CHAPTER – 1

INTRODUCTION
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Libraries today have come a long way from being called the storehouses of information, to being called the power-house for information generation. Increased generation of information in the past few decades have made libraries rethink their strategies to keep pace with this generation. Information is doubling every ten years. This "information flood" has created a problem of space for housing collections as well as their utilisation, since larger the collection the more difficult it is to manage it. Moreover, budgetary constraints, rising prices coupled with the drive to be able to satisfy the information needs of users call for adequate, well-thought out resource sharing. One has to add to this the demand for high quality of service, and that too without any uncalled for delay, which any library worth the name should be able to avoid, since this is the raison de tre of the modern library systems. The concept of library networks is not new and it has been with us since last 40 years. Dr. S.R. Ranganathan has rightly pointed out that the main function of the library is to provide pinpointed, exhaustive and expeditious information. It should procure the latest information and provide it to users to enable them to carry on research. Libraries, particularly the academic libraries and information centres, are expected to play a vital role in supporting research, training and teaching activities by providing precise and speedy information. It is, therefore, imperative to evolve a mechanism for sharing resources and adopting proven methods. This is not possible unless and until it is supplemented by a network of libraries, since no library is an island.

The concept of library network is not new, "Library network is only an extension of traditional forms of inter-library cooperation, it transforms a loose confederation of library collections or information systems in to a formal, integrated organisational structures whose potential for rendering service is greater than the sum of its parts". Library cooperation, though it existed earlier in the form of inter-library loan (ILL), was not organised systematically. Mookerjee (1969), reporting in 1969, maintained that library cooperation and inter-library lending in India was yet to be organised. Nomani (1966) also stated that interlibrary loan scheme was still in its infancy in India. Malhan and Thakar (1980) surveyed eleven university
libraries and found that no other library cooperation except interlibrary loan existed. However, the existence of library cooperative activity in Indian libraries is evident from the large number of union catalogues. Kaul (1992) has reported the first library cooperative activity in India to be the catalogue of manuscripts compiled by Whitney Stokes in 1868. Union catalogue development was one of the major cooperative efforts in Indian libraries up to 1960s.

The 1960s saw a large number of ILA and IASLIC national seminars devoted to the concept of library cooperation. However, with the advent of computers, a change occurred. Raizada (1964) has reported the first use of computers in library work for the production of the union list of serials in 1964 using the IBM/602 machine at INSDOC, New Delhi. Since then library automation has been a matter of primary importance in Indian libraries. Detailed reports on computerisation activities in Indian libraries can be found in Kumar (1987), Kaul (1992), and the University Grants Commission’s report on INFLIBNET (1988). With the establishment of the National Informatics Centre (NIC) in 1975 and the development of NICNET in 1977, networking and communication technology in India received a major boost. This as a whole influenced the development of library network. In July 1984, the working group of the Planning Commission headed by Dr. N. Seshagiri recommended to the government of India, the need for modernisation of library services and interlinking of library systems in the Seventh Five Year Plan (1985-90). During the seventh plan, NISSAT commissioned CMC Limited in 1989 to prepare a feasibility report for CALIBNET which was completed in 1989. The Report of the inter-agency working group for INFLIBNET was published in 1989 by UGC. In 1989 CMC Limited, on behalf of NISSAT, prepared the feasibility report for DELNET (CMC,1991) and in 1992, DELNET was registered as a Society under the Societies Registration Act of 1860. In 1991, the University Grants Commission (UGC) started INFLIBNET programme at Ahmedabad. The most recent development is the recommendation of the working group of the Planning Commission on library and informatics for the ninth five year plan (1997-2002), which emphasises the development of standard bibliographic databases, national library system, networking and standardisation of processes (Kaul,1997).

The 1990s can be considered the golden period of library networking in India because in this period, there emerged a number of networks as a
direct outcome of rapid advancements in the various technologies such as telecommunication, the advent and use of satellite communication system, the availability of microprocessors and PCs at affordable price and the growth of indigenous computers and softwares, etc.\textsuperscript{16} There has been a plethora of publications and seminars on library networking during this period. As a result, there are nine metropolitan library networks (MLNs) in India, besides INFLIBNET viz. ADINET, BONET, CALIBNET, DELNET, MALIBNET, MYLIBNET, PUNENET, HYLIBNET, BALNET. At present the mushrooming of general data networks, library networks and specialised sectoral networks listed in annexure 2, 3 and 6 corroborates this trend. However, the scenario of networks does not provide the growth of ideal library networks in India\textsuperscript{17}. Several networks are either presently functional or in the formative stage in India which we will discuss later on.

1.1 Genesis of the concept of library networks

The optimum policy of collection development of a service unit, together with a complementary agreement with other units, for co-ordination in acquisition and cooperation in organisation, storage and service, is a close approximation to the ideal. Where money fails cooperation and coordination work. This fact, a necessary implication of the Normative Principles of Information Services, was consciously recognised by the library profession at the beginning of the twentieth century. This becomes evident from the following words of C.H. Gould, in 1909\textsuperscript{18}.

"The problems which confront us are different from the earlier ones. They no longer have to do with libraries as final terms in a series but as first term in a series of larger proportions. The twentieth century has the task of evoking methods and order among libraries rather than within libraries. It must discover a classification not for the volumes on the shelves (which has already been done) but for the libraries themselves, grading them as it were, and welding them into a complete system ... such an organisation, such a system of libraries, is the final term in the new series. In it the libraries, of the country would stand not as independent units, but as interdependent partners. And its ultimate attainment should, I believe, be the aim par excellence of this generation of libraries".
To start with, the nature of this cooperation had been mostly informal, and limited to inter-library loans. In the process of evolution, gradually it became relatively formal through the formation of “consortia” and “cooperatives”, in the second decade of the twentieth century” 19.

So the idea of networking of libraries is not new. For example, the provision and development of efficient and effective service to users of information systems through mutual cooperation and coordination of resource-information resources, human resources, facilities and services-has been in operation in one way or the other, for decades. However, with the accelerated growth of information sources, as also of potential users often located at a distance from the information sources needed by them and in the variety of uses to which information, can be put and with the growing realisation of how to use resources economically, the idea of networking is being consciously thought of and planned.

Mechanisms for cooperation among libraries by sharing of resources have been in operation in one form or the other for several decades now. Cooperative agreements among libraries and information centres have also existed for decades. The primary difference between the two is the relative informality of traditional cooperative agreements between individual libraries and information centres as compared to the more formalised patterns of networks which pull individual libraries together to act in concert as one organisation with set responsibilities. The library network concept is exciting because it also provides the user, regardless of his geographic location, with access to larger resources than would normally be available to him locally. The necessity of library networking in India is not new and the need for such network has been strongly felt since 1980s as the developed countries had already put the idea into practice and gained much through resources sharing and networking.

At present, under heavy pressure of inadequate finance and professional willingness to render better service, there has emerged a more formalised complementary pattern in accomplishing a closest approximation to the ideal of information services. Essentially, the concept of “network of libraries and information centres” refers to this relatively formal phenomenon of cooperation among the service-units. A reference to the Normative Principles of Information Service would show that this phenomenon is, indeed, one of the
necessary implications. It implies a formal integrated organisational structure capable of providing every information user, irrespective of his place of work, with access to a large collection of sources of information with superior efficiency in information services, superior effectiveness in the use of information, and thereby superior cost-effectiveness of invested funds. In other words, this implies a system whose service potential is far greater than that of the sum of its parts. This is the only solution to the problems of inadequate finance and higher cost of input resources. This is the only means to satisfy the professional willingness to render better services to users on the one hand, and meet the users’ needs to their satisfaction on the other. This given, the study of the library network assumes an added significance.

Dr. Satyen (Sam) Pitroda, advisor to the Indian Prime Minister on Technology Mission and present chairman & chief executive officer (CEO) of WorldNet Ltd. in a keynote address at the inaugural function in 1989, said:

"...India, information will have to be used to meet our needs and this requires a great deal of innovation to find ways whereby information can be organised, structured, standardised and then made available to everybody."  

He reiterated

"... the biggest challenge in India was to link good information and to link people all over the country to knit then into one entity in an integrated manner so that we could function and harness the power of information for productivity and efficiency to meet the basic needs of the people".

Dr. Henry N. Mendelshon, Director of USIS Libraries who presided over the lecture on “Services in automated library: challenges and opportunities”, held at the NEHU, Shillong(Meghalaya, India) in Sept. 1997, said:-

".... due to continuous rise in the cost of books and journals, even the US Libraries are depending more and more on electronic media, automation and a network of resource sharing."
Resource sharing, using the modern technologies of computers and communication which has enormous capacity of distributing information selectively by removing the barriers of functional and geographical constraints has given rise to library networks in which libraries of the same type i.e., either academic, public, or special, form a network, wherein both the services and the processes in a library may be shared. The document that used to be delivered by mail, on inter-library loan, is now being transferred through electronic-mail (e-mail). The development of on-line, interactive, and user-oriented networking systems bears the promise of converting tomorrow’s library into a communications centre functioning as one of the nodes in a broad network of interdependent library operations (J.G. Williams and Roger, 1979) 23.

The impact of information technology (IT) on these libraries is bound to be strong and as expected has altered the library ecology. The interaction between the libraries by network system revolutionises methods of providing timely information at tremendous savings in cost. “For instance, the member libraries of OCLC have gone to the extent of sharing copies of text books between themselves, thus cutting down the cost of building text-book libraries which are so much of a drain on the already dwindling resources for current periodical subscriptions. It has been calculated that 75% to 90% of the resources of university libraries in this country (USA) are eaten away in the heavy investments made in the current periodical subscriptions and building up text-book libraries.”24 Library networks not only reduce the wasteful duplication of intellectual efforts and expense incurred in providing duplicate coverage of the same material but also increase the opportunities for improving performance of specific services through enhancing the speed and comprehensiveness of coverage and reduce the number of sources that a user would require to find out the required information.

The need for information is growing with the number of information generators is increasing at an exponential rate as a result of continued developments in all the fields, which create problems of collection, organisation and dissemination of information. Dissemination of information is the main function of a library and library generates information through various types of bibliographical resources and literature. However, there are delays in providing services to the end users due to continued use of conventional methods. In the last two decades, especially during nineties,
there has come in to being a noteworthy awareness of automating library processes and services with a promise for an all-round development in this direction. Computers now cost less with the result that the cost of processing and storage has come down, which in itself, is not only encouraging but speaks for a bright future.

The researcher and the academic community are seriously handicapped due to paucity of resources and the services offered by libraries. “It is estimated that as many as three lac new titles are published every year and more than ninety thousands periodicals every year are published in science and technology (S&T) alone and to which one thousand periodicals are added every year. The yearly output of publication runs to thirteen to fourteen million documents. It is humanly impossible for libraries to acquire even a small part of publications of just one year”. It is indeed not possible to equip each library and information centre with the required number of documents such as books, periodicals, etc. Many of these libraries have to discontinue subscription of several periodical titles every year due to inadequate financial resources. We do not have any union catalogue and there is no mechanism of dissemination of valuable information available in these libraries. “Universities are producing more than 10,000 Ph.D. theses every year, which remain buried locally”. Scholars in remote areas do not have access to the adequate library resources and thus feel isolated. At the same time, there is considerable duplication of investment in library holdings. The situation is like this that we do not have enough and what we have is not available to the users. The only solution for meeting this situation is to resort to resource sharing and networking.

The imperatives which decisively influenced the character and increased the current pace of library network activities are as follows:

i) spiraling book and periodicals prices,

ii) budgets have fallen in buying power and size,

iii) increase in cost of providing services,

iv) exponential growth of publications, especially research results and intermediaries,
v) interdisciplinary trend or “Balkanisation” of knowledge,
vi) rapid obsolescence in the fields of science and technology,
vii) increase in variety and degree of user demands,
viii) self-sufficiency, a mirage,
ix) growing consciousness of user’s right to access in all fields, including libraries,
x) shift in emphasis from,
   - local ownership to collective access,
   - library holdings to document-delivery capability;
   - material-orientation to client-orientation,
   - document-delivery to information-delivery,
xi) libraries’ need for more responsiveness to users’ information needs,
xii) library’s willingness to share resources,
xiii) increasingly effective technological capabilities, etc. 27,28,29,30,31, 32,33,34,35

1.2 Need

The networks basically provide a mechanism for pooling library resources of a number of libraries, information centres and databases with a view to sharing their information resources. Resources are better utilised with the saving in the cost since they also promote co-operative collection building of the units. In the long run it is the most effective way of disseminating information irrespective of the location of the units, not only that, a vast store of information is available for use, thus meeting the basic need of a
researcher who is always in search of information relevant to his domain of research. Moreover, the content and scope of services of the participating units are also significantly widened ultimately leading to their improvement and thus adding to the fund of knowledge as an end product.

We need library networks for specific reasons such as:

i) information requirements:
   libraries and information centres commonly have:
   a) large data files,
   b) variable and lengthy records,
   c) the need for many index points,
   d) various types of users with equally various needs,
   e) a large amount of alphabetic, textual, indexed, or abstracted data,
   f) need for output from many angles such as author, title, subject, class number and keywords.

   These requirements can be met with the help of information technology (IT). It should be realised that information has value in use and it is one of the vital input in the development of the economy as a whole. Networks, therefore, have much wider impact on social change, and economical development, even on life-styles.

ii) to improve quality and quantity of library and information services:

   By means of computer networking, quality and quantity of library and information services can be enhanced in terms of time lag, relevance of information retrieved, regularity and user friendliness. To suit the requirements of the user communities in the libraries and keeping the options open to extend the resource sharing facilities even to the outside users because the library network provides efficient means of exchange of information of data
transmission through e-mail and transfer of large quantity of data on-line and off-line. The database can be used by a large number of users.

iii) growing need for resource sharing:

The volume of literature, the number of users and their varied requirements have created a situation in libraries and information centres where it is almost impossible for any single library, information centres to provide information services single handed.

Some recent developments in the field of publishing and printing such as desk-top publishing and printing are responsible for the “Flood of Information”. The budgetary constraints and the tremendous increase in the number of publications as well as increased cost of these publications have made it increasingly difficult for libraries and information centres to fulfill the needs of their clientele from their own collection. There can not be any self-sufficiency-there never was.

iv) technological developments:

It is not possible, neither it is wise, to ignore the use of information technology (IT) and its several manifestations any further. Information technology (IT) is an answer to the actual needs and answers them in as best a manner as possible.

1.3 Functions

The most important function of a library network is to create a mechanism for supporting a variety of activities such as inter library loan, cooperative acquisition, a specialised purchasing programmes, centralised processing, shared cataloguing, sharing of bibliographical data, centralised periodical collection for loan purposes, cooperative microfilm, preparation and maintenance of Union Catalogue and Union List of serials, etc.
1.4 Scope

The scope of this study is mainly to find out the utilisation and satisfaction levels of academic and research communities through the information and library networks of all these 14 university libraries and information centres in Gujarat. With this in view it was necessary to evolve a mechanism for sharing of resources and adopt methods offered by modern information technology (IT) encompassing both computer and communication technology for the provision of their structure, activities and services. It does not confine itself to any discipline/mission-oriented library network but it gives general guidelines for planning library network. The term Information and Library Network has been used to represent both “Library Network” and “Information Network” or any one of the two.

The method of establishing the network, its configuration, topology, model, constraints or limitations in its operation as also the preventive and corrective measures together with the methods of improving networking have been dealt with.

1.5 Objectives

The objective of the study is to determine the scope of library networking for providing cost-effective quality products and services to maximise the sharing of information resources through information and library network in the university libraries and the libraries of important national institutions (which have been considered here as Information Centres) in Gujarat.

To achieve the aforesaid objective, proper organisation and the establishment of information and library network are both essential and desirable. Hence the objective of the study as envisaged is to determine the role of library networking that is to say,

1. pooling, sharing, optimisation of resources, facilities and services of these libraries,

2. enlarging the resource base with minimum cost involvement for these libraries,
3. overcoming time, space and language barriers in i) accessing and ii) obtaining the desired document through a) compilation of union catalogues and b) promoting faster modes of document delivery and access capabilities among participating libraries.

The objective envisages:

4. defining areas of standardisation required and suggesting minimum level of standardisation in such areas like creation of resource database system, technical processing of resource materials, procurement of computer hardware, operating system (OS), library software package, network protocol and modems for compatibility in information and library network,

5. specifying a library network configuration for these libraries, and

6. suggesting a suitable topology as well as a model for information and library network for the participating libraries.

In short, a socially relevant intent of the study is to foster the development and strengthen the spirit of true information and library network sharing the common mission, a commitment and a belief in the power of cooperation and proper coordination amongst all these 14 university libraries and information centres in Gujarat. This should also serve the users at national, and international level as and when required.

1.6 Hypotheses

In pursuance of these objectives, the following hypotheses were formulated to test the significance of the impact -

Ho1. “information and library network doesn’t have greater impact on providing cost-effective quality products and services to maximise the sharing of information at lesser or no great cost among its participating libraries in Gujarat”,

Ho2. “rationalisation of cooperative acquisition of library resources through information library network will not be easier and possible at all levels among university libraries and information centres in Gujarat”,

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Ho3. "there will be discontinuation of the subscription of several costly 
periodicals subscribed every year by these participating libraries in 
Gujarat”,

Ho4. “there will be no additional benefits at lower operational cost and also 
make optimum use of national resources through information and 
library network of the university libraries and the information centres 
in Gujarat”.

1.7 Definition of terms

Definitions of network

A ‘Network’ may be defined variously as:

1. a complex arrangement of interconnected elements
2. a physical entity intended to function as a unit
3. an interconnected or interrelated chain, group or system.

A network comprises of a structure, a set of connectors, and terminals. 
Networks are usually designed with some performance goals to be 
achieved.

The term “networking” is defined as the linking of organisations, institutions 
and individuals for a common purpose. It can assist development in three 
ways:

i) exchange of ideas,
ii) sharing of resources, and
iii) utilisation of expertise.

In the information context, a “network” is defined as a group of libraries or 
information centres that are interconnected for the purpose of resource 
sharing. The resources are both collections of documents and the 
bibliographic information identifying them. The ultimate goal of such
resource sharing is, for a given library or information centre, to provide better service to users than it could on its own. Encyclopaedic Dictionary of Library and Information Science defines the term network as “a series of interconnected computers, peripherals, and terminals which are communicating with each other…”

Harrod’s Librarian’s Glossary of Terms defines the term network as “a system of physically separate computers with telecommunication, allowing the resources of each participating machine to be shared by each other.”

A library network is a chain of libraries controlled and operated as one unit.

Library network may be defined as: A distribution system composed of two or more libraries and/or other organisations engaged in a common pattern of information exchange, through communication, for some functional purpose.

Asynchronous transmission

In data communication, a transmission in which one character is sent at a time. Asynchronous transmission is usually used by personal computers when using modems. Protocol supports for Asynchronous transmission are X.3, X.28, X.29.

Bus topology

Every node connected on a bus network is allowed to receive every transmission on that network. The main problem faced in implementing this topology is the fact that only one communication channel exists to serve the entire network. As a result, if this channel fails, then the whole network will go out of operation.

Coaxial cable

A cable consisting of a single copper wire surrounded by a layer of insulating materials and then by a copper mesh.
Communication channels

The medium through which data are transmitted between communication devices. Communication channels are required to interconnect computers to carry the information placed remotely into a library network.

Communication software

Communication software is, an application program that runs the modem and controls exchange of data between computers.

Computer

An electronic device that stores and processes data according to directions of a program to produce useful information.

Configuration

In a personal computer, all the hardware elements—central processing unit, internal and external disk drives, display screen, keyboard, mouse, printer, modem, etc.—and the interconnection between them.

Hardware

A general name for computers and associated accessories.

Host

The main computer in a computer network. Also, any computer that contains information other computers can access on the Internet.

Hub

The point on a network where a bunch of circuits are connected.

Modem

The modem, is an Acronym for MOdulator/DEModulator, which is also known as Network technical control system, is an electronic device enabling
a computer to communicate and exchange information with other computers via a standard telephone line.

**Mouse**

A mechanical or optical pointing device used to move the on-screen pointer. As it is moved across a flat surface, the motion causes a corresponding movement of the pointer on the screen.

**Network protocols**

Protocols are fundamental to all data communication, which are a set of rules that govern the operation of fundamental units to achieve communication. X.25, Perhaps the best known, widely used and the world’s most implemented data communication protocol standard is X.25. In the case of X.25 the DCE provides access to a packet-switched network.

**Operating system**

Operating system (OS) is a basic software managing the applications software for a computer.

**Optical fiber**

A hair thin fibre of transparent flexible glass or plastic use for transmitting light. At present optic fiber networks can transmit voice, video and data at speeds 10 to 100 times faster than the standard copper cables. It is spelled ‘fiber’ in American English.

**Repeater**

A device that amplifies weakening analog signals back to their original strength.

**Ring topology**

A computer network in which several devices are connected to each other in a closed ring by a single communication channel. No computer is central in
this network, but the failure of a device may cause complete network failure. This topology is more commonly deployed in LANs.

Router

A special-purpose computer (or software) that connects two or more networks and ensures that data going between them is delivered quickly and efficiently. Routers look at the destination addresses of the packets passing through them and decide which route to send them on.

Satellite communication

It provides much more viable, effective, comprehensive and economical as well as reliable data transmission over a network of a large number of geographically distributed sites. Not only textual data, but images, voice and video are also transmitted over satellite networks.

Software

Also called computer program. A sequence of detailed instructions used to direct the operations-input, processing, output and storage-of a computer. Software is generally categorised either as application software or system software.

Star topology

The topology of the star network is normally used in WANs. At the centre of a star network is the hub through which all traffic is routed. As a result, in the event of the failure of the hub computer, the network will fail too.

Synchronous transmission

In data communication, a method of transmission in which blocks of characters with no gaps between them are sent in timed sequence. Unlike asynchronous transmission, it is a high-speed transmission and is used in direct computer-to-computer communication of large computer systems. In synchronous transmission sending and receiving devices operate continuously at the same frequency. Protocol supports for Synchronous transmission are X.25, X.75, X.32.
Tree topology

The tree, or a hierarchical network topology, is one of the simpler and more common topologies found today. Reliability problems can arise in this configuration owing to the control exercised by the topmost node in the ‘tree’. This topology too is used to set up WANs.

Wire cable

A metal conductor used for data communication. Wide cables can only transmit analog signals.

X.25 protocol

One of the most widely known network layer protocols is the X.25 protocol for packet switching.

X.400 message handling

The formal development of the X.400 series of recommendations for message handling systems (MHS) was done by the CCITT, an international standardisation body in the area of telecommunication.

X.435 protocol

A protocol specially designed for handling electronic data interchange (EDI) messages. X.435 is one of a set of recommendation for message handling application called EDI messaging (EDIMG), a form of message handling tailored exchange of EDI information.

X.500 directory services

X.500 recommendations specify the architecture and protocols to set-up a distributed database system which can be accessed by open systems over computer communication networks.

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