARC is reviewed. The capability of keying into online systems has brought interdependence among libraries, the service centers that mediate between them and the large utilities that process and distribute data. Different authors pointed out that while technology has led toward centralization of automated library services, new developments are now pushing toward decentralization. Coordination is a requirement to avoid fragmentation in this new environment.

Bruntjen (1983) pointed out the legal issues involved in library networking. This article describes possible reasons for issues involved. Griffiths (1984) indicated that libraries and other information services are likely to be faced with continuing economic difficulties over the next decade. One of the most promising reliefs for them is networking and other forms of resource sharing. The authors described a framework for library networking that can be used for decision-making by individual libraries, groups of cooperating libraries or managing centralized services. The framework consists of six interdependent dimensions including: functions to be performed, type of access to information, types of materials handled, products and services to be offered, networking configurations and communications means etc. An economic model based on the framework developed to determine the levels within each of these dimensions that should be accomplished by the individual libraries, groups of libraries or a centralized service.

Juneja (1986) in ‘Networking and Libraries’ described the development of networking in India with special emphasis on project INDONET. It also deals with email system provided on INDONET. All these efforts lead to flexible and reliable modern computer networks offering users services.

Anderson and Duggan (1987) explored the interconnectivity of library systems through a gateway which serves as a host in the local area network. The technique described is a
straightforward means of making automated library resources available to remote clients. Data flow and the access to the gateway machine, or overall system design is presented in the communication. Riggs (1987) discussed network participation which requires libraries to pay more attention to a formal planning process in decision-making. The author suggests that it is necessary for the institutional mission statement and the library's stated goals to be compatible and to incorporate more objectives relating to issues such as access and cooperation. Strategies are suggested to help libraries to plan for future directions in networking.

Brown (1989) examined the state of the art of library networking in Europe and North America, with more emphasis on the cultural support aspects of networking achievement rather than the particular technological approach of the various networks. The author offers projections on the future by examining three broad development potentials, desktop workstations, fiber optics and satellite, and increased user access.

Lander (1990) highlights major forces and issues faced by library networks today to the special library environment, like the impact of standards for cataloging and machine-readable data files, networking opportunities for special libraries, the issue of local vs. centralized systems for computer-based cataloging and the implications for resource sharing, accessibility of corporate library holdings, and inequities in resource sharing also discussed in terms of economic, technological, behavioral and societal concerns regarding access to information.

Kaul (1992) presents a systematic study of library networks and analysis the efforts made in India especially the contribution of NISSAT and UGC in promoting information base is prominently highlighted. Author highlighted global view of library networks, automation of Indian libraries, Indian library networks like CALIBNET, DELNET and INFLIBNET, and their comparison with BLCMP (British Library Network). It also covers hardware and software issues, network architecture, communication links, bibliographic standards etc. Gong (1996) described the development of automation and networking in Chinese libraries. Factors responsible for the development of information activities, networks used by libraries and information services in China are focused by the author in which discussed efforts of libraries in networking, construction, trends in the development of library networking in China.
Murthy (1996) in his paper describes the development of library networks in India, and the present scenario of library networking, problems in operating the library networks which includes software, archiving data, operating large databases, online searching, price of the internet, lack of knowledge, standardization and training facilities etc. Author has also suggested possible solutions to solve the problems and suggested opinions for developing good library networking.

Sloan (1996) gave priority for automation and establishing networking of libraries. The vision ensures a basic level of information equity for all Delaware residents, providing timely and accurate information where and when it is needed, and sharing resources across local, state, national, and global networks. The article briefly outlines the networking activities underway at this time.

Kaul (1999) described a large number of metropolitan library resource sharing networks like CALIBNET in Calcutta, DELNET in Delhi, BONET in Bombay, PUNENET in Pune, MALIBNET in Madras, HYLIBNET in Hyderabad, ADINET in Ahmadabad, and countrywide networks like ERNET (Educational and Research Institutions), INFLIBNET (Universities and Research Institutions) and DESINET (Defiance Laboratories), and sectoral networks like BTISNET (Biotechnology Networks). The communication highlights some of the major library networks in India and also discussed the objectives, services, functions, future prospects and stages of completeness of these library resource sharing networks.

Kumbar (1999) traces the developments of the internet and WWW with particular reference to the Indian scene. Author focused on networks like ERNET, NICNET, Satyam online and Mahanagar Telephone Exchange Ltd. (MTNL) etc. and describes the impact on Indian academic libraries, collection development, acquisition, cataloguing, classification, circulation, preservation and storage, cooperation information services, user training, marketing of library services and inter loans etc. While concluding author recognized the important work of the Information and Library Network (INFLIBNET) in coordinating and implementing internet connectivity among the Indian academic libraries.

Mahajan and Patil (1999) described the configuration of Pune University computing network centre linking to all the university departments and the library. They also discussed about the project taken by Dr Mohan and use of internet in the university library by students, teachers, and research scholars. Authors suggested that short term
courses need to be organized to (a) design and developed of sites on internet and (b) use of internet for university library users so that they could better exploit the resources on net.

Balakrishnan (2000), discussed issues related to networks, and networking of libraries and its future trends. Author opined that there is a need to build library networks at the local level which later could be joined to different networks for achieving resource sharing. Paliwal and Shyama (2001) considered areas of library networking, networking and resource sharing, multimedia libraries and its resources, automated libraries, future of libraries and indicated the need of this. Modern concept of resource sharing overflows the boundaries as defined and encompasses other spheres of activities like cooperative, acquisitioning, cataloguing, and classification, cooperation in training and development of the library professionals.

Rao (2001) in his research article illustrated the challenges to be faced while developing networking of libraries and information centers in India. The author suggested that libraries and information centers may provide computerized services to users, promotion of resource sharing among member libraries, the development of a network of libraries and the coordinating efforts for suitable collection and development at economical level is the need. Rao, further illustrated the challenges for the networking of libraries and information centers in India. In the paper author discussed the changes that are faced by libraries and information centers and suggested need to undergo change and also highlighted the role of ICT in transforming traditional libraries and information centre into a digital mode.

Agarwal (2002) in his book explored the basic aspects of library networking and its need, where as Baruah (2002) described the advent of computer networking, which is an accepted part of the library and information. Author opined that it is benefited to all information scientist, programmers, students, managers etc as it covers community information networks, information management tools for network environment, inter-library loan, document delivery, implications of library networking, LAN based software in library systems and futures of networks etc and discussed very well by the author.

Gorman and Cullenna (2002) provided a new approach to the modeling of networks where the libraries enter through the network library model, moved forward through the cooperative library model and ends in an advanced knowledge environment model. The
research paper traced out three stages of development of networks at initial stages, which are equivalent to the Network Library Model (NLM) where the libraries are self sufficient and provide full services to users without relying on other libraries. Here the printed documents, CD-ROMs and dial up connections are the main resources and the resources are discovered through the OPAC mainly describing bibliographic data about the printed resources and the library staff gives face to face service to users. The next stage is intermediately equivalent to Cooperative Library Model (CLM) where the library provides access to off-line e-resources. Further the local networked resources are included in OPAC. The catalogue can be accessed remotely and use of e-mail is for delivery of information and also can be used for data circulation. Library provides e-guide, which is used by the users for accessing the system. The next stage described is advanced and equivalent to Knowledge Environment Model (KEM), where the libraries provide full remote access to resources, most of the material is in e-format, dedicated internet links are used data collection. The metadata is used comprehensively for the bibliographic description of resources. The access is provided totally on-line and remotely. In these models the library is viewed as one player in the information transfer process along with the use of technology and internet, community information services.

Gulati (2004) studied the status of information and communication technologies usage in Indian libraries with reference to special libraries and the efforts made by various institutions to propagate e- information products and services. The consortia effort JCCC, INDEST, CSIR e- journal and UGC INFONET were considered vital. The paper concluded with challenges for LIS professionals and an over view of initiatives taken by Government of India in establishing networks at different levels.

Jebaraj (2004) described the concepts of networking, objectives of the networking, networks development in India, limitations in networks development, and different types of networks etc. in his scholarly communication. Library networks are divided into general network, specialized network and metropolitan network. The paper detailed out the developments of library networks in India like NICNET, INDONET, VIKRAM, CALIBNET, BONET, DELNET, ADINET, MYLIBNET, DESINET, SIRNET, VIDYANET, BTISNET, INFLIBNET, MANLIBNET, BALNET.

Rumeia (2004) pointed out that libraries plays vital role in terms of promoting and sharing of access to information. Although the traditional methods of literature indexing
and accessing continues to exist and develop, library networking might become the new model and the direction for the development of the library. The discussion of the current situation of information sharing in the Chinese library, the author analyzed the factors that affects on information sharing and proposes establishing a cooperative networking center for regional libraries

Sinha, (2004) studied the status of automation and networking of libraries of North East region of India. The researcher has evaluated automation and networking services in twelve libraries that had financial assistance under INFLIBNET program. The researcher used survey research method including the questionnaire technique. The survey findings mainly cover different aspects of library automation and networking, multimedia application, use of CDROM databases, OPAC, internet services and users in-house operations (such as acquisition, circulation, retro-conversion, serial control, information retrieval and dissemination, bibliographical services), on-line searching of databases, OPAC, web OPAC etc.

Meitei and Th Purnima (2006) in their paper discussed the term library network as an essential component in information society. The paper highlights the scenario of rural libraries in the state of Manipur. Authors elaborated conceptual ideas for setting up a proposed model of ‘Rural Library Information Network System’ for powering the masses for the construction of knowledge based society and importance of ICT which is a key to bridging new digital connections in the rural areas of Manipur in this global digital information age.

Ali (2007) pointed out that digital libraries and information networks provide a huge quantity of information without any limitation of time and space. They are increasingly used for preservation of information in a simpler, cheaper and economic way. Besides this, network supports to teaching, learning and allow the new media of information to be managed more effectively. Author highlighted developments at the international level as well within India also. Author also suggested for providing quality of information sources used for preservation, teaching and learning and allowing the new media of information networks more effectively. Some popular digital libraries and information networks have been discussed, which are being operated and developed at the international level as well within India. This book covers around twenty major digital libraries of the country, which are at developing stage. It is very useful for LIS students, teachers and researchers.
Malviya and Kumar (2007) pointed out that single library has limitations in maintaining books/documents/journals and other reading materials demanded by its client or users. To overcome these problems, cooperation among the libraries is necessary and a new concept ‘Library Consortium’ came into existence with a wide coverage. The paper describes the concept of library consortia, networking and consortia management techniques and future of consortia efforts.

Forouzan (2009) discussed the need of networking and how networking is divided in to seven parts covering the aspects like an overview, network security, network and internal model etc. Karn and Das (2009) in their paper ‘Information and Library Network (INFLIBNET): A Boon for Higher Education in India.’ described the growth of library and information networks in India, and also described INFLIBNET and its mission – vision, aims – objectives, activities and services. INFLIBNET has facilitated automation and networking of academic libraries for resource sharing using network and provided access to information.

Joshi and Nikose (2010) narrated presents scenario of automation and the networking of academic libraries in their article. Authors highlighted national and local library networking, and silent features of INFLIBNET, CALIBNET, BONET and DELNET. The constraints of networking in Indian academic libraries are explained in brief. Authors suggested that major information and library networks like INFLIBNET should have a more realistic and time-bound programmes in resource sharing.

Satpathy (2012) in ‘INDOLIBNET: A Proposal’ pointed out that, no library and resource centers in the world is self sufficient to meet the various information needs of the users. Due to the rapid growth of publications, knowledge explosion, shrinking resources, escalation of prices and ever increasing expectation of users compelled the library and information centers to go for networking for resource sharing. The most important goal of networking is to maximize the availability for resources and services at minimum expenses.

Lewis (2013) discussed the aim of the Public Library Networking and focused on contributing to strategic, policy-making, awareness raising and development activities in the area of public library networking and lifelong learning. Patil (2013) discussed in his paper the current status and challenges faced by the public libraries in Maharashtra state. Libraries transformed themselves from delivering traditional library services to
technology based library services. Author observed that public library in Maharashtra faces the lacks of infrastructure and supported information communication technology. Using ICT, handling data is very easy, accurate, high rate, better quality and high speed. It saves time, cost and manpower and also helps to avoid duplication of work. All libraries connected through networking share their data, helps to adopt the suitable strategies for improving collection database. Automation and networking is very essential for sharing information.

Summary:

From the above discussions it is found that for resource sharing may efforts have been made so far since 1975. Initially the efforts started at local or city level and called Metropolitan Area Network (MAN) (ILL and Library cooperation activities). NISSAT, UGC, made efforts in developing library networks in different sectors in India viz PUNENET, BONET, ADINET, CALIBNET, DELNET etc. INFLIBNET at city and national level and Asian networks at regional level are also established in passage of time.

It is found that now there is a need to re-assess the development of library and information networks in the light of trends of LIS and use of technologies change the situations of past. Hence a need is felt to study the structures of library and information networks and existing library network topologies to develop networks for group of libraries in a city or for a group of libraries of an institution. Such efforts are not visualized in literature review and hence researcher has decided to select the topic for detailed study. In addition to this security issues are also to be considered.
Chapter 2: Literature Review

2.7 Network Infrastructure:

Sadowsky (1993) in his article described different infrastructure requirement for networks especially physical communications which supports for data networking. The quality and coverage of the human resource infrastructure which is used to established and operating an international network link or an initial national data network. Held (2000) in his book discussed different requirements like operating systems, hardware, and software, achieving a reliable network has never been more complex also this book helps to create flexible networks. It also describes the basics of LANs, WANs, and offers in-depth coverage of modern network planning, design, and optimization.

According to the Cisco Unified Call Manager Express Solution Reference Network Design Guide (2001), this detailed out the information on network infrastructure and described the requirements for the network to build. It has covered the illustrated roles of the various devices for the network infrastructure, for a typical campus network infrastructure like switch, router and its role in networks. LAN infrastructure design, requirements for basic configuration and design, best practices for deploying a highly sophisticated maintenance of network issues are also highlighted. Different network services are also covered like DNS, DHCP, TFTP and NTP.

Shinder (2001) described all introductory networking terminologies, includes two models, Department of Defense (DoD) model and the Open System Interconnection (OSI) model, which uses latest technologies such as laser, infrared, and satellite/ microwave communications, server operating systems like Windows NT, Windows 2000, NetWare, UNIX, and Linux and security concepts such as cryptography, public and private key encryption, firewalls and proxies, and internal security measures, remote access, virtual private network (VPN), and network monitoring and troubleshooting .

Zacker (2001) pointed out eight parts in network basics, network hardware, protocols, operating systems, connection services, network services, administration etc. This book covers wireless networking, network security, server technologies, network design, internet connections, remote network access, etc. This book is valuable reference offering a wealth of both conceptual and technical information on all aspects of developing networking.

Wong and Yeung (2009) explained the basic concept of network infrastructure security to network device design and fundamentally protection of the network infrastructure and a new approach in designing network devices. Beasley (2010) explained the basics of networking, cabling, protocols, interconnecting the LAN and WAN, routing protocols wireless networking, optical networking, Linux networking and industrial networks and network security etc.

Mansfield and Antonakos (2010) discussed all aspects related to computer networking in their book. In the hardware unit details such as the operation of Ethernet, network media and devices, including hubs, switches, routers, and physical topology, are discussed with design and troubleshooting examples. In software details operation of the TCP/IP protocols, routing protocols, and network operating systems are examined. Applications, of FTP, Telnet, and email are explained in detail, as there are the requirements of writing client/server applications, and illustrated concepts with several working examples in the text.

Oppenheimer (2011) discussed the design of a network and identified customer’s need and goals and based on this, logical network design is discussed including topology, switching, routing protocols, network security strategies and network management strategies etc.

Tomsho (2011) in ‘Guide to Networking Essentials’ described network operating systems in a network administration environment and also introduced the concepts of network topology and technology, protocols, reference models, wireless and network security, networking technology and operating systems including Windows Server 2008 and Linux. This book explains how to support small business network, it practice.
Summary:

From the literature it is noticed that developing or establishing a network is not a simple task but involves hardware, network hardware’s, software’s, operating systems, different software’s for different purpose, protocols etc. To manage the network skilled and qualified manpower is an essential part. After establishing the network, its maintenance and safety issues need to be considered. Thus networking at institutional level and group of institutes networking are to be considered while developing information resource networks.

2.8 Network Security and Maintenance:

Network security is an essential element of any network. The maintenance of the library networks is also very important task of network administrator. Securities mechanisms are provided by many agencies as well as various components of a network are designed to protect a system’s hardware, software and data from accidental damages and unauthorized access. The main goal of the security process is to provide users with authentic access to all of the resources needed on getting authentic user contact details, and keep the network safe from hacking by outsiders. There are many different security mechanisms for networks which are both covering software and hardware. It is also necessary to understand the possible threats and securing safety of the network by any librarian to function the network well.

DRDO organized a National Seminar on "Information and Network Security" which covered in prominence of the area and feet the need to understand issues. The seminar theme covers network security, information security, IT security, security and laws etc. Security is one of the biggest concerns of information networks.

Chavan (2000) discussed computer security based on his experience. The author tried to provide useful examples of the practical application of principles and concepts of security. The main focus is on security and management perspective like company security reviews, policy development, risk analysis, threats, vulnerabilities, and countermeasures, electronic commerce (e-commerce), encryption etc.
Maiwald (2003) in ‘Network Security’ described the concrete foundation required for network security with practical hands-on guide. The discussions in the communication cover issues related to securities like firewalls, wireless security, desktop protection, biometrics, Windows.NET Server, different laws, and the U.S. Patriot Act etc. This information helps in protecting the network system.

Bragg, Ousley and Srassberg (2004) pointed out that there is a need of networks to share the information, and also a neat design of network security is also to be looked into, when considered network development and discussed network security requirements covering design, policies, and authentication and authorization methods in detail. Hill et al, (2004) in the article ‘The Platforms Enabling Wireless Sensor Networks’ indicated that wireless sensor networks combine processing, sensing, and communications into tiny embedded devices. Peer-to-Peer communication protocols then combine the individual devices into an interconnected mesh network where data is seamlessly routed among all the nodes. These networks require no external infrastructure and can scale to hundreds or even thousands of nodes. Cryptography and network security is ideal and explored the basic issues to be addressed by a network security capability through a tutorial and survey of cryptography and network security technology.

Bhavya, Daya (2005) describes regarding network security with differentiating data security and network security. The author narrated history of network security, internet, security timeline, internet architecture and vulnerable security aspects, also explains internet protocols IPv4 and IPv6 architectures. IPv4 architecture contains address space, routing, configuration, security and quality of service. IPv6 architecture contains routing and addressing, multi-protocol architecture, security architecture and traffic control. This paper also described common internet attacks such as eavesdropping, viruses, worms, Trojan, Phishing, IP spoofing attacks, denial of service and technology for internet security such as cryptographic systems, firewall, intrusion detection systems, anti-malware software and Scanners Secure Socket Layer (SSL).

Allen (2009) discussed troubleshooting techniques from copper and fiber cabling to IPv6, and presents unparalleled guidance on identifying and resolving problems at the MAC Layer. Author illustrates the concepts giving his experience and advice maintenance with diagrams and tables. The communication provides practical summaries for networking
technologies and also describes OSI model, Copper and fiber-optic cabling, Media Access Control (MAC) Layer, IPv4 and IPv6 protocols, troubleshooting switches etc.

Stalling (2009) discussed types of network security applications, and system security. OSI security architecture, security attacks and security services, symmetric encryption and message confidentiality, public key cryptography and message authentication, web sites and electronic mail security, IP security, Web security and network management security are discussed in detail.

Parvez (2010) discussed the computer and mobile networks an attempt has been made to characterize the security and performance aspects of computer and mobile networks. Salm (2011) discussed the requirements of information security within an organization felt security is a valuable asset for an organization, which is provided primarily by physical and administrative means. With the introduction of computer the need for automated tools for protecting files and other information stored on the computer became an evident. This is especially in the case for a shared system, such as time sharing system and the need is even more acute for systems that can be accessed for a public telephone or a data network or library networks. The generic name for the collection of tools to protect data from the hackers is “computer security”.

Convery (2012) in his book discussed network security foundations, designing secure networks, secure network designs and network management, case studies and conclusions etc.

**Summary:**

Networks are easy to develop but difficult to operate, merge and maintained. Hence network security and maintenance is required. Every network is strong and protected with different tools to avoid hacking. In future when libraries have to mange networks it is necessary to know how to protect and secure the data in the networked environment. The different tools discussed in different literature helps in identifying proper solution.
2.9 Role of Libraries and Librarians:

Robin (1994), in his book discussed different services provided using network and internet based services. The impact of net on reference services, evaluating internet resources and progress of internet are also highlighted. Jambhekar and Pandian (1999) examined the status and pointed out that there should not be any technological gap between librarians and the information professionals. Authors also examined the use of internet applications in the collection development, information processing, organization, retrieval, dissemination and more importantly information services. Selvi (1999) examined the impact of internet use on academic library services and presented an overview of importance of web resources for academic users and staff. The internet has enabled academic libraries to widen their services and also traditional print based collections.

Saha (2009) has discussed in the study ‘Academic Libraries and Librarian in the Electronic Teaching-Learning Era: Is There Any More Need?’ in which author states that library and librarian become redundant in the tech-based education system. Some may thinks that library without wall and library without librarian are the same. Practically these two are quite different from each other. In the virtual library era it is somehow possible to have a library without wall. The role of the librarian and library professional have just changed their identity, and known as Cybrarian, Information Processor, Information Consultant, etc. The author concluded indicating that to cope up with the rapid changes of the technology and its use to control the rate of information explosion; librarians along with his professional colleagues have to equip themselves as per the requirement of the electronic information society. Singh and Kaur (2009) have made assumption that the future of academic libraries is in librarians hands. Authors emphasized the need for change in academic libraries in the context of the emerging knowledge economy. The discussions highlights the impact of ICT and paradigm shift in academic libraries and appreciates activities consortia, institutional repositories, and open access archives as strategic response to the paradoxical situation in growing digital documents and declining environment.

Tikekar (2009) in his study ‘Towards 21st Century Academic Libraries and Librarianship’ explained the special features of the academic library. The special features of 21st century academic libraries, like library software’s, retrospective conversion, and digital library
initiative are also discussed. The changing librarianship is explained and indicated the
emphasis on new competencies for library and information professionals. It is concluded
that though the core work of libraries remain the same but practices changed due to ICT
applications. The library services too are enhanced and have become more effective.

Ghante (2011) discussed that knowledge is basic requirement for ever human activity. For
knowledge based society librarians need to acquire some new skill to satisfy user’s
information needs. The article highlights important skills required for librarian and role of
librarian in knowledge age, which includes knowledge management, information and
computer skills, scientific and practical skills and ability to support educational programs
of different organizations. Bhatti and Chohan (2012) discussed in their paper, the
importance of research in LIC and considered the role of professional associations in
recognizing, enabling and promoting a research culture amongst qualified professionals.
This paper also addresses the prospects, problems and challenges posed in the changing
higher education system and information age. Throughout the world professional
associations put substantial emphasis on the professional development of LIS community
through fostering research activity. This paper addresses various contributing factors,
problems and solutions for bringing up positive change in the professional culture through
research.

Summary:

From the above literature review it is noticed that the librarians have to update their skills
using technology and modernize the libraries for providing accurate and current
information services to help students. The librarians to survive in latest technology era
they need to adapt technology for sharing and transmitting information at least at local
level at initial level. A network of library information and libraries in the similar areas are
to be developed which solves many problems.

From the literature review it is observed that many scholars have put forth the views on
networking and resource sharing as well as discussed the benefits of available library
networks. But it is observed that the area of developing library networks at local areas
with its requirements and how to maintain the networks including security is not touched
and made studies in this area. Considering the fact researcher made up his mind to
perform a unique study considering the concept of developing library networks and maintaining its security for effective usage in ICT era. An effort is also made to networking of management libraries in Pune city and managing it using proper security measures by librarians.

2.10 Studies on Information and Network Models:

Sahoo (2002) discussed in his paper the need of resource sharing network in India. The objective of this network is to develop resource sharing strategy for India and make cooperation among different types of LIC networks which include National Library of India. Internet technologies have brought a drastic change in this regard, specially Z39.50 protocol has provided a common platform which helps to develop a union catalogue. This protocol has made resource sharing as a reality. Paper also shows the comparison between different LIS networks and provides an economical model for developing the National Resource Sharing Network in India.

Khanna (2005) discussed in his research study, the automation and networking of Delhi based academic libraries under Dayanand Anglo Vedic (D.A.V.) College Trust and management society. It runs a wide range of academic institutions, which includes large number of schools and colleges. DAV EDUNET is the network of academic and research institutions functioning under the umbrella of DAV management. The network is for Delhi and New Delhi. It is divided into four zones based on geographical location. The four zones are NZ (North Zone), EZ (East Zone), WZ (West Zone), and SZ (South Zone). Each zone have a zonal center (ZC), which looks after coordination among the member libraries in the zone and will guide and support implementing various activities and services envisaged under the network. Each ZC maintains and update union catalogue of all books/ documents present in the libraries of all network members (NM). Each Zonal Centre has a repository of the metadata / catalogue of all books in all the network member libraries. The zonal center servers need to update the database of catalogues on the Head Quarters (HQ) server as and when changes take place in the ZC Databases need to be implemented at every zone. For this purpose, each network member electronically sends its catalogue to its ZC which will relay on HQ servers.
Prabhu (2011) in their research studies which are related to development of library networks suggested few models to initiate the networks among group of libraries of Bharathidasan University.

Biradar (2012) has discussed in his research thesis that resource sharing and networking of college libraries affiliated to Gulbarga University, requires a nodal center from where the network will operate. The author opined that there is a need to develop a model for resource sharing and networking of college libraries which would facilitate easy and direct access to information from the central bibliographical databases housed at the nodal center. Participating libraries can establish link with the regional centre to access resources of nodal centre. Kemdarne (2012) in his Ph.D. thesis suggested a network model for Dental College Libraries in Bangalore. In this model, author suggested that to create a union database of all 35 colleges and load over the main server for union database at Bangalore in M. R. Ambedkar Dental College, Bangalore. And all the 35 Dental College Libraries are inter-connected through the internet and if LAN infrastructure available can access on the internet. All libraries can access the eG3 WEB OPAC or any one can access all the Union Databases from anywhere.

These are good studies indicating the efforts of initiating library networks for information and resource sharing at city level.

**Summary:**

From the literature reviewed it is reported that from 2005 to 2011 different studies made by authors to established library and information networks in different areas viz. university libraries, DAV schools library networks in city, Engineering college networks in Kerala and Rajasthan states and city based networks in Delhi and Bangalore. It is observed that librarians are considering networks issues very prominently in the current era of ICT.

**Chapter Summary:**

From the total literature search it is found that:

- A need is felt in the library profession to share resources due to rise in cost, extensive use of ICT and information explosion even in digital form
• Use of ICT is very common and library automation phase is completed in all most all management colleges since it is a need of time.

• Librarians have trained themselves to manage with ICT developments and adapt technologies in libraries for better utilization of funding and providing services.

• Though library and information networks are available but a time has come to re-design the resource sharing in terms of ICT usage.

• Gorman and Cullenna (2002) indicated different types of models for LIC networks and emphasized the need of Network Library Model at local level to initiate activity of resource sharing.


• Pilioura (2004), Curtin (1997) and many others discussed importance to network security which is an essential part of maintaining and sustaining network.

Keeping these aspects in mind and analyzing from the studies reported in chapter one, the researcher made up the mind to undertake a different study to entitle “Design and Development of Network Based Model for Management College Libraries in Pune City with Special Reference to Network Security”.
Reference:

• Hema, R., Nagarajan, M., & Vanathi, B. (2013). A study on use of ICT based resources and services by the faculty members, research scholars, and PG students of Arts and Science colleges in Union Territory of Puducherry. Journal of Advances in Library and Information Science, 2(1), 1–6.


• Mandal, B. R., Podder, A. K., & Choudhuri, B.C. (2012). Building Knowledge

- Oak, M. K. (2012). A Study of Select Libraries of Management Institutes in India with Special Reference to Institutions within the Jurisdiction of University of Pune with Relevance to Networking, Accessibility and Services to the Users. University of Pune, Pune.
Chapter 2: Literature Review

New Delhi: Anmol Publications Pvt. Ltd.


- Rai Vishwanath. (2011). A study of management training and educational institutes in Pune to develop new instructional models, so as to meet corporate’s future requirements of professional managers at the entry point. University of Pune, Pune.


- Rastogi, Ashish (2001). Network Management using the Services of Network
Chapter 2: Literature Review

Oriented Communication Protocol. Guru Ghasidas University, Bilaspur.

New Delhi: Ess Ess Publications.