DESIGN AND DEVELOPMENT OF NETWORK BASED MODEL FOR MANAGEMENT COLLEGE LIBRARIES IN PUNE CITY WITH SPECIAL REFERENCE TO NETWORK SECURITIES

A thesis submitted to the

Tilak Maharashtra University, Pune

For the Degree of Vidyavachaspati (Ph.D.)

(Doctor of Philosophy)

In Library and Information Science

Under the Faculty of Moral and Social Sciences

Submitted by

Ms. Sheetal Deepak Naik

Under the Guidance of

Dr. N. B. Dahibhate

Principal Technical Officer,

CSIR - National Chemical Laboratory, Pune 411008

Department of Library and Information Science

January 2015

DECLARATION BY THE CANDIDATE

I hereby declare that the thesis entitled **"Design and Development of Network based Model for Management College Libraries in Pune City with Special Reference to Network Securities"** Completed and written by me has not previously formed the basis for the award of any Degree or other similar title upon me of this or any other University or examining body.

Date: 15 /01/2015   **Ms. Sheetal Deepak Naik**

Place: Pune   **Research Student**

CERTIFICATE

This is to certify that the thesis entitled "**Design and Development of Network based Model for Management College Libraries in Pune City with Special Reference to Network Securities**" which is being submitted herewith for the award of the Degree of Vidyavachaspati (Ph.D.) in Library and Information Science Faculty of Moral and Social Sciences of Tilak Maharashtra University, Pune is the result of original research work is completed by **Ms. Sheetal Deepak Naik** under my supervision and guidance. To the best of my knowledge and belief the work incorporated in this thesis has not formed the basis for the award of any Degree or similar title of this or any other University or examining body upon her.

Date: 15 /01/2015   **Dr. N B Dahibhate**

Place: Pune   **Research Guide**

ACKNOWLEDGEMENT

I am ever grateful to my research guide Dr. N B Dahibhate, Principal Technical Officer (EII), CSIR National Chemical Laboratory Pune, for his constant encouragement and wise counsel were of immense value to me in completing this research work. In spite of his busy academic and administrative schedule Dr. Dahibhate spared his valuable time and guided me successfully. Because of his able guidance, constant support, encouragement throughout the course of study, I am able to submit this thesis in time. In fact I feel it a great privilege to work under his supervision.

I am thankful to Vice Chancellor of TMV Pune, Dr. Deepak Tilak, Registrar Dr. Umesh Kesakar and Shri Salvi Sir for providing all the research facilities from time to time. I am thankful to Mrs. Wate madam for the kind gesture and Ph.D. unit staff Shri Navnath and others for helping and solving the administrative issues. Thanks to librarian of TMV Dr. Mrs Dhanishtha Khandare and Mrs. Yamini Waliwadekar for their support. I, also place on record my sincere thanks to late Dr. M.B. Konnur, retired University Librarian and Professor Pune University, for his helpful suggestions during selection of topic for my research study.

My Special thanks to the Director of Vishwakarma Institute of Management (VIM) Dr. Shailesh Kasande for supporting to my studies and permitting to continue the study with kind suggestions. I would also like to place on record my gratitude to respected authorities of Symbiosis Centre for Management Studies (SCMS), Viman Nagar Pune, Vishwakarma Institute of Management (VIM), Kondhwa Budruk, Pune for their support. The full support of these authorities helped me in perusing and completing the research study. I am acknowledging the support of library staff and colleagues for their inspiration from time to time.

I am thankful to all the librarians of management colleges of Pune city for promptly responding to my questionnaire and supported to my survey conducted for this research. The ICT experts from Wadia College, DIRC Unit of CSIR - NCL, Symbiosis Centre for Management Studies (SCMS), Vishwakarma Institute of Information Technology (VIIT) who helped me in developing concepts for the models.

Acknowledgement

EXECUTIVE SUMMARY

The primary objective of a library is to provide right information to right user at right time in right form. To fulfil this objective libraries have to provide maximum access to information irrespective of location. ICT has helped to meet these objectives successfully. Applications of ICT and development of networks, use of internet and WWW have changed the practices in libraries. Due to this change librarians and libraries are facing problems like budget, information explosion, satisfying user needs etc. However the concept of library cooperation and resource sharing is developed since long in different nomenclature like ILL, sharing of catalogue data, professional skills, information resources etc. But recently ICT made revolutionary change by developing networks and provide better services to user community.

Libraries from its inception are called as store houses of information having qualitative collection of documents useful to the information society. Libraries are also called as power houses of information and knowledge resources centers which disseminate information and help users in generating new knowledge base on the existing knowledge. However, libraries are not self sufficient and are unable to fulfil all the needs of users due to information explosion and rising cost of publications. Librarians have understood the situation and initiated Inter Library Loan (ILL) facilities and now reached to library networks in the passage of time with different transformations. The Librarians, UGC, NISSAT made different efforts in achieving resource sharing and provide information resources to the users through developing centers and consortium.

University Grants Commission (UGC) and National Information System for Science and Technology (NISSAT) under Department of Science and Technology (DST) developed many library networks to strengthen the resource collection in particular discipline and also share resources and develop specialised databases. INFLIBNET, CALIBNET, DELNET, MYLIBNET and many more city networks are the outcome of the efforts of UGC and NISSAT. Technologies also supported to the developments of networks in order to achieve maximum level of resource sharing and increase the level of productivity of information products and services.

The ICT use in libraries extended the scope of resource sharing by developing library networks for effective transfer of the information. E-publishing, digital contents (e-books, e-journals, databases) supported to the mission and new concepts are developed in resource sharing. Considering these developments the researcher has planned to unite the management libraries in Pune city and design a model for the library networks through study to achieve economy and best resource sharing. This base model can be later extended in the geographical area also.

The study initiated with explaining the need of library networks, review of library networks developed so far in India, reason and need of the study in ICT era, prerequisites for the development of networks and finally a PMLN model for the management libraries in Pune. The objectives are selected to fulfil these concepts with selection of suitable research methods. Few objectives are : assess the status of management education and management institutes in Pune city, assess the resources and facilities, library services available in management libraries and user expectations form these libraries, assess the status of ICT infrastructure and ICT skills of library staff in management colleges libraries, assess the use of e-resources, study the efforts made so far in library networks and resource sharing, study the pre-requisites for developing networks including security and workout, prepare and suggest a conceptual model for networking of management libraries in Pune city and its security.

The research method has many dimensions. The present study is providing a model for resource sharing in management libraries which is new initiative using ICT. Model is developed based on the data collected and concepts used. The primary and secondary both methods are used for data collection. For the present research study descriptive research method is used in which questionnaire tool is used for collecting data regarding the status of libraries in management discipline. Based on the data the effective model is suggested.

In addition to this to assess the interest of library professionals towards participating in resource sharing activities and also to seek the opinions of few librarians of prominent institutes as well as ICT experts were interviewed. The interviews conducted informally and without any structured questionnaire. This gave the support to the study. The researcher has also collected related and the available literature published in different

resources and reviewed to understand efforts made towards resource sharing activities among libraries in India as well as other developed countries. The literature review helped in analysing networks benefits, topologies, security etc. Thus literature review (secondary analysis) helped in supporting concepts, observations. Thus for conducting this study, descriptive research method in which survey using questionnaire, observation, interviews and secondary analysis are used. The data obtained from these ways helped researcher in building a model for library networks and its security. The researcher has reviewed 17 studies conducted by the different scholars to identify the uniqueness in the present study. In this study following phases are discussed while developing network model which are not focused in other studies noticed by the researcher e.g. design and planning phase, pre-requisite / pre-conditions for networking, operational and maintenance phase, security phase and application phase etc.

The study is presented in nine chapters.

Chapter 1 – Introduction: This chapter highlights need of library networks, library networks in India, background of study, reason to select topic, scope and limitations, aim and objectives, research methodology, hypothesis, uniqueness of study and structure of the study etc.

Chapter 2 – Literature Review: This chapter is a brief analysis of information literature published in different forms and consulted by researcher, relevant to study. The different facets considered while conducting literature are discussed at length with brief summary. The literature survey help in building the concepts developed in the mind of researcher and also used and cited reference in text suitably in different chapters.

Chapter 3 – Proliferations of Management Education and Institutes: In this chapter efforts have been made to analyse the prominence and importance of management education and the growth in development of management institutions. A survey covers global to local developments in management education, a structure nature of programs etc.

Chapter 4 – Changing the Paradigm Libraries and Technology: This chapter highlights implementation of different technologies and its effective use in managing

libraries. A review of latest trends especially in technologies applied in libraries are discussed in this chapter, along with its merits in performing different library activities.

Chapter 5 – Networks Prerequisites: A detailed presentation in respect of network building and its different facets like need, benefits, prerequisites, maintenance and securities are discussed.

Chapter 6- Library Networks in India: An Overview: The efforts are made to study the development of library networks at national level. The agencies, associations, organisations involved in developing library networks at different level are also highlighted in this chapter.

Chapter 7 – Data analysis and Interpretation: This chapter analysis the data collected from the questionnaire and presented after the evaluation systematically using different statistical methods. This chapter in general helps in narrating the status of management libraries.

Chapter 8 – Findings, Suggestions and Conclusion: This chapter highlight the observations and findings from the data collected observations and literary evidences and based on these findings suitable suggestions to initiate proper networking are narrated. At the end study is concluded stating scope for future research and usability of the study.

Chapter 9 – Conception of Pune Management Libraries Network (PMLN): Based on different model presented so far and after the detailed study of all the past reporting the researcher has developed his own conceptual model for networking management libraries in Pune city based on NKN. The structure of proposed network for PMLN is discussed in detailed in this chapter.

Opening part of the thesis presented the very need of the library network which was substantiated in the later chapters. The sole objective of the research work was to seek the readiness of the management institutes in Pune towards formation of a library network wherein the individual libraries now serving a rich hub of information and knowledge based services can gain collective advantages and which in turn would be attained by their stakeholders. Based on the findings as regards to the technical capabilities of the libraries of management institutes in Pune a model of Pune Management Library Network referred hereafter as PMLN has been conceived and presented in this study.

CONTENT PAGE

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

Abbreviations	Full Form
ACBSP	Accreditation Council for Business School and Programs
ACM	Access Control Management
ACRL	Association of College and Research Library
ADINET	Ahmadabad Library Network
ADR	Audit Data Reduction
ADSL	Asymmetric Digital Subscriber Line
AGRIS	International System for Agricultural Science and Technology
AICTE	All India Council for Technical Education
ALA	American Library Association
ALIA	Australian Library and Information Association
ALISE	Association for Library and Information Science Education
ALPSP	Association of Learned and Professional Society Publishers
AMBA	Association of MBAs
AMC	Annual Maintenance Contract
ARL	Association of Research Libraries
ASCE	American Society of Civil Engineers Library
ASIS	American Society for Information Science
ASIST	American Society for Information Science Technology
ASLIB	Association for Information Management
ASME	American Society of Mechanical Engineers e-journals Package
ATMA	AIMS Test for Management Admissions
BALNET	Bangalore Library Network
BARC	Bhabha Atomic Research Centre
BBA	Bachelor of Business Administration
BBM	Bachelor of Business Management
BBS	Bachelor of Business Studies
BGP	Border Gateway Protocol
BIMTECH	Birla Institute of Management Technology

Abbreviations	Full Form
BLCMP	Birmingham Libraries Co-operative Mechanisation Project
BONET	Bombay Library Network
BOSLA	Bombay Science Librarians Association
B-Schools	Business Schools
BSNL	Bharat Sanchar Nigam Limited
BTISNET	Biotechnology Information System Network
CAI	Computer-Assisted Instruction or Computer-Aided Instruction
CALIBNET	Calcutta Library Network
CAS / STN	Chemical Abstracts Service / Scientific and Technical Information Network
CAS	Current Awareness Service
CAT	Common Admission Test
CBI	Computer-Based Instruction
CBT	Computer-Based Training
CCTV	Closed-Circuit Television
C-DAC	Centre for Development of Advanced Computing
CET	Common Entrance Test
CFTRI	Central Food Technological Research Institute
CILIP	Chartered Institute of Library and Information Professionals
CISCO	Commercial & Industrial Security Corporation
CLIR	Council on Library and Information Resources
CLRI	Central Leather Research Institute, Madras
CMAT	Common Management Admission Test
CNI	Coalition for Networked Information
COPOL	Council of Polytechnic Librarians
CSIR	Council of Scientific and Industrial Research
CSU/DSU	Channel Service Unit / Data Service Unit
CUCOLIS	Current Contents for Library and Information Science
DAC	Discretionary Access Control
DAV	Dayanand Anglo Vedic

Abbreviations	Full Form
DCM	Descriptive Cataloguing Manual
DDS	Data Distribution Service
DEC	Distance Education Council
DEIs	Distance Education Institutes
DELNET	Developing Library Network
DESIDOC	Defence Scientific Information and Documentation Centre
DG set	Diesel Generating sets
DHCP	Dynamic Host Configuration Protocol
DLA	Delhi Library Association
DLIs	Distance Learners Institutions
DNS	Domain Name Server
DoD	Department of Defence
DRDO	Defence Research and Development Organisation
DRTC	Documentation Research and Training Centre
DSIR	Department of Science and Industrial Research
DST	Department of Science and Technology
DTE	Directorate of Technical Education
DVD	Digital Video Disc / Digital Versatile Disc
EDI	Electronic Data Interchange (Clearing house)
EDS	Electronic Data Systems
ELNIT	Electronic Libraries and New Information Technologies
E-MAT	Executive Management Aptitude Test
EQUIS	European Quality Improvement System
ERNET	Education and Research Network
FDDI	Fiber Distributed Data Interface
FORSA	Forum for Resource Sharing in Astronomy & Astrophysics
FTP	File Transfer Protocol
GDP	Gross Domestic Product
GMAT	Graduate Management Aptitude Test
GOAL-Net	Goa Library Network

Abbreviations	Full Form
HDLC	High-level Data Link Control
HEC	Higher Education Commission
HELINET	Health Sciences Library & Information Network
HRM	Human Resource Management
HTTP	Hyper Text Transfer Protocol
HYLIBNET	Hyderabad Library Network
IACBE	International Assembly for Collegiate Business Education
IASLIC	Indian Association of Special Libraries and Information Centres
IATLIS	Indian Association of Teachers of Library and Information Science
IATUL	International Association of Technological University Libraries
IBM	International Business Machines
IBSAT	ICFAI Business Studies Aptitude Test
IBT	Internet-Based Training
ICICI Knowledge Park	Industrial Credit and Investment Corporation of India (ICICI) Knowledge Park
ICMR	Indian Council of Medical Research
ICSSR	Indian Council of Social Science Research
ICT	Information and Communication Technology
IDS	Intrusion Detection System
IFLA	International Federation of Library Associations and Institutions
IGNOU	Indira Gandhi National Open University
IIFT	Indian Institute of Foreign Trade
IIHMR	Indian Institute of Health Management Research
IIL	Inter Library Loan
IIMA	Indian Institute of Management, Ahmadabad
IIMB	Indian Institute of Management, Bangalore
IIMC	Indian Institute of Management, Calcutta now Kolkata
IIMHRD	International Institute of Management and Human Resource Development
IIMI	Indian Institute of Management, Indore

Abbreviations	Full Form
IIMK	Indian Institute of Management, Kozhikode
IIML	Indian Institute of Management, Lucknow
IISc	Indian Institute of Science
IISWBM	Indian Institute of Social Welfare and Business Management
IIT	Indian Institutes of Technology
ILA	Indian Library Association
ILIAC	International Library Information and Analytical Center
IMAP	Internet Messaging Access Protocol
IMT	Institute of Management Technology, Ghaziabad
INDEST	Indian National Digital Library in Engineering Sciences and Technology
INDOLIBNET	Indore Library Network
INFLIBNET	Information and Library Network
INFONET	Information Network
INIS	International Nuclear Information System
INSDOC	Indian National Scientific Documentation Centre
IP	Internet Protocol
IP Camera	Internet Protocol Camera
IPS	Intrusion Prevention System
IPX	Internetwork Packet Exchange (Protocol)
IR	Institutional Repository
IRC	Information Resource Centre
IRS	Indian Remote Sensing / Information Retrieval System
ISB	Indian School of Business
ISC	Information Systems Committee
ISDN	Integrated Services Digital Network
ISP	Internet Service Provider
ISRO	Indian Space Research Organization
IUC	Inter-University Centre
IUCAA	Inter-University Centre for Astronomy and Astrophysics

Abbreviations	Full Form
IXP	Internet Exchange Point
JASIST	Journal of the American Society for Information Science and Technology
JCCC	J-Gate Custom Content for Consortium
JISC	Joint Information Systems Committee
JMET	Joint Management Entrance Test
KLA	Kerala Library Association
LAN	Local Area Network
LC	Library of Congress
LIC	Library and Information Center
LIDDAS	Local Inter-lending and Document Delivery Administration Systems
LIS	Library and Information Science
LISA	Library and Information Science Abstracts
LIST	Library and Information Science and Technology
LUCKLIBNET	Lucknow Library and Information Centers Network
MAC	Media Access Control
MAC	Mandatory Access Control
MALA	Madras Library Association
MALBNET	Madras Library Network
MAN	Metropolitan Area Network
MANLIBNET	Management Library Network
MAT	Management Aptitude Test
MBA	Master of Business Administration
MBM	Master of Business Management
MBS	Master of Business Studies
MCA	Master of Computer Application
MCLC	Mysore City Library Consortium
MCM	Master of Computer Management
MCS	Master of Computer Science

Abbreviations	Full Form
MEDLINE	Medical Literature Analysis and Retrieval System Online
MERC	Managerial Excellence Resource Centre
MIB	Master of International Business
M-Learning	Mobile Learning
MMS	Master of Management Studies
MPLS	Multiple Label Switching
MPM	Master of Personnel Management
MTNL	Mahanagar Telephone Exchange Limited
MYLIBNET	Mysore Library Network
NAT	Network Address Translation (Protocol)
NAAC	National Assessment and Accreditation
NAL	National Aeronautic Laboratory, Bangalore
NASSDOC	National Social Science Documentation Center
NAT	Network Address Translation
NBA	National Board of Accreditation
NCB	National Center on Bibliometrics
NCL	National Chemical Laboratory
NCSI	National Center for Science Information
NCST	National Centre for Software Technology
NDS	Novell Directory Services
NETBEUI	NetBIOS Extended User Interface
NFIL	National Forum on Information Literacy
NFS	Network File System (Protocol)
NHS	National Health Service
NIC	Network Interface Cards
NIC	National Informatics Center
NICAC	Central Glass and Ceramics Research Institute, Kolkata
NICDAP	Central Drug Research Institute, Lucknow
NICHEM	National Chemical Laboratory, Pune
NICMAP	Central Manufacturing Technology Institute, Bangalore

Abbreviations	Full Form
NICTTAS	Ahmedabad Textile Industry's Research Association, Ahmedabad
NICDAP	National Institute of Central Drugs Research Institute, Lucknow
NICDROM	National Information Center on CD-ROM
NICFOS	National Information Centre for Food Science and Technology
NICLAI	Central Leather Research Institute, Chennai
NICMAP	National Institute Central Machine Tools Institute, Bangalore
NICMAR	National Information Center for Material and Research
NICNET	National Information Center Network
NICRYS	National Information Center of Crystallography
NICTAS	National Information Center Textiles and Allied Subjects
NIFM	National Institute of Financial Management, Faridabad
NIOS	National Institute of Open Schooling
NISCAIR	SAARC Documentation Centre
NISCOM	National Institute of Science Communication
NISSAT	National Information System for Science and Technology
NITs	National Institutes of Technology
NKN	National Knowledge Network
NODLIBNET	National Open and Distance Learner's Library and Information Network
NOS	Network Operating System
NTP	Network Time Protocol
OCLC	Online Computer Library Center
OPAC	Online Public Access Catalogue
OSI	Open System Interconnection
OUIBC	Oxford University India Business Centre
PGDBM	Post Graduate Diploma in Business Management
PGDDRM	Post Graduate Diploma in Research Management
PGDFT	Post Graduate Diploma in Foreign Trade
PGDHRM	Post Graduate Diploma in Human Resource Management
PGDM	Post Graduate Diploma in Management

Abbreviations	Full Form
PKI	Public Key Infrastructure
PMLN	Pune Management Library Network
POP3	Post Office Protocol
PPP	Point-to-Point Protocol
PUMBA	Pune University MBA
PUNENET	Pune Library Network
RBAC	Role-Based Access Control
RGIIM	Rajiv Gandhi Indian Institute of Management, Shilong
RIP	Routing Information Protocol (RIP)
RLG	Research Libraries Group
R-PROTOCOL	Routing Protocol
RTOS	Real-Time Operating System
SALIS	Society for Advancement of Library and Information Science
SAN	Storage Area Network
SAS	Serial Attached SCSI
SATKAL	Satinder Kaur Ramdev Memorial Trust for Advancement of Leadership
SCONUL	Society of College, National and University Libraries
SCURL	Scottish Confederation of University and Research Libraries
SDI	Selective Dissemination Information
SFTP	Secure File Transfer Protocol
SIB	Scientific Information Bureau
SIRNET	Scientific and Research Network
SLA	Special Library Association
SLIM	System for Library Information Management
SMDS	Switched Multimegabit Data Service
SMTP	Simple Mail Transfer Protocol
SNAP	Symbiosis National Aptitude Test
SNLP	Successfully Networked Public Library
SONET	Synchronous Optical Network

Abbreviations	Full Form
SOUL	Software for University Libraries
STPI	Software Technology Parks of India
SOUs	State Open Universities
SPF	Shortest Path First
SSD	Solid-State Drive
SSIM	Siva Shivani Institute of Management, Secundrabad
SSH-SFTP	Secure File Transfer Protocol
SSL	Secure Sockets Layer
STP	Shielded Twisted Pair
TCP/IP	Internet Service Protocols/ Internet Protocol
TECLIBNET	Tamil Nadu Engineering College Libraries Network
TEL	Technology-Enhanced Learning
TIFR	Tata Institute of Fundamental Research
TFTP	Trivial File Transfer Protocol
TLP	Transport Layer Protocol
TSP	Telecommunication Service Provider
UDCT	University Department of Chemical Technology, Mumbai
UDP	Universal Datagram Protocol
UGC	University Grand Commission
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNISIST	United Nations International Scientific Information System
UOP	University of Pune
UPS	Uninterruptible Power Supply
UTM	Universal Transverse Mercator
UTP	Unshielded Twisted Pair
VIA	Virtual Interface Adapter
VLE	Virtual Learning Environments
VPN	Virtual Private Network
VSNL	Videsh Sanchar Nigam Limited

Abbreviations	Full Form
WAN	Wide Area Network
WBT	Web-Based Training
WWW	World Wide Web
XAT	Xavier Aptitude Test
XLRI	Xavier School of Management

CHAPTER 1

INTRODUCTION

1.1 Introduction:

The primary objective of a library is to provide right information to right user at right time in right form. To fulfil this objective libraries have to provide maximum access to information irrespective of location. ICT has helped to meet these objectives successfully. Applications of ICT and development of networks, use of internet and WWW have changed the practices in libraries. Due to this change librarians and libraries are facing problems like budget, information explosion, satisfying user needs etc. However the concept of library cooperation and resource sharing is developed since long in different nomenclature like ILL, sharing of catalogue data, professional skills, information resources etc. But recently ICT made revolutionary change by developing networks and provide better services to user community.

Libraries from its inception are called as store houses of information having qualitative collection of documents useful to the information society. Libraries are also called as power houses of information and knowledge resources centers which disseminate information and help users in generating new knowledge base on the existing knowledge. However, libraries are not self sufficient and are unable to fulfil all the needs of users due to information explosion and rising cost of publications. Urquhart (1981) rightly pointed out in one of his principles that, "No library is an Island". This statement is an outcome of the experience that it is not possible to keep all the relevant collection on any selected area under one roof and he states that, in any library it is not possible to acquire all the documents published even in particular micro areas. The reasons are information explosion, rising cost of publications, changing habits of users and improper bibliographic control; but to overcome these problems, libraries have developed resource sharing among libraries to serve the users better. Librarians have understood the situation

and initiated Inter Library Loan (ILL) facilities and now reached to library networks in the passage of time with different transformations.

Resource sharing is initiated since long with introduction of inter library loan (ILL) in which activities were limited to only loan the documents among libraries and had limited scope and managed at local level. Later ILL activities expanded to library cooperation in which cooperative planning was developed in various library activities like acquisition, storage, exchange of staff, classification, cataloguing etc. The term resource sharing encompasses all the resources available in libraries including library services. Resource sharing was popular and many projects like INIS and AGRIS developed to achieve resource sharing at international level along with regional and national. The advent of ICT changed the scenario in libraries and information centres and the activity of resource sharing transformed to library networks and the sharing activities were enhanced and initiated network based library activities and services. The rising prices and development of e-resources forced librarian to hunt for new practices in the profession and way out was to develop consortium projects among group of libraries. This is possible due to internet usage and development of web technology and digital technology. Different factors made the surrounding in libraries to develop links and economically develop library networks to share resources among libraries and provide services based on networks. The library networks developed at different levels like local, city / metro, national, regional and international etc.

University Grants Commission (UGC) and National Information System for Science and Technology (NISSAT) under Department of Science and Technology (DST) developed many library networks to strengthen the resource collection in particular discipline and also share resources and develop specialised databases. INFLIBNET, CALIBNET, DELNET, MYLIBNET and many more city networks are the outcome of the efforts of UGC and NISSAT. Technologies also supported to the developments of networks in order to achieve maximum level of resource sharing and increase the level of productivity of information products and services.

1.2 Need of Library Networks:

In the present era of information explosion and technologies the need of library networks felt essential due to:

- Faster growth of information in all sectors

- Increased R and D activities and increased educational values in society

- Varied and multidisciplinary needs and demands of users

- Development of micro subject disciplines as well as interdisciplinary subjects

- Affordable technology and its possible use in practice due to slashing of prices of hardware, software and electronic goods

- Crunching budgets and ever rising cost of publications

- Proliferating knowledge and new areas

In academic sector university libraries are well linked due to efforts of INFLIBNET and UGC. College libraries are also coming under the preview of net but not so well linked. The colleges are gaining momentum and also acquiring status of research centre. The libraries attached to colleges are also getting weight age but funds are not adequate to grow. It is now felt that, need of networking of college libraries is essential to provide better and enhanced services. The main purpose behind developing networks at any level is to cluster or link libraries and resources and avoids duplication and increase access to information at economical rate.

In addition to this use of ICT in libraries developed automated libraries and different library activities are now performed using computers. Databases, OPAC's, Web-OPAC's are developed and linked through computer networks. E-resources are developing and helping in sharing the resources. But the information resources are not economical and also sufficient funds are not available to acquire needed resources in libraries. This environment is favourable in developing networks and sharing information and services economically.

1.3 Library and Information Networks:

Since past three decades earlier practices of resource sharing are enhanced due to use of ICT and development of information networks took lead in the LIS field. The different geographical networks at local, state, regional, national and international grown to fulfil the user needs. Availability of databases, e-resources, e-publications, internet, web resources and affordable technologies have supported to the development of networks. UNISIST II (1979) defined networks as "a set of inter-related systems associated with communication facilities which are cooperating through more or less formal agreements in order to implement information handling operations to offer better services to users".

The National Commission on Libraries and Information Science (NCLIS) (1975), in its National Programme Document defined library network as:

> "Two or more libraries and/or other organizations engaged in a common pattern of information exchange, through communications, for some functional purpose. A network usually consists of a formal arrangement whereby materials, information and services provided by a variety of libraries and other organizations are available to all potential users. Libraries may be in different jurisdictions but they agree to serve one another on the same basis as each serves its own constituents. Computer and telecommunications may be among the tools used for facilitating communication among them".

The above definitions connotes the meaning that when more than two libraries join together for the purpose of information or resource sharing at any level using computers and communication technology for providing better services to user community and also exchange information efficiently is the motto of library networks.

In developed countries technologies adapted quickly and developed library networks e.g. LC, OCLC, JANET, IFLA to serve the user community at global level. These networks also supported the information transfer globally. The organizations and library associations like IFLA, SLA, ALA, OCLC and LC took lead in develop resource sharing programmes at different levels. In developing countries considering the limitations they have also initiated resource sharing projects at national and local level.

1.4 Library Networks: India

Initially in India UGC and NISSAT (Project of DST) took lead in creating library networks and later many other organizations like INFLIBNET established for the same purpose. Use of ICT favoured developing different types of networks like computer networks, communication networks, data networks, library and information networks etc. The different networks developed for communication, data storage, libraries are:

- Data Networks: NICNET (NIC Delhi), INDONET (CMC Limited), ERNET (DOE), I-Net (DOT), VSNL etc.
- Communication Networks: SIRNET (CSIR set up by INSDOC/NISCAIR), ICNET, SPINT MAIL, etc

- Library and Information Networks: INFLIBNET, DELNET (Delhi), CALIBNET (Kolkata), BONET (Mumbai), PUNENET (Pune), ADINET (Ahmadabad), MYLIBNET (Mysore), HYLIBNET (Hyderabad), BALNET (Bangalore), NAGNET (Nagpur), GOAL-net(Goa)

- Subject Networks: BTISNET (For Biotechnology), MANLIBNET (for Management)

In addition to these, new and recent developments are taking place in developing local and national consortium for recourse sharing like INDEST, UGC INFONET, N-LIST, CSIR consortium, IIT, IIM consortium. A concept of mega consortium is developing fast to achieve resource sharing. The development and expansions of networks was growing fast in India based on the grounds of developed countries like LC, OCLC, JANET etc.

1.5 Background of Study:

It is observed that educational organizations are growing fast to support academics and developed specialised institutions for education like management, law, architecture, engineering, computer science etc. The growths of education in different sectors as well as institutions are growing in number and so as libraries associated to them are also proliferating. The organizations may have different branches in different places in the city or different cities. The libraries developing in different new areas are also facing the problems like:

- Qualitative and proper collection development
- Budget limitations
- Rising cost of publications
- Information explosion (Voluminous growth in published literature and in different formats and sources)
- Users demand for specialised information
- Growth in e-publications
- Use of internet in libraries
- Users migrates towards ICT use

Thus librarians are facing challenges in the profession while meeting out the expectations of users from libraries. Hence librarians are thinking seriously towards undertaking different resource sharing projects. Kent (1974), rightly pointed out that "The success and

survival of libraries depend on how much and to what extent the libraries cooperate with each other in future". The information explosion and limited budget forced librarians and libraries to form networks and consortium in modern library practices.

National Knowledge Network (NKN) (2010) is an innovative concept developed for supporting knowledge society for information support by sharing resources. NKN is India's achievement aiming to connect academic research zones like universities, researcher institutes, agricultural and healthcare organizations across country. Few more areas like nuclear science, space, defences may also join as a part of NKN in following years. (www.nkn.in). NKN also proposed to add hundreds of new institutions and these might also be benefited and becomes resourceful. Librarians have to take care of such opportunities for developing resource sharing.

Due to ICT library system has transformed and changing activities using technologies. The activities like databases creation in different forms (full-text, multimedia, bibliographic), creation of library home page and providing services connecting different libraries and information resources to it. Development of OPAC and Web OPAC, use of open source software's for libraries, use of web tools and social media in addition to traditional practices helped in achieving resource sharing.

The technology development is very favourable for developing library networks to pull and push the resources of group of libraries. It is advisable that such initiations need to be developed among libraries of cities or group of libraries of any organization at initial stage. This concept later may grow fast and connect to networks at higher level among two-three cities to achieve maximum resource sharing. Considering the background development in libraries, use of technologies and the challenges faced by the profession, the researcher thought to undertake a study to develop a network among libraries of a city or in subject disciplines like management libraries for resource sharing.

1.6 Reason to Undertake the Study:

The different factors made to change the minds of library professionals from self sufficiency in collection to sharing the collection among the libraries at least at local level in the initial stage. Though resource sharing was initiated since long under different terms but the purpose was to share the resources. The implementation of ICT proved as boon to libraries and e-data helped libraries for exchanging the information among libraries easily

and affordably. Different library networks developed to share the resources at various levels and felt the need of depending on others for the peripheral needs of the users. No doubt the networks have already been practiced at higher level but the researcher felt that the resource sharing activities at city level among similar group of libraries or libraries under the organizations might help in providing enhanced services to users form the coordinated collection of all the libraries.

The ICT environment is now common in all institutes and libraries are also being automated and this situation is very favourable for the development of local library networks in similar areas like management, engineering, architecture, pharmacy, medical etc. The institutes have also opened their branches in different areas of same city or nearby city and if such libraries are networked even though the institute is new, might have proper shared collection with them. Hence researcher selected the topic **"Design and Development of Network Based Model for Management College Libraries in Pune City with Special Reference to Network Security"** for the study. This study is also useful to many other groups of libraries and library personnel's in building networks.

Another reason to consider this topic in mind is that the researcher is qualified in library science (MPhil) and also in computer science (MCS) and this background supports well to undertake the study of networking of libraries in a city as basic level initiation and can be expanded later.

The reason behind selection of the management education institute and networking their libraries after understanding the status is that the researcher has worked in management library for few years and understood the importance of management education. Management science is concerned with developing and applying models and concepts to illuminate management issues and helps in solving managerial problems. A broad spectrum of management involves procedures to forecast, plan, analyze, decide, motivate, communicate, and implement concepts for better productivity. In India, higher education has received more importance in all disciplines including management education and witnessing an exponential growth in terms of number of institutes imparting management education which are usually termed as Business Schools (B-Schools) (Sanjeev Kumar and Dash, 2011).

The role of management education is to provide mangers, technologists and adjust with the globalisation, commercialization and industrialization. A real manager is one who is

not only able to manage complexities and unpredictable situations of the corporate world, but also be able to handle the problems effectively. Hence the growth in management institutes and libraries is seen overwhelming everywhere. Management institutes have also incorporated e-learning system in teaching in classrooms and made environment Wi-Fi. Management institute libraries are well developed in apply in ICT. Hence the management discipline is selected for the study and networking of libraries in this area.

The era of information technology and management, the libraries and librarians are facing new challenges and libraries are changing from traditional to digital and virtual to manage library system in less budget, manage with rising prices of publications and reading materials, satisfying increasing user demand, provision for different information services using internet and web technology etc. A need is felt to apply ICT in libraries. The expectations from the users of professional education are different and demands for quick and qualitative access to information by using print as well non print media, which need use of latest technologies. If libraries are networked using ICT then maximum problems might be solved in respect of resource sharing.

1.7 Need for the Present Study:

Over the past few decades constant revolutions are faced by librarian viz publishing (print to digital), ICT, Web, Internet etc. This made impact on publishing and hence information explosion is very high. In limited budget it is not possible to acquire maximum information resources and hence need felt to find solutions. The use of computers and communication technologies in libraries changed information environment. Standalone libraries concept is diminishing and networking of libraries is growing fast due to evolution of digital libraries / virtual libraries and networking technologies helps in developing library networks. Further multimedia and internet, web made the task smoother in LIS profession. The college libraries are not exception to all these changes. The college libraries are also facing the same situations. Due to rise in digital literature like e-books, e-journals and its use at college level (especially management) is also apparent. Digital library can be easily shared online through building strong networks.

To provide access to information resources without considering geographical barriers, resource sharing in academic institute libraries is essential and a current topic of present era throughout the world. Increased availability of information in digital format as well ever growing cost of publications compels libraries to work together in present as well as

in nearer future. The sharing of resources among libraries in academics improves teaching, learning and research activities.

1.8 Statement of Problem:

Applications of ICT is increasing fast in academic library sector, university libraries have already progressed in it and college libraries felt the need of it to fulfil the user needs through pulled resources. The different resources like shortage of budget, increasing users demands from libraries, insufficient staff etc. felt the need to develop more resource sharing among college libraries, especially in Management, Medical, Architecture, Engineering, Law and so on.

College libraries are now focused and considered as nodal point in supporting education system. But the desired output from libraries is not yet properly visualised and hence felt a need to examine the situation of college libraries in management science education and try to establish networks of these libraries for pulling resources. Hence researcher considered **"Design and Development of Network based Model for Management College Libraries in Pune City with special reference to Network Security."**

Thus the present study is being conducted keeping in mind the need of resource sharing at group of libraries in a city. The researcher has developed a model for management college libraries in Pune city. There is a strong collection as well as ICT facilities in these libraries across city but lack of initiation in resource sharing among different colleges of management institutes since there is no interlinking of college libraries through the network. Researcher hence felt to attempt this issue and purpose a suitable conceptual model for resource sharing.

1.9 Scope and Limitations of Study:

The present study is related to development of library network for management college libraries and its security. Through this study researcher made an effort to suggest a conceptual model for developing network for management libraries and initiate resource sharing among these libraries. The study focused on the development of networks, for effective resource sharing at city level. This study is mainly attempted to review management college libraries in Pune city and suggest their networking.

The present status of management college libraries affiliated to University of Pune, DTE and AICTE are selected to find status of networks which supported a background of collection development, staff, services, information and ICT facilities available and attitude for development of networks. The study at the end suggests model for development of network in city to improve performance of management libraries and also suggest a viable conceptual model with approximate costing for initiation of networks. Similarly efforts are made to analyse services to be provided through this network.

For the present study the scope and limitations demarked are as under:

1. The population of the management college libraries in Pune city associated with Pune University, DTE and AICTE are only considered for this study.

2. The scope of the study is limited to management institute libraries in Pune city area. It also includes Pimpri-Chinchwad, Wakad, Undari-Manjari, Chikhali, Chakan, Mulshi, Bhore, Lavale, Talegaon Dabhade etc as these are also covered in Pune city.

3. The Management institutes conducting management courses other than MBA courses are not considered in this study viz. BBA, MPM, MCA, PGDBM etc.

4. The management institutes conducting courses like MMM, MPM and PGDM by correspondence are not considered for this study. Similarly the management colleges conducting undergraduate courses and the other institutes of management such as hospital management, hotel management etc are not considered for this study.

5. Management institutes where full time MBA courses are conducted is the core population and also the sample for the study, which are located in the vicinity of Pune. All the management libraries are selected for review. There are total 127 management institute libraries and all are selected as population.

6. Institutes approved by DTE, AICTE, and affiliated to University of Pune are only considered for the present study. In addition to above the researcher has also considered top ranked management institutes in Pune city for survey like Symbiosis Institute of Business Management, Bharti Vidyapeeth, D.Y. Patil Institute etc as these are popular autonomous institutes in the city.

7. The management institutes established till 2006 are only considered for the survey. Thus in the present study 127 management institute libraries are being selected. For statistical growth in institutes the data is considered up to 2011 which is collected from authentic sources.

1.10 Significance of Study:

From the literature review it is noticed that though sufficient efforts have been made in developing library networks but still need some more exercise at different level. Keeping in mind, this study has made an attempt to develop a management library network in Pune city to share resources and initiate cooperative ventures. This study may be useful to other group of libraries also. This effort may help in enhancing utility of available resources at city level and coordinate them properly. The networks makes efforts in content development, data based development, use of internet resources, institutional resources and coordinating in group of libraries. This effort may also reduce duplication of resources and save finances and use the saved resources for enhancing power of information. In simple way it may be a development of information grid among management libraries at city level.

1.11 Aim and Purpose:

The main aim of the study is to construct a design to develop a network for management college libraries in Pune city to achieve resource sharing among them for economical purpose. Similarly analyse the network maintenance problem and suggest security issues for networks.

1.12 Objectives:

1. To assess the status of management education and management institutes in Pune city and placed on record its role.

2. To assess the resources and facilities, library services available in management libraries and user expectations form libraries.

3. To assess the status of ICT infrastructure and ICT skills of library staff in management colleges libraries.

4. To assess the use of e-resources in management libraries.

5. To study the efforts made so far in library networks and resource sharing.

6. To study the pre-requisites for developing networks including security.

7. To workout, prepare and suggest a conceptual model for networking of management libraries in Pune city and its security.

1.13 Hypothesis:

1. The ICT infrastructure available in Management College libraries need to be enhanced.

2. Library professionals are interested in sharing the resources for providing better services.

3. The information resources are available in management area but the concept of networks in management libraries is not yet developed in Pune city.

1.14 Research Methods:

The research method has many dimensions. The present study is providing a model for resource sharing in management libraries which is new initiative using ICT. Model is developed based on the data collected and concepts used. The primary and secondary both methods are used for data collection. The survey method is commonly used to conduct research studies in social sciences, when concrete data or information about the problem is not visualised. Researcher has to gather data from the population using questionnaire and interviewed technique.

For the present research study descriptive research method is used in which questionnaire tool is used for collecting data regarding the status of libraries in management discipline. The questionnaire (Appendix - A) has been distributed to 127 management libraries (Annexure – A) in Pune city. The questionnaire contains 66 questions related to libraries, staff, collection, services, automation, modernisation, membership etc. The total population for survey is 127 management libraries which are selected for the study and hence sampling is out of site in this study as population and sample is same.

The survey of management libraries given and helped in assessing availability of resources in management institutes, library services provided and expectations of users from library. Similarly the survey assessed the availability of ICT infrastructure skilled

manpower and efforts made towards resource sharing and helped in satisfying objectives considered at serial number 2 and 3.

In addition to collecting management library data through questionnaire from 127 management libraries researcher visited following institutes to review the status of automation and networks developed in their organization.

1. Indira Institute of Management Education, Pune

2. Wadia College of Engineering, Pune

3. CSR – National Chemical Laboratory, Pune

4. Symbiosis Institute of Business Studies, Pune

5. Symbiosis Centre for Management Studies, Pune

6. Institute of Management and Carrier Courses, Pune

Thus observation method provided the insight to researcher for understanding the requirements for developing networks in organizations and libraries to achieved resource sharing.

To assess the interest of library professionals towards participating in resource sharing activities and also to seek the opinions of few librarians of prominent institutes as well as ICT experts were interviewed. The interviewers conducted informally and without any structured questionnaire. The interviews with Prof. S. K. Patil (Librarian, Symbiosis International University), Mr. Ajit Sonawane (Librarian, Wadia College of Engineering), Mr. M. Y. Khan and Mr. Mangesh Kuman (Librarian, Indira Institute of Management), Dr. Mrs. Meenal Oak (Librarian, Institute of Management Carrier Courses) were interviewed and understand the status of management libraries and its future development. Similarly network expert Mr. K. D. Deshpande (Head Network Unit, CSIR-NCL), Mr. Gajanan B. Gogavale (System Administrator, Symbiosis Centre for Management Studies), Mr. Ahmed Khan (Ex Network Administrator, Wadia College of Engineering), Prof. R. K. Kamat (Head Department of Computer Science, Shivaji University Kolhapur) were also interviewed to understand the development of networks and initialisation of network plan for this study. The discussions made with these experts

in the field of library, networks and computer science helped researcher in designing conceptual model.

Literature Review:

The researcher has also collected related and the available literature published in different resources and reviewed to understand efforts made towards resource sharing activities among libraries in India as well as other developed countries. The literature review helped in analysing networks benefits, topologies, security etc. Thus literature review (secondary analysis) helped in supporting concepts, observations.

Thus for conducting this study, descriptive research method in which survey using questionnaire, observation, interviews and secondary analysis are used. The data obtained from these ways helped researcher in building a model for library networks and its security.

1.14.1 Research Process:

The main aspect is to investigate the present status of management libraries affiliated to University of Pune and AICTE approved management institutes libraries.

The research methodology selected is based on the research problem. In the present study researcher is reviewing the management libraries in Pune city for taking the note of efforts made towards status and resource sharing by means of networking the libraries. Similarly the opinion of experts from library and networks is also sought to understand structure and finding required for networks. Prominent institutes were networks are established internally as well as accessed from outside are reviewed. Researcher visited and studied their networks. This background study was conducted user descriptive research method.

In the first phase is to understand the status of management libraries; data is collected using structured questionnaires. The data collected using questions contain aspects of library collection, staff, and user's automation, software used, network availability, efforts made for resource sharing, users expectations etc. In all 66 questions were covered to understand the status of management libraries in city. This gave an idea of libraries and facilities provided to users. Since the ICT usage is increased at user level and also applied in teaching and learning methods in management colleges. The trend shifted from

traditional class room to e-learning system, changes are also reflected in the library system. For this purpose, user's requirements are also evaluated from the different studies reported and also interactions were made with few users.

In second phase, to support the data collected, and concept developed, interviews of experts from management libraries as well as reputed libraries and network administrators are also conducted. This helps in getting the opinions of library professionals. The opinion of libraries is that there is a need of development of **"Pune Management Libraries Network (PMLN)"** at local level. The discussions with network administration helped in understanding the network requirements and structure along with literature published for developing networks.

In the third phase a review on library networks was analyzed of published literature and the topology used in existing library networks was studies. This supported to visits of different libraries and centres where networks are managed. The purpose was to study the structure, and security issues, based on this data a model could be suggested. The computer experts were also interviewed to assess the pre-requests for developing PMLN in Pune city.

1.14.2 Structure of the Questionnaire Circulated:

Questionnaire is tool that helps in collecting the data. A structured questionnaire circulated in 127 management institute libraries. A structured questionnaire contain nearly 66 questions (Appendix – A) grouped in to nine facets to get the desired data from management libraries and to understand the status of management libraries. The questionnaire is designed in such a manner that data might be gathered without prejudice and be objective.

1.14.3 Response to Survey:

127 management college libraries in Pune city (Annexure - A) were selected and sent questionnaire to them through e-mail, courier and researcher also visited few institutes. Out of 127 libraries, response received is full due to maximum efforts made by the researcher and hence 100% response is achieved for his study.

1.14.4 Data Analysis and Interpretation:

All questionnaires were analyzed statistically and systematically and presented the analysis chapter number 7.

1.15 Uniqueness of the Present Research Study:

The analysis of the past studies related to the present research indicates that the research conducted so far is covering different aspects related to resource sharing and development of concepts for networking of libraries in different sectors. 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 emphasised on consortium based resource sharing and providing services. Whereas Philip (2008) described the growth in management education, management institutes, importance to management education due to globalization, industrialisation, 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. Ali, Owoeye and Ansai (2010) opined and stated need of resource sharing among libraries using Information and Communications Technology (ICT).

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 may 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. This is a just suggestive approach towards the networking of libraries. Thus 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 then can access on the internet also. All libraries can access the eG3 WEB OPAC (Based on using e-Granthalaya software) any one can access the Union Databases from anywhere.

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. Parvez (2010) discussed the computer and mobile networks and an attempt has been made to characterize the security and performance aspects of computer and mobile networks. 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.

Apart from these different studies few more studies are identified by the researcher as detailed below which covers areas like resource sharing and networking concepts, proposing for the development of national resource sharing activity, networking of Delhi libraries, University of Bharatidasan and user needs in the era of digital media.

1. Raina, R. L. (1997). "Library Resource Sharing and Networking: An Approach to Management Schools in India". New Delhi: Vikas Publication.

2. Kaul, H. K. (1999). "Library Resource Sharing and Networks". New Delhi: Virgo Publications.

3. Rastogi, Ashish (2001). "Network Management using the Services of Network Oriented Communication Protocols". (Ph.D. thesis submitted to Guru Ghasidas University, Bilaspur).

4. Sahoo, Bibhuti Bhusan. (2002). "Need For a National Resource Sharing Network in India: Proposed Model". Workshop on Information Resource Management. Presented at the DRTC, Bangalore.

5. Khanna, Banita (2005). "Automation and Networking of Delhi based Academic Libraries under D.A.V. Management". (Ph.D. thesis submitted to Bundelkhand University, Jhansi).

6. Prabhu, P. (2011). "Networking of College Libraries affiliated to Bharathidasan University: A Study." (Ph.D. thesis submitted to Bharathidasan University Tiruchirappalli).

7. Rai V. (2011). "A Study of Management Training and Educational Institutes in Pune to Develop New Instructional Models, so as to Meet Corporate Future Requirements of Professional Managers at the Entry Point, University of Pune". (Ph.D. thesis submitted to University of Pune, Pune).

8. Gill, Gurupreet Singh (2012). "Management Education in India: A Case Study of Selected B-Schools". (Ph.D. thesis submitted to Punjab Technical University, Jalandhar).

9. Khandare, Dhanishtha (2013). "Information Seeking Behaviour of Users of Management Institute Libraries in Pune." (Ph.D. thesis submitted to Tilak Maharashtra Vidyapeeth, Pune).

From the analysis it is noticed and found that these studies, articles and thesis are covering different aspects related to:

- The studies are mainly focused on the issues like use of ICT in LIC, impact of ICT on library activities, application of ICT in modernising libraries, trends in ICT and implications in libraries, use of internet, impact and need of resource sharing in libraries, etc.

- Only few studies are reported on development of library networks and also reviewed in detail and noticed that they are encompassing broad views of networking and resource sharing and discussed issues related to planning phase mainly on theoretical aspects.

Whereas the present study undertaken to establish a city network based on NKN concept is focused on development of library network at local level and is a pilot network development study for the subject libraries like management and its use is also for the other libraries also. A conceptual model is presented at the end of study which can also be extended in other zones and hence this study might prove as a base model for the others to act on. In this study following phases are discussed while developing network model which are not focused in other studies.

1. Design and planning phase
2. Pre-requisite / pre-conditions for networking
3. Finance provision
4. H/W and S/W selection
5. Operational and maintenance phase
6. Security phase
7. Application phase and expansion phase
8. Utility phase

Thus this study has different coverage and attains possibility of developing network using modern techniques and technologies. It is also observed that information network and its security is considered at highest level for managing resource sharing. In the literature survey the researcher noticed that few prominent conferences on information and network technology as well as information security have been conducted at international level.

- International Conference on Information and Network Technology (ICINT 2014), China.
- International Conference on Network Technologies (ICNT 2014), China.
- International Conference on Networks and Information Security (ICNIS 2014), China.

These conferences has been organised very recently and the research study conducted by the researcher is seems to be very essential for the networking of libraries which is need of the time. Thus it's different than the existing studies conducted so far in the area of Library and Information Science.

1.16 Structure of the Research Study:

The complete research study is presented in nine chapters and its contents are briefed as under:

Chapter 1 – Introduction:

This chapter highlights need of library networks, library networks in India, background of study, reason to select topic, scope and limitations, aim and objectives, research methodology, hypothesis, uniqueness of study and structure of the study etc.

Chapter 2 – Literature Review:

This chapter is a brief analysis of information literature published in different forms and consulted by researcher, relevant to study. The different facets considered while conducting literature are discussed at length with brief summary. The literature survey help in building the concepts developed in the mind of researcher and also used and cited reference in text suitably in different chapters.

Chapter 3 – Proliferation of Management Education and Institutes:

In this chapter efforts have been made to analyse the prominence and importance of management education and the growth in development of management institutions. A survey covers global to local developments in management education, a structure nature of programs etc.

Chapter 4 – Changing the Paradigms: Libraries and Technology:

This chapter highlights implementation of different technologies and its effective use in managing libraries. A review of latest trends especially in technologies applied in libraries are discussed in this chapter, along with its merits in performing different library activities.

Chapter 5 – Networks Prerequisites:

A detailed presentation in respect of network building and its different facets like need, benefits, prerequisites, maintenance and securities are discussed.

Chapter 6- Library Networks in India: An Overview:

The efforts are made to study the development of library networks at national level. The agencies, associations, organisations involved in developing library networks at different level are also highlighted in this chapter.

Chapter 7 – Data analysis and Interpretation:

This chapter analysis the data collected from the questionnaire and presented after the evaluation systematically using different statistical methods. This chapter in general helps in narrating the status of management libraries.

Chapter 8 – Findings, Suggestions and Conclusion:

This chapter highlight the observations and findings from the data collected observations and literary evidences and based on these findings suitable suggestions to initiate proper networking are narrated. At the end study is concluded stating scope for future research and usability of the study.

Chapter 9 – Conception of Pune Management Library Network (PMLN):

Based on different model studied the researcher has developed his own conceptual model for networking management libraries in Pune city. The structure of proposed network for PMLN is discussed in detailed in this chapter.

Summary:

This chapter presents the objectives suitable to frame out the research study in systematic manner. Due to different factors which are affecting the collection developments of libraries and user needs. There is a need felt for resource sharing among group of libraries specialised in a particular discipline like management. The benefits of resource sharing are many to both libraries and users. Introduction of ICT in almost all fields made it convenient to established library networks at much easier level than before. To provide maximum information current information from libraries there is a need to developed different resource sharing projects. Kent (1974), rightly indicated "The success and survival of libraries depend on how much and to what extent the libraries cooperate with each other in future". This statement is indicating the need of resource sharing in libraries.

References:

- Ali, Hussaini, Owoeye, J. E. & Anasi, Stella N. I. (2010). Resource sharing among law libraries: an imperative for legal research and the administration of justice in Nigeria. *Library Philosophy and Practice (e-Journal). Paper404*.

- Azeez Abdul T A. (2007). *Development of a library consortium for engineering colleges in Kerala.* University of Calicut, Kolkatta.

- Biradar, G. S. (2012). *Resource Sharing and Networking of College Libraries Affiliated to Gulbarga University: A Study*. Karnataka University, Dharwad.

- Cedefop Glossary. (2001). Retrieved from http://www.cedefop.europa.eu/EN/about-cedefop/projects/validation-of-non-formal-and-informal-learning/european-inventory-glossary.aspx on dated 21 Jan 2011.

- Gill, Gurupreet Singh. (2012). *Management Education in India: A Case Study of Selected B-Schools".* Punjab Technical University, Jalandhar.

- Kaul, H. K. (1999). *Library Resource Sharing and Networks*. New Delhi: Virgo Publications.

- Kaula, P. N. (1986). *Towards Resource Sharing in Libraries. In Planning in Library Resource Sharing*. Lucknow: Print House.

- Kemdarne, Suryakant B. (2012). *A Study of Library Automation and Networking in Dental College Libraries Affiliated to Rajiv Gandhi University of Health Sciences, Bangalore.* Tilak Maharashtra Vidyapeeth, Pune.

- Kent, Allen (1974). *Resource Sharing in Libraries: Why, How, When.* Next Action Steps. New York: Dekker.

- Khandare, Dhanishtha. (2013). *Information Seeking Behaviour of Users of Management Institute Libraries in Pune.* Tilak Maharashtra Vidyapeeth, Pune.

- Khanna, Babita. (2005). *Automation and Networking of Delhi based Academic Libraries under D. A. V. Management*. Bundelkhand University, Jhansi, New Delhi.

- National Commission on Libraries and Information Science (NCLIS). (1975). Library Networks. Retrieved from http:// www.netugc.com/library-network on dated 12 June 2013.

- National Knowledge Network. (2010). Retrieved from http://www.nkn.in/index.php on dated 21 May 2012.

- 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.

- Odiase, J.O.U, Unegbu, V. E. & Haliso, Y. L. (2001). *Introduction to the Use of Libraries and Information Sources.* Benin City: Nationwide Publications.

- Parvez, Javed. (2010). *Security Aspects and Performance Analysis of Mobile and IP Networks*. Universitry of Kashmir, Srinagar.

- Pathak, R C. (2009). Enhancing Academic Excellence in Management Education in India. Presented at the Global Meltdown, Pune.

- Philip, J. (2008). Management Education in India. In *XIII International Study and Practical Conference Competitiveness in Information Society: BRICS-countries Experience*. Russia: Moscow. Retrieved from http://www.docstoc.com/docs/46820519/management-education-in-India on dated 25 April 2012.

- Prabhu, P. (2011). *Networking of College Libraries Affiliated to Bharathidasan University: A Study*. Bharathidasan University, Tiruchirappalli.

- Pradhan P.D. (2012). *Modernization of Libraries of Management Institutes in Pune City: A Survey*. Bharati Vidyapeeth University, Pune.

- 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.

- Raina, R. (1997). *Library Resource Sharing and Networking: An Approach to Management Schools in India*. New Delhi: Vikas Publication.

- Ramabhadran, Tito. (2012). MBA History and Evolution. *Planning in Library Resource Sharing*. Retrieved from http://titoramabhadran.blogspot.in/ on dated 12 Oct 2012.

- Rastogi, Ashish (2001). *Network Management using the Services of Network Oriented Communication Protocol.* Guru Ghasidas University, Bilaspur.

- Sahoo, Bibhuti Bhusan. (2002). Need For A National Resource Sharing Network in India: Proposed Model. Workshop on Information Resource Management. Presented at the DRTC, Bangalore.

- Sanjeev Kumar & Dash, M K. (2011). Management Education in India: Trends, Issues, and Implications. *Research Journal of International Studies*, *18*, 16–26.

- Singh, C. P. (2008). *Library Automation in Modern Age* (Vol. 18). New Delhi: Alfa Publications.

- United Nations Educational, Scientific and Cultural Organization. (1979). UNISIST II: main working document. UNESCO. Paris.

- Urquhart, Donald J. (1981). The Principles of Librarianship. N. J. and Methuen: Scarecrow Press.

<div align="center">

CHAPTER 2

LITERATURE REVIEW

</div>

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.

Sinha, (2004) in his book 'Management Education in India: Perspectives and Challenges' narrated insights into ranking of Indian B-Schools. Indian management education received global recognition because of the brand created by IIMs and its faculty. This book contains articles on management education, B-School, education policy and AICTE, NBA functions etc.

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, Owoeye 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 inter library 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 canters 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 inters 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-bounded 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.

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.

Pilioura (2004) in his book, 'Network Design: Management and Technical Perspectives' focused upon networking protocols, designing a telecommunications strategy, selecting technologies for networks, and bridges the communication gap that often exists between managers and technical staff involved in the design and implementation of networks. It provides guidelines, templates, checklists, and recommendations for technology selection and configuration, outsourcing, disaster recovery, business continuity, and security of networks.

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 notices 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 confidentially, 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.

- Rumeia (2004), Meitei and Th Purnima (2006) Forouzan (2009) have strongly opined the need of city library networks for particular area of discipline.

- 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:

- Agarwal, Vibhuti. (2000). Library networking : Challenges and opportunities.

- Agarwal, Vibhuti. (2002). Information Networking Concepts in Library. New Delhi: Daya Publishing House.

- ALA's Interlibrary Loan Fact Sheet. (2013). RUSA STARS' 5 Things Every New Resource Sharing Librarian Should Know. Retrieved from website http://www.ala.org/rusa/sections/stars/5-things-every-new-resource-sharing-librarian-should-know

- Albach, Horst & Bloch, Brian. (2000). Management as a science: emerging trends in economic and managerial theory. Journal of Management History (Archive), 6(3), 138–158.

- Ali, Amjad. (2007). Digital Libraries and Information Networks. New Delhi: ESS Publications.

- Ali, Hussaini, Owoeye, J. E. & Anasi, Stella N. I. (2010). Resource sharing among law libraries: an imperative for legal research and the administration of justice in Nigeria. *Library Philosophy and Practice (e-Journal). Paper404*.

- Allen, Neal. (2009). Network Maintenance and Troubleshooting Guide: Field Tested Solutions for Everyday Problems. New Delhi: Pearson Education.

- Alzaza, N. S. & Yaakub, A. R. (2011). Students Awareness and requirements of mobile learning services in the higher Education Environment. American Journal of Economics and Business Administration, 3(1), 95–100.

- Anderson, D. A. & Duggan, M T. (1987). A gateway approach to library system networking, 6(4), 1–6.

- Asproth, V. (2012). Information technology challenges for long term preservation of electronic information. International Journal of Public Information Systems, 1(1).

- Aswal, R.S. (2003). Information Networks in Inida. New Delhi: Ess Ess Publication.

- Avram, H. D. (1980). Directions in Library Networking. UK: Wiley Publications.

- Azeez Abdul T A. (2007). *Development of a library consortium for engineering colleges in Kerala.* University of Calicut, Kolkatta.

- Balakrishnan, S. (2000). Networking and the future of libraries. New Delhi: Ess

Ess Publications.

- Bansode, Sadanad & Perirea, Shamin. (2000). Use of Internet for Reference Service in Malaysin Academic Libraries, 24(5), 381–388.

- Baruah, Arunima. (2002). Computer Networking in Libraries. New Delhi: Kalpaz Publications/ Gyan Books Pvt Ltd.

- Beasley, Jeffrey S. (2010). Networking (2nd ed.). New Delhi: Pearson Education.

- Benjamin, P.N. (2006). Google : its impact on the library. Library Hi Tech News, 23(9), 9–11.

- Bhatti, Rubina & Chohan, Tariq Mohmod. (2012). Assessing the role of library associations in promoting research culture in LIS. Library Philosophy and Practice (e-Journal). Paper 839, 1–11.

- Bhavya, Daya. (2005). Network Security : History, Importance, and Future. Retrieved from http://web.mit.edu/~bdaya/www/Network%20Security.pdf

- Biradar, G. S. (2012). *Resource Sharing and Networking of College Libraries Affiliated to Gulbarga University: A Study*. Karnataka University, Dharwad.

- Bourke, C. (2005). Public Libraries : Building Social Capital through Networking, 18(2), 71–75.

- Bragg, R., Ousley, M. R., & Strassberg, K. (2004). Network security : the complete reference. New Delhi: McGraw-Hill.

- Brown, R C W. (1989). Achievement, potentialities and limitations for library networking in Europe and North America, 39(3), 192–200.

- Bruntjen, S. (1983). The political, economic, and technological roots of some legal issues in library networking, 3(2), 15–28.

- Chavan, John E. (2000). Fundamentals of Network Security. Boston: Artech House, Inc.

- Cholin, V. S., & Karsiddappa, C. R. (2002). Consortia Approach for Academic Libraries: Emerging solution for optimum utilization of Resource. 27–29. Presented at the Consortia Approach for Content Sharing among Libraries, Mangalagangothri.

- Cisco Unified CallManager Express Solution Reference Network Design Guide. (2001).

- Convery, Sean. (2012). Network Security Architectures : It is an expert guidance on designing secure networks. New Delhi: Pearson Education.

- De Gennaro, R. (1983). Library automation and networking perspectives on three decades, 108(7), 629–632.

- Devarajan, G. (2005). Applied Research in Library and Information Science. New Delhi: Ess Ess Publications.

- Dhar, M. (2010). Research and Technical Libraries Organisation, Operation and Services. UK: Ess Ess Publications.

- Dhiman, A. K. (2003). Basics of Information Technology for Librarians and Information Scientists. New Delhi: Ess Ess Publications.

- Engwall Lars & Zamagni Vera Negri. (1998b). Management education in historical perspective. UK: Manchester University Press.

- Esmail, S. M., Kanakaraj, M. & Sivaraj, S. (2008). Bridging the Information Divide am one Engineering College Libraries in Tamil Nadu, India: A Network Design. Presented at the Library Philosophy and Practice. 1-10.

- Esmail, S. S. & Kanakaraj, S. S. (2008). Resource sharing among engineering college libraries in Tamil Nadu in a networking system, 14(1), 39–49.

- Forouzan, B. (2009). Data communications and networking. New Delhi: Tata McGraw-Hill Publishing Company.

- Fortz, B. (2010). Applications of meta-heuristics to traffic engineering in IP networks, 18(2), 131–147.

- Ghante, P. B. (2011). Skills for librarians in the age of knowledge. Indian Streams Research Journal, 1(1), 187–190.

- Gill, Gurupreet Singh. (2012). *Management Education in India: A Case Study of Selected B-Schools".* Punjab Technical University, Jalandhar.

- Gong, Y. (1996). The initial development of networking in Chinese libraries, 22(6), 462.

- Gorman, G. E. & Cullenna, Rowena. (2002). The knowledge model applied to library networks in Asia. Library Consortium Management: An International Journal, 2(7).

- Griffiths. (1984). Multitype Library Networking: A Framework for Decision-Making, 2(1), 31–39.

- Gulati, Anjali. (2004). Use of information and communication technology in libraries and information centres: an Indian scenario. The Electronic Library, 22(4), 335–350.

- Hallberg, B. (2005). Networking: a beginner's guide. New Delhi: Tata McGraw-Hill Publishing Company.

- Harinarayana, N.S. (1991). Concept of Library Automation. Herald of Library Science, 30(3-4), 176–177.

- Held, Gilbert. (2000). Understanding Data Communications: From Fundamentals to Networking Hardcover. UK: John Wiley and Sons Inc.

- 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.

- Hildreth, C. R. (1987). Library Automation in North America: A Reassessment of the Impact of New Technologies on Networking. Munich: K.G. Saur.

- Hill, J., Horton, M. & Kling, R. (2004). The Platforms Enabling Wireless Sensor Networks. Communications of the ACM - Wireless sensor networks, 47(6), 41–46.

- Jambhekar, A. & Pandian, S. P. (1999). Internet as an opportunity for libraries (pp. 10–19). Presented at the CALIBER 99, Nagpur.

- Jebaraj, Franklin David. (2004). Library and Information Networks in India. Library Philosophy and Practice, 6(2). Retrieved from libr.unl.edu:2000/LPP/lppv6n2.htm on dated 21 Feb 2012.

- Joshi, Pradip & Nikose, Satyaprakash. (2010). Problems and Prospects in Automation and Networking in Libraries in India. Retrieved from http://eprints.rclis.org/14339/1/Problems_and_Prospects_in_Automation_and_Networking_in_Libraries_in_India.pdf

- Juneja, P. K. & Parthasarathy, S. (1986). Networking and Libraries. Computer Applications to Library and Informational Retrieval and Networking. Intternational Journal of Computer Science Issues, 3(2), 120.

- Kadiri, Jasiliu A. & Adetoro, Niran A. (2012). Information explosion and the challenges of the information and communication technology utilization in Nigerian libraries and information centres. Ozean Journal of Social Sciences, 5(1), 21–30.

- Kadli, Jayadev & Kumbar, B. D. (2013). Library Resources, services and information seeking behavior in changing ICT environment: a literature review.

Library Philosophy and Practice (e-journal).Paper 951.

- Kanamadi, Satish & Kumbar B. D. (2006). Impact of Information Technology Innovations on Resources and Services of Management Institute's Libraries in Mumbai: A librarian approach. Electronic Journal of Academic and Special Librarianship, 8(1), 1–10.

- Kanamadi, S. & Kumbar, B D. (2006). Web-Based Services Expected from Libraries: A Case Study of Management Institutes in Mumbai City, 3(2). Retrieved from http://www.webology.ir/2006/v3n2/a26.html on dated 23 Feb 2013.

- Kar, Debal C, Bhattacharya, Parha & Deb, Subrata. (1999). Library Networking in India for Resource Sharing : Present Status and Prospects. 9(1).

- Karn, Sanjay Kumar, & Das, Basanta Kumar. (2009). Information and Library Network (INFLIBNET): A boon for higher education in India. In ICAL 2009 (pp. 698–700).

- Kaul, H. K. (1992). Library Networks: An Indian Experience. New Delhi: Virgo Publications.

- Kaul, H. K. (1999). *Library Resource Sharing and Networks*. New Delhi: Virgo Publications.

- Kaul, Sangeeta. (2010). DELNET - the functional resource sharing library network: a success story from India. Inter lending & Document Supply, 38(2), 93–101.

- Kemdarne, Suryakant B. (2012). *A Study of Library Automation and Networking in Dental College Libraries Affiliated to Rajiv Gandhi University of Health Sciences, Bangalore.* Tilak Maharashtra Vidyapeeth, Pune.

- Khandare, Dhanishtha. (2013). *Information Seeking Behaviour of Users of Management Institute Libraries in Pune.* Tilak Maharashtra Vidyapeeth, Pune.

- Khanna, Babita. (2005). *Automation and Networking of Delhi based Academic Libraries under D. A. V. Management*. Bundelkhand University, Jhansi, New Delhi.

- Korobili, Stella, Tilikidou, Irene & Delistavrou, Antonia. (2006). Factors that Influence the use of Library Resources by Faculty Members. Library Review, (55). Retrieved from www.emraldinsight.com/0024-2535.htm on dated 27 Mar 2012.

- Kumar B. D, Kanamadi Satish, & Ramesha, B. D. (2004). Evaluation of IT based Services on the basis of User Requirements and Satisfaction: A Case Study of University Libraries of Karnataka State. In Second International CALIBER 2004 on Roadmap to New Generation of Libraries Using Emerging Technologies. Ahmadabad.

- Kumar Sanjeev and Dash M.K. (2011). Management Education in India: Trends, Issues and Implications. Research Journal of International Studies, 18, 15–25.

- Kumbar, T. S. (1999). Internet and Academic libraries: Indian scenario. Presented at the CALIBER 99, Nagpur: INFLIBNET.

- Lander, S. J. (1990). Networking and special libraries: Impact of technology, economics and human nature. Presented at the IOLS'90.

- Lata Suresh. (2011). Resource Sharing and Networking of Libraries in Rajasthan : A Proposal. In ICoASL. 1–5.

- Lewis, Sally. (2013). Public Library Networking Focus. Retrieved from website http://www.ukoln.ac.uk/public on dated 17 Mar 2012.

- Lynch, Matthew. (2014). Future Trends in K-12 Classroom Management and Discipline. Retrieved from http://www.huffingtonpost.com/matthew-lynch-edd/future-trends-in-k-12-cla_b_4706571.html on dated 10 Nov 2014.

- Mahajan, P. (2005). Academic libraries in India: A present day scenario. Library Philosophy and Practice, 8(1), 1–4.

- Mahajan, S. G., & Patil, S. K. (1999). Internet: its use in university libraries in India (experiences at Pune University). In CALIBER 99 (pp. 478–483). Nagpur.

- Mahapatra, Rabindra K. (2010). Capacity Building and Restructuring of Library and Information Centres. New Delhi: Ess Ess Publications.

- Mairaj, Muhammad Ijaz. (2012). Applications of information and communication technologies in libraries in Pakistan. Journal of Medical Library Association, 100(3), 218–222.

- Maiwald Eric. (2003). Network Security: A Beginner's Guide, Essential Skills made Easy, Network Professionals' Library. New Delhi: Tata McGraw-Hill Publishing Company.

- Malviya, R., & Kumar, Anil. (2007). Networking and Consortia Management Techniques. DESIDOC Bulletin of Information Technology, 27(3), 21–30.

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

Management System: the key to Special libraries renaissance at the digital era. Challenges in Library Management System, 24, 369.

- Mansfield Kenneth C., & Antonakos, James L. (2010). Computer Networking for LANS to WANS: Hardware, Software and Security. Boston: Cengage Learning.

- Margaret MacNamara, Arnold Anne, & Margaret Meyler. (1990). Management education and the challenge of action learning Higher education, 19(4), 419–433.

- McClure, Charles R., Feldman, Sari, & Ryan, Joe. (2006). Politics and Advocacy: The Role of Networking in Selling the Library to your Community. Information Use Management and Policy Institute, Florida State University, Public Library Quarterly. 137–154.

- Meitei L Shanta, & Th Purnima Devi. (2006). Library networking: a conceptual model of rural library Information Network System for easy access by Rural Community of Manipur. In 4th Convention Planner. Mizoram University. Aizawal.

- Mello, Bernard. (1999). Management education a critical appraisal. Economic and Political Weekly, 34(48), 169–176.

- Molholt, P. (1996). The Influence of Technology on Library Networking. Special Libraries, 87(4), 318–321.

- Moorthy, A. L., & Karisiddappa, C. R. (1998). Impact of internet on library and information centers: Review Festschrift in honor of Prof. N Guruswamy Naidu, 2, 308–324.

- Mudbidri Arun. (2004). An empirical study ofacademic excellence in management based in Pune city. University of Pune, Pune.

- Murthy, S. S. (1996). Library Networks in India – an overview. DESIDOC Bulletin of Information Technology, 16(2), 3–9.

- 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.

- Oppenheimer, Priscilla. (2011). Top-Down Network Design: A systems analysis approach to enterprise network design (3rd Edition). USA: Cisco Press.

- Paliwal P.K., & Balakrishnan Shyama. (2001). Management of Library Networking. New Delhi: Anmol Publications Pvt. Ltd.

- Pandey, S. K. (1999). Encyclopedia of Library Automation Systems and Network.

New Delhi: Anmol Publications Pvt. Ltd.

- Pandian, P., Jambhekar, A., & Karsiddappa, C. R. (2002). IIM Digital Library System: Consortia-based Approach, 20(2). Retrieved from www.emraldinsight.com/0264-0473.htm on dated 12 Jan 2011.

- Parvez, Javed. (2010). *Security Aspects and Performance Analysis of Mobile and IP Networks*. Universitry of Kashmir, Srinagar.

- Patil, Varsha. (2013). Library automation and networking: need and importance of Maharashtra public libraries. Journal of Advances in Library and Information Science, 2(3), 152–156.

- Peter A Jaszi. (2010). Fair Use Challenges in Academic and Research Libraries. Presented at the Association of Research Libraries, Washington, DC.

- Philip, J. (2008). Management Education in India. In *XIII International Study and Practical Conference Competitiveness in Information Society: BRICS-countries Experience*. Russia: Moscow. Retrieved from http://www.docstoc.com/docs/46820519/management-education-in-India on dated 25 April 2012.

- Pilioura, Teresa C. (2004). Network Design, Second Edition: Management and Technical Perspectives (2nd ed.). USA: CRC Press.

- Plemnek, Alexander. (2006). The Electronic Library. MCB UP Ltd.

- Prabhu, P. (2011). *Networking of College Libraries Affiliated to Bharathidasan University: A Study*. Bharathidasan University, Tiruchirappalli.

- Pradhan P. D. (2012). *Modernization of Libraries of Management Institutes in Pune City: A Survey*. Bharati Vidyapeeth University, Pune.

- 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.

- Raina, R. L. (1997). *Library Resource Sharing and Networking: An Approach to Management Schools in India*. New Delhi: Vikas Publication.

- Rajasekaran, K. (2010). Digital Library. New Delhi: Ess Ess Publications.

- Rao, S. (2001). Networking of Libraries and Information Centres: Challenges in India. Library Hi Tech, (19), 2.

- Rastogi, Ashish (2001). *Network Management using the Services of Network*

Oriented Communication Protocol. Guru Ghasidas University, Bilaspur.

- Raval, D. A. M. (2013). E-environment and new challenges for academic libraries and librarians. Education, 2(1).

- Rezaul, Islam, & Mirza, Mohd. (2012). Present status of library cooperation, networking, and resource sharing in Bangladesh: Web-based library cooperation for access to world-wide information. Library Philosophy and Practice (e-Journal). Paper 784, 1–12.

- Riggs, Donal E. (1987). Networking and institutional planning. Journal of Library Administration, 8, 59–65.

- Robin, Kinder. (1994). Librarians on the internet: impact on reference services. New York: Haworth Press.

- Rumeia, Guo. (2004). Constructing Library Networks with Chinese characteristics: bringing about society-wide sharing of information resources. Library Review, 36(4), 283–290.

- Sadowsky, George. (1993). Network Connectivity for Developing Countries. Communications of the ACM - Special Issue on Internetworking, 36(8), 42–47.

- Saha, N. (2009). Academic Libraries and Librarian in the Electronic Teaching-Learning Era: Is There Any More Need? In International Conference on Academic libraries. 2009. Retrieved from crl.du.ac.in/ical09/165-170 on dated 24 Apr 2011.

- Sahney Sangeeta. (2011). Delighting customers of management education in India: a student perspective, part II. The TQM Journal, 23(5), 531–548.

- Sahoo, Bibhuti Bhusan. (2002). Need For A National Resource Sharing Network in India: Proposed Model. Workshop on Information Resource Management. Presented at the DRTC, Bangalore.

- Salm, Amber. (2011). Network Security and Cryptography. Retrieved from http://www.creativeworld9.com/2011/04/abstract-and-full-paper-on-network_13.html on dated 25 Jun 2013.

- Satpathy, K. C. (2012). INDOLIBNET: A Proposal. In Information-Innovation-Technology: Creating Seamless Linkages. Assam. Retrieved from http://indolibnet.blogspot.in on dated 18 Sep 2013.

- Satyanarayana, N.R. (2003). A Manual of Library Automation and Networking. New Delhi: New Royal Book Co.

- Schwarzwalder, Robert. (2011). The Changing Face of Academic Libraries: Why Less Space Does Not Have to Mean Less Impact. Library Connect Partnering with the library community. Retrieved from http://libraryconnect.elsevier.com/articles/roles-professional-development/2011-03/changing-face-academic-libraries on dated 14 May 2012.

- Selvi, G. T. (1999). Internet and web search engines and their impact on academic library services. In CALIBER 99. Nagpur. 305–315.

- Sheshadri, K. N, Manjunatha, K., Shivalingaiah , D., & Radhakrishnan, N. (2011). Library Consortium, Resource sharing and Networking in United Arab Emirates – A Study. International Journal of Library Science, 3(1).

- Shinder, Debra Littlejohn. (2001). Computer Networking Essentials: An essential guide to understanding networking theory, implementation, and interoperability. USA: Cisco Press.

- Singh, C. P. (2008). Library Automation in Modern Age. New Delhi: Alfa Publications.

- Singh, J. & and Kaur, T. (2009). Future of Academic Libraries in India: challenges and opportunities (p. 52). Presented at the International Conference on Academic Libraries (ICAL), University of Delhi.

- Singh, S.P. (1975). Automation in Libraries. Metropolitan Book Company, 87–88.

- Sinha, Dharni P. (2004). Management Education in India: Perspectives and Challenges. Hyderabad: ICFAI University Press.

- Sinha, M. K. (2004). Scenario of Automation and Networking of Library and Information Centers (LICs) of North Eastern Region of India: An Evaluative Study. In Roadmap to New Generation of Libraries Using Emerging Technologies. Ahmadabad.

- Sloan, Tom. (1996). Delaware: Library automation and networking. Library Hi Tech, 14(2/3), 81–83.

- Stalling, William. (2009). Network security essentials: applications and standards (3rd Ed.). New Delhi: Pearson Education.

- Subbarao, V. S. (1998). Impact of information technology on the knowledge and skill base of library staff in IIT Bombay: a study of management of change. In CALIBER 98. Bhubaneshwar. 35–39.

- Sujatha, G. (2000). Resource Sharing and Networking of University Libraries.

New Delhi: Ess Ess Publications.

- Tanenbaum, Andrew S, & Wetherall, David J. (2012). Computer Networks (5th ed.). New York: Pearson Education.

- Tedd, L.A. (1997). An Introduction to Computer Based Library Systems. (pp. 129–131). Presented at the Heyden International, London.

- Thu-Thuy Do, & Kim, D. (2005). An Evolvable Operating System for Wireless Sensor Networks. International Journal of Software Engineering and Knowledge Engineering, 15(2), 265–270.

- Tikekar A. (2009). Towards 21st Century Academic Libraries and Librarianship. In International Conference on Academic Libraries. Retrieved from crl.du.ac. in/ical09 on dated 15 Feb 2013. 40-45.

- Tomsho, Greg. (2011). Guide to Networking Essentials (6th Edition). Boston: Cengage Learning.

- Venugopal M. V. (1999). Vistas in Library, Information Systems and Networks. Agra: Y.K. Publishers.

- Vijaykumar, A., & Thomas, Jaison. (2012). Application of information communication technology in college libraries. International Multidisciplinary Research Journal, 2(2), 91–94.

- Wayane. (2005). Top Technology Trends in Texas Libraries: Wireless Networking & Anti-Spyware Software. Texas Library Journal.

- Whelan, David P. (2001). Extending Library Services with Wireless Networking. Presented at the The Technology Conference for Information Age Librarians, Washington, DC.

- White, P., & Twomey, C. (2006). Informing Interlibrary Networking and Document Supply in the English National Health Service: A Comparison of Models from five Countries and a Caribbean Network. Inter Lending and Document Supply, 34(2). Retrieved from www.emraldinsight.com/0264-1615.html on dated 17 Oct 2012.

- Wong, Angus and Yeung, Alan. (2009). Network Infrastructure Security. New York: Springer Science + Business Media.

- Zacker, Craig. (2011). Networking: The Complete Reference. New Delhi: Tata McGraw-Hill Publishing Company.

CHAPTER 3

PROLIFERATION OF MANAGEMENT EDUCATION AND INSTITUTES

3.1 Introduction:

Management is all about learning to organize the available resources in such a way so that the overall purpose of the organization can be attained efficiently and effectively as possible and also the usage of resources has to be optimized. Management Education is one of the growing disciplines and is in demand worldwide. The need of management education is felt due to globalization and industrialization as well collaboration among the different part of country or even among the international venture developments. Management education in India is also growing fast and has initiations since past fifty years and growing at an alarming speed. During this period, tremendous growth is observed in management education and also in the number of management institutions offering management education causes at different levels. Initially having few notable management institutes in India the addition of thirteen Indian Institutes of Management and more than 50 university departments are now offering post graduate level management courses. Today in all organizations, learned, talented, efficient and ethical leaders are required to mange organizational goals. Thus, students are now opting for specialized education in management which helps in attaining special status in the society and more value in terms of money, respect etc. Thus now management education is not anymore an additional asset but an important aspect for every individual. (http://www.polish-youth.org/263-role-in-management-education-in-todays-world.html).

3.2 Trends in Education Systems:

Education is a process of learning, teaching, knowing, and it is not restricted to only textbooks, schools and is an important activity for everyone in the world. Education makes human being to understand the developments of society. An educated person has the ability to take viable decisions and take right moves at the right time. Education not only enables individuals to put their potential to best use but also do something productive in their lives. Education plays an important role in shaping an individual to be a better, responsible citizen and an active member of the society.

Some of the important benefits are listed below:

1. Ensure students becomes productive, have good character and bright future.

2. Helps in making best use of skills and talent and get success in competitive jobs.

3. Helps to enrich the society and achieve success in life by utilizing skills gained in a constructive way.

4. Open new avenues and vistas in the domain of expertise and awareness.

5. Education helps in making proper and right decisions at right time to solve problems.

6. Helps in building information and education society that makes better citizens for the country.

Thus no human beings survive without proper education. The application of education in different situations varies as per the basic mindset and intelligence levels of different people. Education is a productive and beneficial factor in a human life. In every field education is necessary component and government is also striving hard on this issue constantly. Sasi Kumar (2011) discussed the education system operative in India in which author reviewed education since ancient times, from Gurukula system of education to present curriculum based modern subjects using classrooms teaching with advance and ICT aids.

Trends in education systems in generated are analyzed and grouped and briefed as:

- Traditional Education System: Consisting of 10+2+3 replacing all the previous schemes.

- Formal and Informal Learning: Formal consists of regular classroom teaching delivered by trained teachers in a systematic way in schools and colleges. Informal learning is not structured properly but informal groups discusses over a particular subject in depth in a group more effectively.

- Distance Learning: A method of learning remotely, without classroom, and regular face-to-face contact of tutor.

- Online Learning / E-Learning System: This is a latest practice implemented due to applications of ICT in education system and developed E-learning or online learning which is nothing but distance learning using internet resources, making use of electronic media and resources, databases etc. This education system is in great demand in present situation of electronic age.

Thus a present trend in education system is changing from formal, informal to E-learning. E-learning system includes education system using e-resources with multimedia learning. Technology-Enhanced Learning (TEL), Computer-Based Instruction (CBI), Computer-Based Training (CBT), Computer-Assisted Instruction or Computer-Aided Instruction (CAI), Internet – Based Training (IBT), Web-Based Training (WBT), online education, virtual education, Virtual Learning Environments (VLE) , m-learning, and digital educational collaboration are main facets of E-learning system. It is observed that e-learning education system is approaching fast as users are also using different techniques and technologies smoothly.

Education is basic need for the development of the society. Education system is well supported by libraries and support in providing information to the users. Since the world is advancing and entering into competitive environment the need of well-developed education system is necessary to manage the changes. Education in any faculty brings out improved values to every citizen and helps in building better future. Education helps in making people aware of the activities and development carried out in the world. The main purpose of education is to build confidence in the minds of people and develop courage to face the changes in the different systems to sustain competitions in life. The education

systems are changing to increase knowledge and get good job opportunities in the society. "Education is not preparation for life: Education is life itself" is the right statement made by John Dewey (2011) while stating importance of education.

3.3 Management Education:

The growth and development of management education can be traced back to 18th century. From 18th century to 21st century, management education has witnessed many changes and developments. Management education in India is predominately a derivative of western management thought and practice. It may be worthwhile to notice that management itself is a discipline which has evolved from fundamental disciplines of philosophy, psychology, economics, accounting, computer science, mathematics, statistics and industrial engineering. In India, management education is seen as elitist and often young men and women are attracted to management education not because they need some education, but exposure and experience to create something wonderful and hence useful to society. (Sanjeev Kumar and Dash, 2011)

In 21st century, many transformations appeared in management education system due to liberalization, privatization, and globalization. It introduces new courses in accordance with industrial demands which have more economic value in society. Management education is one among those which receives new dimensions with changing time. Initially Marketing, Finance and Human Resource Management were considered as functional areas of management education, but now management education covers more functional areas like Operations, Information Technology, International Business, Supply Chain Management, Retail Management etc. MBA courses throughout the country are based on the specialization needed in different sectors. India has witnessed a continuing growth in this sphere of education because of the rising demand of trained management graduates. Management education has become one of the most prominent disciplines in education today and as a result of this; private sector has entered in Indian management education and invested in its development.

Management education moulds students in managerial skills, theories, fundamentals of business and processes of managing a business. The students of management science

improve as well as developed career opportunities. Management science supports to solve problems and facilitate decision making at the workplace.

The ultimate challenge in management education is to initiate more practical oriented and industry focus programs instead theory-based developments and teachings. Management education need to be holistic, targeted and customized with aim to remove the gap that exist between industry requirements and academic curriculum, corporate awareness, grooming and developing managerial skills. Industry interaction has to be strengthened by inviting senior persons from industries to deliver expert and special lectures and ensure that students get associated with live industry projects. While understanding needs of students in all areas such as analytical reasoning, lateral thinking, and solving case studies to be considered while providing services from libraries. Recently mentoring and carrier counseling also introduced in most B-schools and claims to have it but not practiced well. There is a need that management education in India has to extend its image at par with international need and support to institutes, industries and government to work in alignment and improve quality of management education. (Khandare 2012).

3.4 Importance of Management Education:

Times of India (2012) narrated the necessity of management education in today's business environment and stated that, "Management education has a vital role to play in today's business environment, where everything changes so fast that it makes it difficult for organisations to survive the growing competition. This has led to the need for business schools in developing nations to impart relevant education to students, which reflects the changes in society. Also, schools need to be in close contact with industry."

Management education in recent times has received enormous attention and gaining importance in India (Janardhanam 2003). The economic liberalization, globalization, industrialization and privatization over the past decades are few the important reasons for gaining importance to management education. However the challenges in management education are manifold in terms of institution building, enhancing the educational quality, covering global perspectives, developing ethical standards, seeking industrial collaborations and developing eastern perspectives in the management thought. Thus

India is an attractive destination for the world famous companies to set up their manufacturing units mainly use of revolutionary developments in the information technology like the Internet and e-mail services etc.

Ashaj (2009) pointed out that management education is important which helps in improvement in leadership qualities and turns out into excellent managers. A management course with specialization in different areas moulds students to face the constantly advancing corporate world and impart effective people-management skills.

Management education helps in developing different skills among the mould students viz:

- Management capabilities: The capacity development due to learning managerial methods to motivate other employees for better productivity.

- Presentation skills: Improving public speaking abilities and other interpersonal skills to impress upon the clients.

- Team building capabilities: Develops a strong and successful team building skills that works together towards achieving challenging goals. Team working gives different environment.

- Problem solving skills: Due to learning difficult concepts students can handle different situations by applying strategies to manage employee performance problems.

3.5 Improvements in Management Education:

Growth and development of management education involves in developing methods, techniques and different branches in management field. The growth and development helps to increasing suitability to environment and competence to manage change effectively. Management education based on needs introduced different courses at UG, PG and Diploma level. Now M.Phil, Ph. D. degrees are also added. Many new branches subject are introduced and it lists to make them more than 80 specializations (Appendix B) like hotel management, aviation, agriculture etc. NBA, NAAC, ISO, AICTE and UGC

are different accreditation bodies looking into improving the quality of management educations.

In spite of improvements and development of new programs in management education still few considerations like:

1. Need collaboration with industrial sectors and develop a transformation process.

2. Selection of qualitative facilities in learning and teaching process.

3. Develop research programs in education system for collaboration between industry and the institutes.

4. Bring in greater market orientation among the students through education.

5. Support the globalization.

3.6 Global Trends in Management Education:

Globalization means integration of economies and societies through cross country flows in respect of information, ideas, technologies, goods, services, capital, finance and people etc. Cross border integration is useful for enhancing cultural, social, political and economic development. Globalization is one of the most significant force for change in business activates and transform management education at least on par with major inflection points in the past, such as the turn from application to research in the 1950s as advocated by Gordon and Howell (1959). The turn toward humanism in 1988 as advocated by Porter and McKibbin (1988). It is likely to overshadow more recent developments such as the rise of rankings initiated in 1988; then the turn toward leadership development in 1990s (Pfeffer and Christina 2004) and debates over the management profession in the 2000s (Khurana 2007). Globalization of management education re-opens new complexity, broader scope, and greater scale. The pace and direction of change, it seems inevitable that the future global field of management education differs vastly from what it is today. Leaders in academia, business, and government need to understand the consequences of these imminent changes. This report aims to complement and extend the stream of critical reflection on management education

by illuminating the opportunities and challenges presented by globalization. The spirit of new management trends encourage and support business schools' globalization efforts.

The review on business schools and its analysis made by Jenster (2011) in which author has identified the trends in management science and stated that the global management education market is growing every year and alone in 2003 management education market was 22 billion US dollar which raised to 33.39 US billion dollars in 2007. The management education programs introduced at different levels which include regular and distance or online full time, part time, executive management courses etc. A cursory global review of development of business schools (b-schools) in every country shows growing trend and the leading countries are China (1396 institutes), India (1100 institutes), Mexico (1000 institutes), Philippines (1127 b-schools), US (1500 b-schools). From this it is observed that US is the best country in monitoring management courses and India is reaching to the levels of US and China.

Vaidhyasubramaniam S. (2007) compared the growth of management education in USA with India, using different models of organizational decision making. The findings summarized by author indicates the need for a bounded rationality model which characterizes best the need for informed decisions in policy level decision making. Initial stage US management education passed out through various phases during its development with garbage can model and ended with bounded rationality. The Indian management education is still following traditional models of decision making but however growing fast in activities.

In the global scenario the first management education program started at MIT in 1931and the second program was at Harvard, dating back to 1943. The first review of business education that has been reported in the public domain was from University of Pennsylvania in 1931 (Kaul N. 2011). This report stated that schools of business establish a genuine discipline to be credible. Later Carnegie Foundation brought out a report on management education in 1959 (Pierson 1959). Later the growth in management education is rising continuously.

3.7 Management Education in India:

No doubt that management education has very well developed in USA, UK, Germany etc. The basic aim of management education is to develop professionals, entrepreneurial and socially responsible leaders and managers. Globalization, liberalization and privatization have tremendous influence over the business environment in India. Business or management education has its origins in the late 19th century all over the world. But the first management institute of 'Wharton School of Finance and Commerce' came into existence at the University of Pennsylvania, USA during 1881. This was followed by University of Chicago and California in 1898. The Harvard Business School started operating in 1908. Thereafter the growth of schools in management is very rapid (Pathak, 2009).

In India, also management education has grown rapidly after independence. In 1950, the Department of Commerce of Andhra University started M.B.A. program in India. In 1961, Indian Institute of Management, Calcutta now Kolkatta (IIMC) was established to provide quality education in management science. Indian Institute of Management Ahmadabad (IIMA) was set up 1962. These two national level management institutes were funded by the central government and had collaborations with Sloan School of Management and Harvard Business School respectively. In 70's, progress continued with establishment of Indian Institute of Management (IIMB), Bangalore in 1973. Later 1980's witnessed the exponential growth in management education in India. Indian Institute of Management, Lucknow (IIML) was established in 1984.

Management education gained momentum in 1990's when AICTE permitted private organizations to established management colleges and institutes to offer postgraduate courses in management science. This was the turning point of fullest growth in management education in India and large number of self financing management institutes in India put their contribution. Indian Institute of Management, Indore (IIMI) and Indian Institute of Management, Kozhikode (IIMK) both were set up in 1996. The Rajiv Gandhi Indian Institute of Management (RGIIM) was established in 2008 at Shilong.

Management science is much more advanced and from basic courses like HR, Finance and Marketing more than 80 streams or courses (Annexure - B) in management are

conducted in different colleges through the country. Management education in India has taken proper shape to face advanced situations and for this purpose IIM's have been established. Management Development Institute, Gurgoan; Symbiosis Institutes, Pune; Institute of Management Technology, Gaziabad; ICFAI Business Schools at Hyderabad; Xaviers Institute of Management, Bhuneshwar; Wellingkar Institute of Management, Mumbai; International Management Institute, New Delhi; Indian Institute of Foreign Trade, New Delhi; Narsee Moonjee Institute of Management, Mumbai; Nirma Institute of Management, Ahmedabad; are some of the top management institutes established, for providing better management educational facilities in different parts of India.

Since inception, different nature of courses in management education are developed like Certificate, Diploma, Bachelor Degree, PG-Diploma, Master Degree etc. and in addition to this Bachelor of Business Administration (BBA), Bachelor of Business Studies (BBS) and Bachelor of Business Management (BBM) are the courses introduced at graduation level. Post Graduate Diploma in Business Management (P.G.D.B.M.), Post Graduate Diploma in Management (P.G.D.M.), P.G.D.D.R.M., and PGDHRM are few prominent diploma courses degree generation. Master of Business Management (M.B.M.) and Master of Business Administration (M.B.A.), Master of International Business (M.I.B.), Master of Management Program (M.M.P.), Master of Performance Management (M.P.M.), Master of Personnel Management (M.P.M.), Master of Business Studies (M.B.S.), are the courses at master degree courses in management education. In competitive era admission to these courses are given through entrance exams MAT (Management Aptitude Test), GMAT (Graduate Management Aptitude Test), CET (Common Admission Test), ATMA, E-MAT, XAT, CEMAT, OPENMAT, IIFT (IIFT entrance test for IIFT New Delhi and Kolkata), BIMTECH etc are conducted in India.

3.7.1 Management (MBA) Education Programs in India:

The Master of Business Administration (MBA) which attracts students from a wide range of academic disciplines. The core courses in the MBA program are designed to introduce students to the various areas of business such as accounting, finance, marketing, human resources, operations management, etc. Students in MBA programs have options of

taking general business courses throughout the program or can select specialization areas. Accreditation bodies exist specifically for MBA programs to ensure consistency and quality of graduate business education. Business schools offers MBA programs tailored to full-time, part-time, executive, and distance learning students with specialized concentrations. The education in management develops capabilities like presentation skills, team building capabilities, problem solving skills etc.

Master of Business Administration (MBA) courses are of two years and divided in to four semesters, and subjects taught in all the four semesters relates to management education like Accounting for Business Decisions, Economic Analysis for Business Decisions, Legal Aspects of Business, Business Research Methods, Organizational Behavior, Basics of Marketing, Marketing Management, Financial Management, Human Resource Management, Decision Science, Operations and Supply Chain Management, Management Information Systems, Strategic Management, Enterprise Performance Management, Startup and New Venture Management, Information Technology, Operations Management, Human Resource Management, International Business Management, Supply Chain Management, Rural and Agribusiness Management, Managing for Sustainability, Subject Core Courses in Marketing, Finance.

However, during the second year, students can select a special subject, from the different areas like Marketing Management, Financial Management, Computer Management, Production and Materials Management, Human Resource Management and nearly 80 specialized disciplines are developed based on the need. (Annexure - B)

3.8 Management Education in Maharashtra:

Different type of management courses at different level are conducted in this sate however Mumbai and Pune are cities where more number of management programs are being conducted and a competition for the entrance in MBA program is visualized. Management education is controlled by two major organizations in Maharashtra State viz. Directorate of Technical Education (DTE) and All India Council for Technical Education (AICTE). DTE is for Maharashtra state and AICTE is managing at national level.

3.9 Management Education in Pune:

It is observed that the growth of management education in Pune is also alarming as compared with international and national development. Pune being an educational hub has received value in education and management education has no exception to it. In Pune management institutes and education both are growing and at present different management courses are conducted in 127 management institutes (as on 2011-2012) affiliated to University of Pune, DTE, AICTE and autonomous organizations. Different types of management education programs at different levels are conducted in Pune city among 127 management institutes. These institutes and management courses are accredited either DTE or AICTE or affiliated to University of Pune. Over all it is observed that nearing to 20 to 25 management programs are conducted in different management institutes in Pune.

3.10 Management Education: Issues and Challenges:

Saha (2012) indicated that there is a continuous progress in the management education and to maintain quality, numbers of committees are developed for and they constantly suggest improvements in management education system. Due to establishment of IIM and B-schools there are significant changes taken place in management education in recent years. New management institutes are coming up with introduction of new management specializations and at the same time there is a need felt to assess the issues in this system also.

Major Issues in Management Education:

Saha (2012) pointed out different issues regarding challenges in management education sector. Few of them are:

1. Quality in faculty (improve by organizing faculty development programs)

2. Promoting research culture in management education

3. Proper collection of reading materials relevant to management education

4. Build interactions and collaboration with industries

5. Device proper system for accreditation

6. Corporate governance of B-schools and broaden the specialization.

7. Develop internationalization in management education

1. Quality in faculty improvement by organizing faculty development programs:

The experts are of the opinion that there is a need to have qualified faculty to develop the management society which is sustainable to the needs of present culture and global scenario. The educated and qualitative faculty though needed but there is a need to orient them from time to time to suit the needs with trends.

2. Promoting research culture in management education:

It is observed that in present scenario the management institutions do not support to cultures and needs research element. To develop a research culture, it requires a good library support system. Scholars and faculty be invited to undertake research projects in certain areas of national interest. There is a need to encourage institutes to develop adequate support system to start research programmes to enhance the quality in management education. In management discipline the research activities are not yet developed like other faculties of education.

3. Proper collection of reading materials relevant to education:

It is observed that the ideas and concepts are generated by way of reading qualitative literature. The management institutes have to develop proper collection of literature in libraries. For this purpose collection development policies are to be developed.

4. Build interactions and collaboration with industries:

To enhance the qualitative education, students after qualifying the exams also to be trained for industries for this interactions with the co-workers and get acquainted with the industrial management system collaboration is required. At the final year, student collaboration with industries is to be developed to understand the practices followed in industrial sector.

5. Device proper system for accreditation:

Like DTE and AICTE some accreditation board only for management institutes which is advised by the reviewer to gain quality in institutions as well as curriculum. A National Task Force (NTF) on management education needs to be appointed or developed.

6. Corporate governance of B-schools and broaden the specialization.

Along with the development of B-schools which are specific process driven institutes there is a need to develop need based and demand based new management streams to solve the problems of management requirements. As indicated by Rao, (2005) a major weakness is the lack of a corporate governance system in B-schools, and needs careful consideration. There is a need to have independent directors as well as to implement independent audit committee for managing the B-schools. The B-schools are process driven. Corporate governance has to be made an element of accreditations.

There are some businesses, which are context specific to India. e.g. agricultural services, infrastructure management, contract research, hospital management etc are rapidly growing areas in business. These businesses need customized management education. Curricula customization, specific material development and faculty specialization are some of the neglected factors that led to poor quality of management education in India. No doubt some of the B-schools have introduced MBA, program, focused on telecom, financial services and infrastructure management but still it requires more efforts on customization in order to broaden the specialization.

7. Develop internationalization in management education:

The need is now felt in management sector to suit with the trends to meet the needs at international level and accordingly management education programs have to be developed. International collaboration is increasing day by day and it needs suitable manpower to manage the needs.

3.11 Management Education Institutes (India):

There are approximately 4765 business schools and management institutes in India offering two year MBA programs and total intake capacity of students is more than 1.8 lakh per annum (http://www.aicte.com/). The students taking admissions to MBA courses are either fresh graduates without any work experience or graduates with significant work experience.

The Indian Institute of Management (IIM) is a group of 13 public, autonomous institutes in management education in India established for creating standards. The main objective behind establishing IIM is to provide quality management education to new entrants and develop capacity. The first institute of IIM was established in Calcutta in November 13, 1961. Other IIM institutes are in Ahmadabad, Indore, Bangalore, Lucknow, Ranchi, Kozhikode, Raipur and Kashipur. The IIM primarily offer postgraduate, doctoral and executive education programmes. IIM are one of the prestigious business schools in India.

Government accreditation bodies such as Association to Advance Collegiate School of Business (AACSB), Accreditation Council for Business School and Programs (ACBSP), Association of MBAs (AMBA), European Quality Improvement System (EQUIS), International Assembly for Collegiate Business Education (IACBE) and All India Council for Technical Education (AICTE) working for maintaining good quality in Management Education.

On demand B-schools are developing to groom global managers to handle the situation more comfortably. It has become necessary that the management education becomes more global in nature and the scenario at global level is quite different and development is very fast. The response to globalization of business is the basic reason behind the

growth of management education and management institutes having the following criteria for vision:

1. The business schools admit international students in different programme.

2. The B-schools have to introduce few international faculties and provide an opportunity to the students to listen to developments made elsewhere.

3. The B-schools have to develop an active programme for students and develop collaboration with industries and also develop faculty exchange programs with advanced countries.

4. To ensure that at least 25% of the curriculum deals with international subjects like international economics, international marketing, international financial management or international business management etc.

5. Indian B-schools have to collaborate with some well known foreign B-schools by which Indian students can take part in their educational activities.

6. The B-schools also collaborate with some foreign placement consultancies to provide chances for employment abroad.

Business education has a long history in India, date back to the 19th century. Early Business-Schools were focused on the commercial side of business, seeking to fulfill the needs of the then British government. A brief developmental sketch is presented in brief in following paragraph.

India's first B-school i.e. Commercial School of Pacchiappa Charties was set up in 1886 in the southern city of Chennai (Madras). In 1903, British government initiated Secondary school level commerce classes at the Presidency College in Calcutta with a focus on Secretarial Practice, Business Communication, Short hand, Typing, Correspondence and Accounting etc conform. The first college level Business School was established in 1913 at Sydenham College in Mumbai. Soon after this another college in Delhi in 1920 established Commerce College, later on it was renamed as Shri Rama College of Commerce Delhi. The Indian Institute of Social Science founded in the year 1948 as India's first management program with an intention to train manpower to create and

spread the knowledge required for managing industrial enterprises in India. Catholic community established Xavier Labour Relations Institute (XLRI) at Jamshedpur in 1949. Indian Institute of Social Welfare and Business Management (IISWBM) was set up in 1953 at Calcutta. This was considered as India's first official management institute in historical development.

Encouraged by the results, Government of India applied for and obtained grant from the Ford Foundation in 1961 to launch two institutes for management i.e. Indian Institutes of Management (IIM) at Calcutta (West Bengal) and IIM at Ahmadabad. This grant was focused on helping American business education knowledge and models to other nations and having intensive collaboration with an American B-school for facilitating the transfer of learning. The IIM Calcutta established in collaboration with the Sloan School of Management (MIT) for faculty and pedagogy development in the year 1961, with an intention to focus on quantitative and operational aspects of management. IIM Ahmadabad was established in 1962, pioneered the case method of teaching in India with an emphasis on qualitative strategic-integration. The mission of IIMs was to professionalize Indian management education through teaching, research, training, institution-building and consulting with the support of expertise developed by the pioneering IIMs. Later two more IIMs were Bangalore (Karnatka) and other in Lucknow (U.P.) in 1973 was established. In late 1990's, two more IIMs were setup, one at Kozhikode (Kerala) & the other at Indore (M.P.). The Indian Institute of Forest Management was setup in 1982 at Bhopal (M.P.) as a leader in specialized management education for the entire forestry system in India with the help of IIM, Ahmadabad.

Growth both in numbers and status initiated during the 1990's. A large number of multinational companies entered in India. Domestic companies also followed to compete with multinational corporations. Companies found that the graduates from commerce stream fell considerably short of the demands of the executive positions in a competitive world. They had good accounting skills but lacked requisite marketing, behavioral, finance and operations skills. They were also weak in oral and written communication, critical thinking and critical reading skills and in information technology. Consequently, rather incurring on training cost for commerce graduates companies started offering huge premiums for MBA graduates. Recognizing the success of MBA programs and demands

from students and employer, universities started looking at management education as an academic discipline and started offering MBA & BBA programs. (Bownder and Rao, 2005). Thus management education explored with establishing qualitative institutes to impart management education in India.

In Maharashtra state management education is progressing fast but more development is noticed in the cities like Mumbai and Pune. In Mumbai city around thirty five prominent management institutes have been established. Out of them Jamnalal Bajaj Institute of Management Studies, Narsee Monjee Institute of Management Studies, Sydenham Institute of Management, Lala Lajpat Rai Institute of Management, Welingkar Institute of Management Development are the most popular management institute. Pune is known as educational hub and almost all the branches of education are available in Pune. A cursory review of the management education in Pune, revealed that more than 127 management institutes are established (till 2011) in Pune and out of these few prominent management institutes are Symbiosis International University's SIBM, SCMHRD, SIMS; Pune University's PUMBA, Sinhgad Management Institutes, Vishwakarma Institute of Management, Indira Institutes of Management, Dr. D.Y.Patil Institute of Management studies leading management institutes in Pune. Entrance to the management education courses are monitored through entrance exams like CAT, SNAP, JMET, IIFT, XAT, MAT, IBSAT etc. are conducted for entry into prominent management institutes.

Choudaha (2013) Growth of engineering and management institutions in Indian have come to a screeching halt, confirming the trend predicted in my earlier posts-Engineering Pipeline: Disproportionate and Disconnected in August'09 and Indian B-School Bubble? In July'11. Here we described only Management College Growth.

Table 3.1: Growth of Management Institution and Student Intake in India

Year	Institution	Growth (#)	Growth (%)	Student Intake
2006-2007	1132			94704
2007-2008	1149	17	2%	121867
2008-2009	1523	374	33%	149555
2009-2010	1940	417	27%	179561
2010-2011	2262	322	17%	277811
2011-2012	2385	123	5%	352571
2012-2013	2467	82	3%	385008

(Source - http://www.dreducation.com/2013/01/engineering-mba-india-statistics.html)

The percentage growth in number of business schools in India, growth declined from 33% in 2008-09 to 3% 2012-13. In terms of absolute numbers, the number of new B-schools declined from 417 in 2009-10 to 82 in 2012-13.

Although the growth of management institutions has slowed down, with 2,500 B-schools in India has disproportionately large number of institutions, indicating high value Indians place of job-oriented, professional programs with social prestige.

As per AICTE, number of approved seats for student intake in management institutions in India grew by nearly 180% respectively in five years as compared to the growth of economy (Gross Domestic Product-GDP) by only about 50%.Another troublesome part is that despite the growth of student intake of doctoral seats have not increased proportionately. For example, number of management seats in PhD increased by 98% as compared to number of students to be taught increased by 179%.

It can be concluded that the intake capacity of the management institutes is also growing and this clearly indicate the popularity of management education. From 94,704 intake in 2006 rose to 385008 in the year 2013. Approximate 2, 90,304 numbers of the students have increased in last seven years span. This indicates the growing importance of management education in comparison with others.

Table 3.2: Course Details of Management Education as per AICTE

AICTE approved intake of students (seats available for admissions)					
Program	Level of Course	2011-12	2007-08	Five Year Change	Five Year Change (%)
Management	Post Graduate	249,710	89,369	160,341	179%
	Fellowship & Ph.D.	178	90	88	98%

(Source: http://www.dreducation.com/2012/03/data-engineering-management.html)

It is observed that in India like other institutes established for different branches of education the management education institutes are also steadily growing since 2006 and this shows the importance related to this education system. From 1132 institutes in 2006 the number increased to 2467 in 2013 which is alarming. Thus in a span of eight years nearly 1335 new management institutes have been established to cover the different specialized areas in management. It is found that the management education is growing fast and to cope up with the intake new management institutes are also established.

3.12 Accreditation in Management Institute:

Accreditation is a tool and a process by which institutes qualities in education sector are assessed and issue, certification of competency, credibility. Accreditation provides an institution or program to meet standards of quality, set forth by an accrediting agency.

Accreditation gives recognition by an authorized accrediting agency to the institution or program to meet standards and enhance the quality of education and training.

The enormous growth in management schools is an issue of great concern to AICTE, industry and AIMS and ensures quality in management education. With this consideration in mind the AICTE had formed the National Board of Accreditation (Philip J. 2003). AICTE and UGC have directed all universities and other affiliated institutions and colleges to obtain NAAC/NBA accreditation. The government established National Assessment and Accreditation Council (NAAC) and National Board of Accreditation (NBA) for assessing the qualitative competence of educational institutions from the Diploma to the Pose-Graduate in Engineering and Technology, Management, Pharmacy, Architecture etc.

3.12.1 Directorate of Technical Education (DTE):

The role of the Directorate of Technical Education (DTE) is to maintain and enhance the standard and quality of technical education by developing policies, establishing new institutions, guiding and supervising, providing financial aid, developing private institutions, interacting with industries and national level institutions, coordinating with other departments of State Government, Government of India Statutory Organizations and to contribute to the development of industrial society at large.

The Directorate of Technical Education (DTE), Mumbai was established in 1948 by the Government of Maharashtra for taking care of technical education of the state. The institute has given first hand liability of managing and directing technical institutes - engineering colleges, polytechnics, industrial training institutes, and technical high schools of the state. Before 1948, Director of Public Instructions Industries was responsible for managing technical institute and technical education of the state. In 1983, the government has made the separate Directorate for Technical Education and Vocational Education. Now, the Directorate of Technical Education (DTE), Mumbai; Maharashtra is responsible for standardization and regularization of technical education in the state. The DTE offers Post Graduate, Under Graduate and Diploma program in several disciplines in Engineering, Architecture, Pharmacy, and Management etc. The

information about the DTE and its role in education system is placed on the official site of DTE Maharashtra. In all 2147 institutes are effective under the control of DTE in Maharashtra for different disciplines. (http://www.dtemaharashtra.gov.in/)

3.12.2 All India Council for Technical Education (AICTE):

All India Council for Technical Education (AICTE) is also a statutory body at national-level and a council for technical education, under department of Higher Education, Ministry of Human Resource Development which is established in November 1945 first as an advisory body and later in 1987 given a statutory status by an Act of Parliament. AICTE is responsible for proper planning and coordinated development of the technical education and management education system in India. The AICTE accredits postgraduate and graduate programs under specific categories at Indian Institutions as per its charter. The main objective of the AICTE is to promotion of quality in technical education, planning and co-ordinate development of technical education system and regulations and maintenance of norms and standards. The Council's Headquarters is located at New Delhi (Wikipedia).

AICTE has also established eight regional offices situated in Bhopal, Bangalore, Chandigarh, Chennai, Kanpur, Kolkata, Hyderabad & Mumbai, for the efficient discharge of the Council's functions within their respective regions. These offices act as secretariats of the Regional Committees and coordinate with the headquarters and the State Technical Education Departments.

3.12.3 National Board of Accreditation (NBA):

The National Board of Accreditation (NBA), India was initially established by All India Council of Technical Education (AICTE) under section 10(u) of AICTE act, in the year 1994, for periodic evaluations of technical institutions and programmes according to specified norms and standards as recommended by AICTE. NBA in its present form came into existence as an autonomous body with effect from 7th January 2010, with the objective of Assurance of Quality and Relevance of Education, especially for the

programmes in professional and technical disciplines, i.e. Engineering and Technology, Management, Architecture, Pharmacy and Hospitality Management through the mechanism of accreditation of programs offered by technical institutions. NBA has introduced a new process, parameters and criteria for accreditation and these are in line with the best international practices and oriented to assess the outcomes of the programme.

3.13 Status of MBA Colleges in Pune:

Pune is the cultural and educational capital of Maharashtra, and also biggest education hub of western Indian States. Pune city has many educational colleges and universities for higher education. University of Pune is one of the oldest universities in India which was established in year 1948. Large number of students comes to the city from various states of India and abroad due to quality in education. Pune city has many management institutes which have given international quality for management education and teaching along with other branches of knowledge.

Since 2008, University of Oxford announced plans to establish the Oxford University India Business Centre (OUIBC) at Pune. This is Business School's first offshore facility made available in India. Pune University started the first full time MBA course in BYK College in Nasik in 1968 and in the same year BMCC, Pune has also stared a part time Diploma in Business Administration. Thus University of Pune is known as Oxford of the East, and came a long way since its establishment in 1949. This university is also recognition by the University Grants Commission (UGC) for conducting management courses and also accreditation by National Assessment and Accreditation Council (NAAC) with the highest possible grading of five stars which has further strengthened its position.

According to AICTE, 708 Institutes are running management programme in Maharashtra (www.aicte-india.org/) and according to DTE Management Institutes are 416 (www.dte.org.in). Under the justification of University of Pune about 266 institutes are available. (www.ernet.org.in) out off 266 management institutes 205 institutes are in Pune district, 27 institutes are in Ahmednagar and 34 institutes are in Nashik. Among them

many well known institutes are in Pune e.g. Symbiosis International University, PUMBA, Indira, MIT etc. According to AICTE, DTE and UOP at the end of 266, 155 Management Institutes were conducting different management courses other than MBA such as MMS, MPM, MCM, DCM, PGDBM, MMS etc., and these courses are also in the purview of University of Pune.

Pune is treated as capital of education in India and have excellent centers for pursing management studies. Pune is developing city for management education and colleges for MBA (regular, part-time and executive courses) have been developed continuously. These colleges are equipped with best infrastructure for management education in campus facility, experienced faculties and visiting corporate business leaders as guest faculty and top of that excellent track record of the placement in reputed companies also takes place from these institutes. Admission to MBA colleges in Pune is through entrance examinations like CAT, MAT, ATMA, CET, CMAT, SNAP etc. Pune University affiliated MBA colleges accepts CMAT score for admission to MBA courses. While autonomous colleges are also accepting CAT, MAT, XAT scores. Some colleges like Symbiosis (SNAP), BIMM (BAT), MIT etc conduct their own MBA entrance exams. The growth of management institutes in Pune is visualised with chronological development and growth of management institutes is in Table 3.3.

Table 3.3: Growth of Management Institutes in Pune

Year of Establishment	Management Institutes
1971-1983	4
1984-1993	11
1994-2003	24
2004-2013	88
Total	**127**

(Source: www.dte.org.in)

It is noticed that in Pune city the development of management education and institutes initiated around 1970's. In the first decade only four institutes were established. In the following decades the growth is rising and became almost doubled till 2003, but during 2004 to 2013 nearly 88 institutes were developed and this is the alarming growth. Nearly 127 institutes were established in management education till 2013. The growth is continuous in institutes as well as also in developing different management specialized courses as per the demand and society and industry. The popular MBA colleges in Pune city are Symbiosis Institute of Business Management, PUMBA of Pune University, Vishwakarma Institute of Management (VIM), Sinhagad Institute of Management (SIOM), MITSOM, and Indira etc.

MBA colleges in Pune offer different courses like full time, part time, correspondence and executive programs. All these courses offered in the various colleges, approved by All India Council for Technical Education (AICTE) or autonomous universities or recognized by the University Grant Commission (UGC). The course structure of the MBA colleges in Pune is two years duration (four semesters) as per the guidelines of UGC, DTE and AICTE. These courses offer dual specialization, major and minor. Part time and executive MBAs are offered by autonomous universities and for employed staff in industries and the length of these courses differ from one institute to another. Some courses are conducted in the evenings during the week while others are offered over the weekend.

Ranked Management Institutes in Pune:

- Vaikunth Mehta National Institute for Cooperative Management

- Indian Institute of Cost Management and Research (IndSearch)

- Institute of Management Research and Development (IMDR)

- Institute of Management Education and Development (IMED)

- National Insurance Academy (NIA)

- Institute of Management Education

- Symbiosis Institutes of Management (SIMS, SIOM etc)

- Department of Management Sciences (PUMBA)

- Foundation for Liberal and Management Education (FLAME)

- Neville Wadia Institute of Management

- Audyogik Shikshan Mandal's Group of Institutes (ASM)

- Sinhgad Institutes of Management (SIOM, SIBACA, SIMCA, SIBACA etc)

- Institute of Business Management and Research (IBMR)

- Vishwakarma Institute of Management (VIM)

- Balaji Institutes for Management Education

- Modern Institute of Business Management

In Pune about 127 management institutes as on 2012, as detailed in Annexure A and are regularly reviewed by accrediting bodies. Out of 127 following 10 management institutes are ranked in the city.

Table 3.4 Top Management Institutes in Pune

Institute Name	Courses
Symbiosis Institute of Business Management (SIBM)	Regular and Executive MBA, PG Diploma in Finance, HRM, Marketing and Operations Management
Sinhgad Institute of Management (SIOM)	MBA, Masters in Marketing Management (MMM), Masters in Personnel Management (MPM), PG Diploma in Foreign Trade and PGDBM
Indira Institute of Management	MBA, PGDBM, Degree of Philosophy (PhD)

	in Management
The Indian Institute of Planning and Management	Full time and Integrated Programs in National Economic Planning and Entrepreneurship, European Exchange Program
Symbiosis Institute of International Business (SIIB)	MBA in International Business/ Agri-Business/ Energy and Environment
Bharati Vidyapeeth's Institute of Management	BBA, BCA, MBA in HR/ IT/ Biotechnology/ Business Analytics, MCA, PhD in Management
Padmashree Dr. D.Y. Patil Institute of Management Studies	MBA and Doctorate and Post Doctorate Research
Vishwakarma Institute of Management (VIM)	Master of Business Administration (MBA), MCA
MIT School of Management (MITSOM)	MBA, MCA, Masters of Business Studies, MMM, MPM
Institute of Business Management and Research (IBMR)	MBA, MCA, MCM, MMM, MPM, PGDFT

Few institutes are affiliated to deemed university or becomes autonomous. However, with the growing demand for management, many top private universities felt the need to capitalize on the opportunity and started management courses in their colleges. Today, many private management colleges are at par with all the university affiliated colleges. In fact, many private colleges, like SIBM, are much better ranked compared to most of the top Pune University affiliated B-Schools. The private MBA colleges in Pune, also have excellent quality of education, better faculty and excellent campus placements have

indeed created and carved a niche for themselves in this Oxford of the East. Among the different types of colleges the government college is Department of Management Sciences, University of Pune (PUMBA). All the others are non aided colleges.

The MBA colleges are at different levels like aided, non-aided, autonomous, affiliated to AICTE/ DTE etc. They run regular and distance learning MBA courses. Correspondence MBA courses are offered by autonomous universities recognized by the University Grant Commission (UGC) or colleges approved by All India Council for Technical Education (AICTE) or Distance Education Council (DEC). Some universities such as the Indira Gandhi National Open University (IGNOU) conduct entrance exams followed by group discussions and personal interviews to select students for their distance learning courses. IGNOU and the Tilak Maharashtra Vidyapeeth (TMV) are some of the most popular distance learning universities in the vicinity of Pune, so entrance exams for correspondence MBA are required for short listing deserving candidates.

Colleges for distance MBA in Pune are Symbiosis Centre of Distance learning (SCDL), MIT School of Distance Education (MITSDE), Sikkim Manipal University, D. Y. Patil Vidyapeeth's Institute of Distance Learning, Bharati Vidyapeeth Deemed University School of Distance Education

3.14 Role of Libraries in Management Education:

Libraries play an important role in education and it's era of information explosion, information overload, information revolution, information technology. The management education also grow fast and covers more than 80 different types of management courses (MBA) for different specialization like Marketing, Human Resource, and Finance etc. The use of technology changes the libraries and information centers. Now libraries and information centers are not only equipped with materials in traditional formats but also acquiring material in electronic formats offering users a vast selection and getting fast information. The library is now known as the academic heart of the institute (Odiase, Unegbu, and Haliso, 2001).

Management education is growing very fast and it is complex, also it is very systematic and well discipline. Many courses and subjects are studied in management institute. Syllabus, the teaching methods and trends are constantly changing and new methods and trends are covered in managerial activities. To handle these changes, management libraries needs a continuous improvement in their services and techniques use in libraries. A management library acts as an academic library, research library or special library as well as knowledge resource centre. The resources and services provided by the libraries should be qualitative which fulfilled users, students, faculties and researchers demand and their requirement. For this reason management libraries have to survey on use study and user study for the analyze the needs and complete their requirements.

3.14.1 AICTE norms and Management Libraries:

Management institute library have syllabus recommended textbooks, reference books, journals and databases for all the areas of management courses and subjects. The library should have collection of audio and video CDs/DVDs and other material in management and related areas. As per ACTE norms, management libraries should subscribe national and international journals. There should be a subscription to e-resources as well as databases. The institute should purchase minimum 1000 books and 100 of titles per academic year in all subjects. As per AICTE norms, management institutions have to add two books per student per year i.e. 120 per year for the intake of 60 students. The institute may subscribe minimum of 30 journals from the list of AICTE. In monetary terms, the institutes initially invest approximately rupees two lacs on books, journals, periodicals and subsequently every year 10 percent of the fee must be spent for addition of books, journals and periodicals in the library (AICTE Handbook). The educational qualification of the librarian is also M.Lib & I.Sc and either SET or NET qualified.

3.15 Services Provided by Management Libraries:

In the era of information explosion, insufficient financial budgets and use of information technology a need is felt to depend on library services to get more resources. To provide qualitative services to the students, teachers and researchers different efforts are required from library professionals. The researchers are focused on finding qualitative and

quantitative information resources in management libraries. Management libraries can adapt trends like institutional publishing, creating open-access electronic repositories for the intellectual output and use of institute teachers and researchers which may be used as study material provided to the management students. This practice developed both institutional self-publishing and self-display (promotion) at the same time. These libraries are units that frequently take the responsibility for conceiving, building, and maintaining these repositories. OPAC, reference services, access to web based resources, electronic resources like e-books, e-journals, e- thesis and dissertation, library networking, consortia, web technology, library 2.0 and open access are provided very easily by using ICT to management users.

3.16 Role of Management Library Professionals in ICT Era:

The use of ICT in libraries has changed the role of libraries and the services provided to the users. Library automation which is an essential part has completed using information technology. The impact of ICT also reflected in management libraries, on different activities like housekeeping operations and the rendering advanced services, IT application tools and library management software are used in housekeeping operations like acquisition, cataloguing, circulation, serials control and OPAC etc. The internet is used as a tool for delivering library services like Web OPAC, and different library services can be rendered 24/7 in a very cost efficient manner. The role of librarian is changing from an intermediary to a facilitator and information provider. The management education system allows students using laptops in class rooms and preference is also given to online education using internet to gather the information and the libraries are yet to prepare for providing advanced services. ICT is a boon to libraries but a need is to find how to make its use better.

Mallapur and Naik (2009) pointed out that before the invention of ICT the libraries had library resources in print media form. The changes brought by ICT have given rise to new ways of information repacking and delivery of information methods. The management libraries use both the print and electronic media for providing library services and marching towards the digital libraries (DL). The concept of ICT has also changed the

name of library as Information Resource Centre (IRC) and the librarian as the information mediator, IT manager and information manager etc. The management libraries have to face the new challenges and adapt to find out user needs and accordingly provide the services and develop collection.

The concept of resource sharing has changed the role of libraries in ICT era. ICT helps libraries in automation of libraries, use of internet and intranet for information collection and dissemination, generation of digital information resources in the form of e-books and e-journals, creation of digital libraries etc. Using ICT the traditional library trends are shifted to automation of libraries, digital library, virtual library, online searching, networking, consortium, cloud computing in libraries, optical and digital media etc.

The consortium at various national and international levels has helped in overcoming the financial crunches. The libraries are adopting the resource sharing through networks by availing membership of various networks like DELNET, INFLIBNET, CALIBNET and MANLIBNET etc. A library web page or Universal Resource Locator (URL) facilitates single window access to various web enabled library services this also helps in for sharing resources. The web pages of library contains institute information, library information like library working hours, holidays, rules, library resources and contact details like phone number, e-mail address etc. Library web page links to catalogue, free and subscribed resources, some value added services like self help tools and subject gate-ways and FAQs. These management libraries have to perform different roles in ICT era.

3.17 Future of Management Libraries:

The information needs and requirements of library users of management college libraries are (students, faculty and researcher) fulfilled properly. The user expectations from the libraries like enhanced library services, use of e-resources, access to global information is to be satisfied using ICT. Library sources are available in both printed and electronic format, free and fee based easy access to library resources from any place through search engines, web tools, portals etc. The libraries of management are changing slowly towards digital. It is now necessary to manage libraries with qualified library staff having the knowledge of ICT is now essential to satisfy users. Technological revolution increased

the expectations of users and librarians have to work on following fields to satisfy users in future.

- Try to increase the library funds or utilized more amount from budget for information technology.

- Create a database of library resources and institutional repositories and create library networks and consortia (local level).

- The marketing of available information resources and delivering need based information services to the users from global information base.

- Adopt or follow best practices in libraries to improved services and facilities of management college libraries.

- Providing various online services like news alerts, ask a librarian, online reference desk, FAQ etc.

- Conduct Indian School of Business (ISB) studies and improves the library services regularly.

- Encourage team building spirit among the library professionals to provide better services.

Summary:

In this chapter researcher tried to understand in brief the important of management education, growth of institutes etc. The issues and challenges in management institutes are isolated. It is noticed that management education is growing with new areas having nearly 80 specialized subject courses for MBA are introduced in education systems but research culture is not yet developed which need information support. If libraries are networked in city, this may be helpful in developing and supporting to research culture as well as global education. The library is not only a knowledge centre but its ultimate aim is to provide satisfactory services for all the library users. Due to this library should improve itself constantly by adopting new IT technologies.

References:

- AICTE: Handbook 2013. Retrieved from http://www.aicte.com/ on dated 25 Jan 2014.

- All India Council for Technical Education (AICTE). Retrieved from website http://en.wikipedia.org/wiki/All_India_Council_for_Technical_Education on dated 21 Jan 2012.

- American Psychological Association (APA). Retrieved from website http://www.apa.org/support/education/accrediation/description.aspx#answer on dated 28 June 2012.

- Ashaj (2009). The Importance of Management Studies for a Successful Corporate Career. Retrieved from website http://ashaj.hubpages.com/hub/The-Importance-of-Management-Studies-for-a-Successful-Corporate-Career on dated 12 May 2013.

- Bowonder and Rao, S. L. (2005). Management Education in India its Evolution & Some Contemporary Issues. *AIMA/CME.*

- Choudaha, Rahul (2013). Growth of engineering and management institutions in India. *DrEducation: International Higher Education Blog.* Retrieved from *http://www.dreducation.com/2013/01/engineering-mba-india-statistics.html* on dated 15 Jan 2013.

- Dewey, J. (2011). Pioneers in Our Field: John Dewey – Father of Pragmatism. Retrieved from http://www.scholastic.com/teachers/article/pioneers-our-field-john-dewey-father-pragmatism on dated 27 March 2012.

- Directorate of Technical Education (DTE). Retrieved from website http://www.dtemaharashtra.gov.in on dated 12 Aug 2012.

- Distance MBA College in Pune. Retrieved from website http://www.mbacollegespune.co.in/distance.html on dated 18 Sep 2012.

- Education. Retrieved from website http://www.indiaeducation.net/apexbodies/dte

on dated 6 Nov 2012.

- Globalization of Management Education: Changing International Structures, Adaptive Strategies, and the Impact on Institutions. Report of the AACSB International Globalization of Management Education Task Force. (2011). UK: Emerald Group Publishing Limited.

- Gordon, Robert Aaron, & Howel, James Edwinl. (1959). *Higher Education for Business*. New York: Columbia University Press.

- Importance of Education. Retrieved from website http://www.facebook.com/notes/ncb-foundation/importance-of-education/340177865996265 on dated 15 Feb 2013 on dated 23 Jun 2012.

- Jenster, Per V. (2011). *The Business of Management Education: A Strategic Analysis of the Industry. Market Situation, Trends and Strategic Issues for Business Schools.* Retrieved from website http://www.autjorstream.com/presentation/pjenser/45976.management.education-market on dated 9 May 2013.

- K Janardhanam, & M Shankara. (2003). *Management Today*. New Delhi: Himalaya Publishing House.

- Kaul, Natashaa (2011). Management Education in India: A Case Study. *Asian Journal Of Management Research*, 2(1), 533-552.

- Khandare, Dhanishtha. (2013). *Information Seeking Behaviour of Users of Management Institute Libraries in Pune.* Tilak Maharashtra Vidyapeeth, Pune.

- Khurana, Rakesh (2007). Higher Aims to Hired Hands: The Social Transformation of American Business Schools and the Unfulfilled Promise of Management as a Profession, Princeton University Press, Princeton, NJ.

- Mallapur, V. B., & Naik, R. R. (2009). Modernization of academic libraries: A challenge in the digital era. Karanataka. Retrieved from http://dliskud.over-

blog.com/article-36027433.html on dated 12Oct 2012.

- Management Education. Retrieved from website http.www.authorstream.com/presentation/pjenster/45976.management.education-market on dated 23 Jun 2011.

- Management Education. Retrieved from website http://www.polish-youth.org/263-role-in-management-education-in-todays-world.html on dated 11 Sep 2013.

- Master of Business Management. Retrieved from website http://en.wikipedia.org/wiki/Master_of_Business_and_Management on dated 15 Dec 2011.

- National Board of Accreditation (NBA). Retrieved from website http://www.nbaind.org/views/Home.aspx on dated 23 Apr 2012.

- Odiase, J.O.U., Unegbu, V.E. & Haliso, Y.(2001).Introduction to the use of Libraries and Information Sources. Benin: Nationwide Publications.

- Pathak, R C. (2009). Enhancing Academic Excellence in Management Education in India. Presented at the Global Meltdown, Pune.

- Penthoi, Ajay Kumar, & Dash, Sankarashan. (2005). Indian Higher Education in the Era of Globalization: Challenges & Quality Management Strategies. *University News*, *December*.

- Pfeffer, Jeffrey, & Lawrence E. McKibbin. (2004). The Business School "Business": Some Lessons from the U.S. Experience. *Journal of Management Studies*, *41*(8), 1–20.

- Pierson, R.C. (1959). The Education of American Businessmen. New York: McGraw-Hill.

- Porter, Lyman W., Lawrence E. McKibbin, & American Assembly of Collegiate Schools of Business. (1988). *Management Education and Development: Drift or Thrust into the 21st Century?* (Vol. Ch. 1). New York: McGraw-Hill Book

Company.

- Rao, S. L (2005). Report of the working group on management education formed by National Knowledge Committee.

- Saha, Goutam G. (2012). Management Education in India: Issues & Concerns. *Journal of Information, Knowledge and Research in Business Management and Administration*, *2*(1), 35-40.

- Sanjeev Kumar, & Dash, M. K. (2011). Management Education in India: Trends, Issues and Implications. *Research Journal of International Studies*, *18*, 16–26.

- Sasi, Kumar (2011). Education System in India. Retrieved from website http://www.gnu.org/education/edu-system-india.html on dated 21 Jan 2013.

- Times of India 18 June 2012 accessed at http://www.gbsnonline.org/ on dated 20 June 2012.

- Vaidhyasubramaniam S. (2009) compared the growth of management education in USA with India, using different models of organizational decision making.

CHAPTER 4

CHANGING THE PARADIGMS: LIBRARIES AND TECHNOLOGY

4.1 Introduction:

Information and Communications Technology (ICT) is an umbrella that involves communication application or device, encompassing: computer hardware and software, satellite systems, television, radio, cellular phones and many more. Various services and applications associated with them, such as distance learning, e-learning, videoconferencing etc. are becoming more popular. ICT is used in every filed including education, academics, schools, colleges, universities, libraries, different organizations, companies and industries, and business houses for effective communication as well as holding voluminous data.

Information and Communication Technology (ICT) is constantly upgrading and its utility in different sectors is also increasing due to its benefits. Applications of ICT made innovative performances in every field to serve the user community better. The applications of emerging technologies in libraries and information centers also made impact on library functions, activities and information services. This helped in providing qualitative services to users at economical and effective ways. It is observed that many libraries have been completed the automation process using computer and communication technology and ready to accept the advanced steps towards modernization.

Knowledge society and information society both are relying on the technology and looking for the acceptance of value added changes in their activities. Library and Information Centers are facing many changes and challenges due to emergence of technology and its effective use in the profession which is beneficial to everyone who are involved in knowledge generation and distribution sector. Academic i.e. education sector is changing from formal to e-learning due to applications of ICT and the users demands

are also changing due to maximum use of technology and digital contents. The infrastructure supporting to this activity is also changing like libraries, teaching methods, text, tutorials etc. Libraries are responsible for providing the information support to users and the emergent developments in education sectors also expects changes in LIS profession by providing required information based services, on demands of users. (Karambelkar et al 2012).

4.2 Trends in Education System in ICT:

Education is progressing, since ICT is effectively used for educational development. Emerging trends in education has completely changed the traditional practices. Different career options that were earlier not considered to be important have now emerged as the most popular education and career option base for the society. Online education is popular and becoming a major preferred mode of education among students and in education system. The changing practices in the education system forces other dependent systems to upgrade and change. Libraries in academic sector are facing challenges due to ICT applications in all fields. Higher education is becoming a dynamic, global enterprise, and becoming increasingly complex with multiple roles and provision for different information services (Campbell 2006, Karambelkar et al). Libraries have also to play an important role in satisfying the user needs by accepting modern techniques and practices to support current e-learning education systems.

4.3 Limitations of Traditional Libraries:

Traditional libraries no doubt have efficient library management system but due to information explosion, rising cost of publications, it is not possible for traditional library to provide instant access to users. Traditional libraries have many limitations in exploiting their library activities and services and major time of the library professionals is spent in repetitive and manual work. More manpower and capital investment is required for maintenance of collection than for providing information and reference services to users. Due to these drawbacks, traditional libraries are now started using ICT in libraries. The

practices followed in traditional libraries were undertaken in closed library system environment but revolutions like ICT has changed the face of libraries in the e-era.

4.4 Changing Systems in Libraries:

Libraries acts as powerhouse of information and have collection of books, journals, magazines, newspapers and other reading materials. A basic function of library is acquiring, accession, cataloguing, classifying documents, circulation, and reference service to users. Computerization of library activities such as acquisition, cataloguing, classification, circulation, serial control, OPAC etc. have changed the look of the libraries. Computers are used in libraries in all the activities and made the tasks simpler. Libraries have witnessed many transformations due to constant implementation of technologies e.g. in the mid of 20th century libraries began to use microfilms and microfiches for the purpose to save space, finance, and preserve the documents for the longer run. In 1952 concept of magnetic tape, a data storage system in digital format used and preserved huge data. The use of magnetic media to record and store numeric and textual information, sound, motion, and still images has presented librarians and archivists with opportunities and challenges. (John 1995). Later in the 1970s and 1980s, audio compact cassettes were used as an inexpensive data storage system. Compact disk (CD), is a laser disc technology and used in the mid-to-late 1970's. Digital Video Disc / Digital Versatile Disc (DVD) developed in 1999 and offers higher storage capacity than previous media used. These magnetic and digital formats are used in libraries very commonly for storing and retrieving. Internet played the vital role in LIC's and transformed the library system. Internet changes the functions of libraries especially information gathering, information searching etc.

4.5 Expectations of Users from Libraries:

In ICT era, librarians are facing significant challenges and to satisfy user expectations which are different than before. Users require different type of information resources and information services, advanced library services to fulfill needs pin pointedly. User expectations from the academic libraries are changing from text book monopoly to mega

information storage or knowledge base like wikis and from print media to digital media and reference services to virtual information services based on different information resources available online or offline. In addition, 24/7 services in digital form and deliverable at any suitable place, information delivery through mobile, I-phones, e-readers and real time archives of information is expected by users. The information services and dissemination of information covers active learning facilities supporting to current education system, with downloads and synchronization facilities, and information availability from distance or distributed learning centers based on user centric and customized services from libraries. For gathering resourceful information users are now using portals, search engines, information gateways, RSS and web 2.0 tools (Blogs, toolkits, flicker, twitter, face book, podcast, slideshow), webinars, might be effective for scholarly communication and access (Impactmax 2009). Thus the user's expectations are more appropriate and their needs are now very specific and qualitative. Information explosion, availability of information in various formats, user needs have different approaches, search information from the huge information, retrieval of information, impact of information technology are the major issues faced in libraries.

To meet the expectations librarians have to perform activities differently. The traditional practices are not effective to satisfy user needs in the era of information growth and now technological support helps in assisting to provide advanced services using digital technology as well as other different technologies. The applications of emerging technologies and management practices in libraries are giving proper shape in consolidating information and generating information products suiting to needs of a specific user ICT and management issues are main factors in re-engineering academic libraries. Proper use of technology helps in developing the modern library practices and also supports to modern trends in education.

4.6 Performing Library Functions Using ICT:

The main purpose of the library is to serve users in getting the right Information. Library collects the information resources in different formats and stores it for use after processing. Basically, acquisition, processing, organizing, dissemination and library

services are the different functions carried out in libraries every day. Figures 4.1 and 4.2 are represents the different library services and functions carried out in the libraries, both traditional and advanced environment. Figure 4.1 describes basic functions and facilities of libraries.
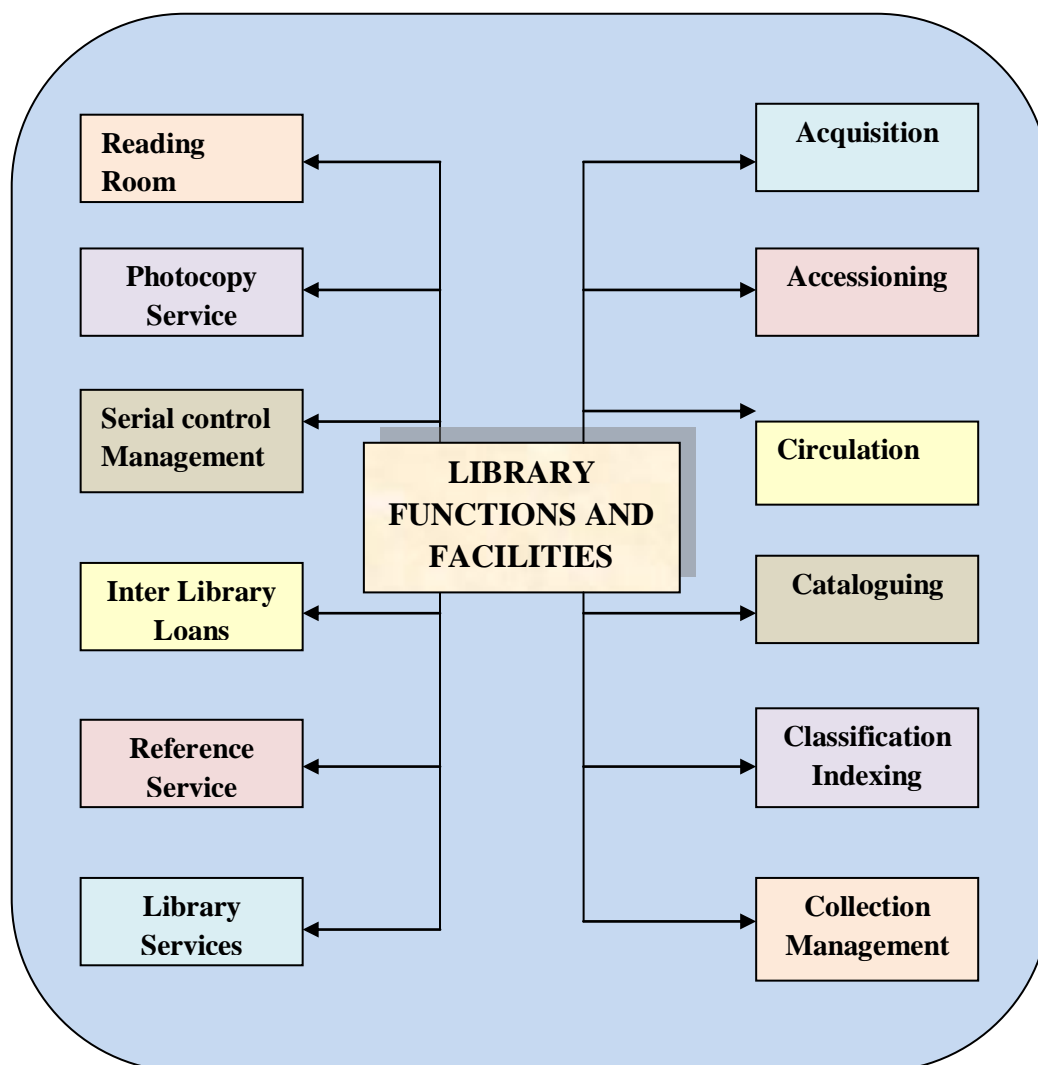
Figure 4.1 Traditional Library Functions and Facilities

In the automated environment, libraries provide additional facilities in addition to basic as detailed in figure 4.2, due to use of technologies.
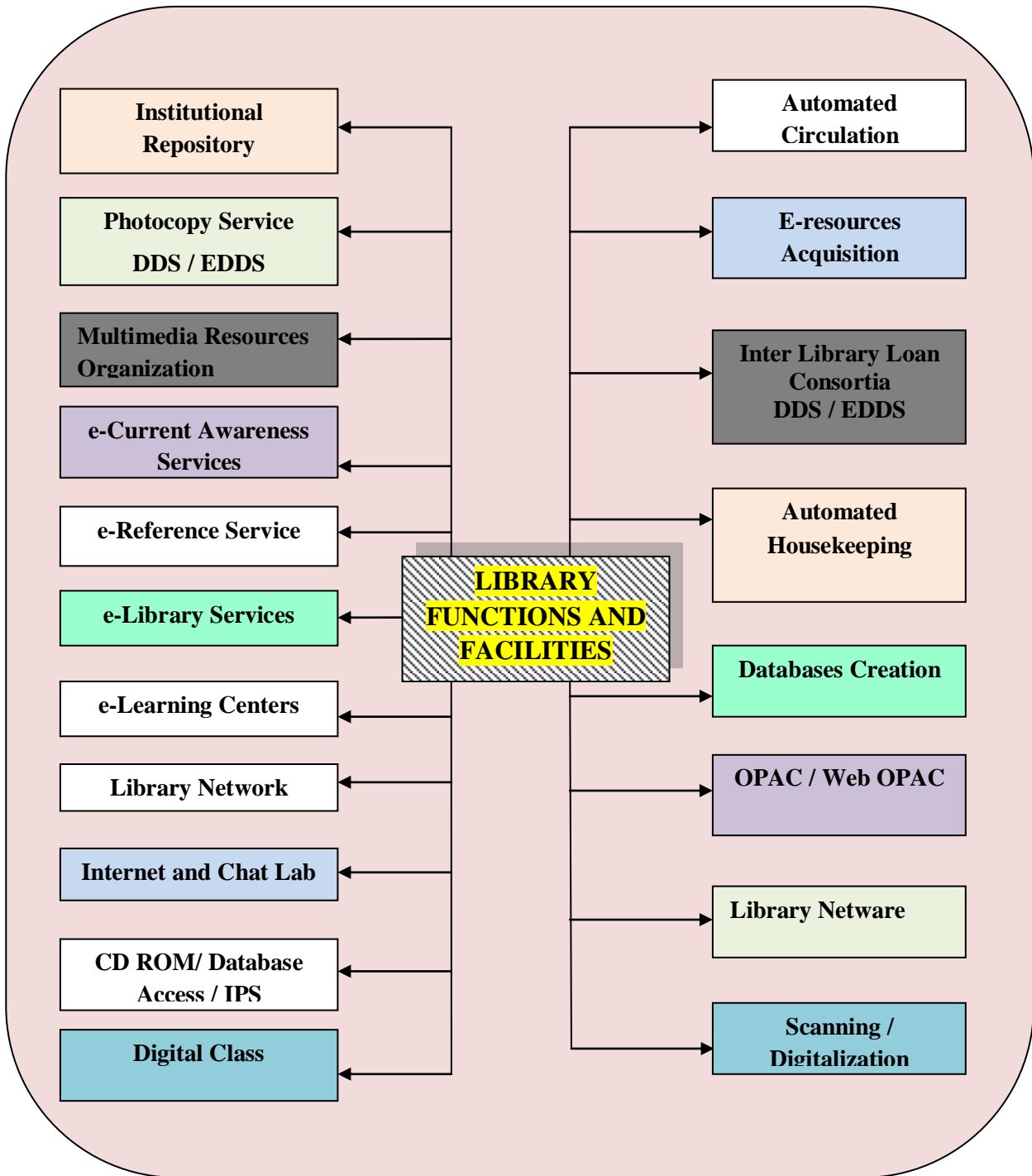
Figure 4.2 Library Functions and Facilitates using ICT

From above table concepts are very clear and ICT is like a boon to libraries.

4.6.1 Emerging Trends in Technologies:

Changes in libraries are visualized due to development of technologies and its practical applications to provide advance services to users. The technologies are emerging fast and techniques supporting to different activities in LIS might shift to:

- Mobile computing and mobile learning

- Cloud computing

- Distributed data processing

- Semantic web

- Networks based activities

- Web tool applications

- Virtual reality

- Internet and WWW resources

- Institutional repositories

- Visual data analysis (visual representation of data)

Using technologies and practices in libraries, which emerge to personalize learning, teacher generated open content, use of information commons, ICT based library systems, library 2.0, hyperlinked libraries, IR and knowledge base developments, visual data analysis and mining are considered on priority.

4.6.2 Benefits of Technologies in Developing Modern Libraries:

ICT made an impact over library collection, library services, library uses and library professionals. Benefits of ICT might visualize in all concepts in libraries and this made to change the face of libraries and the future libraries may act as:

1. Library as a place: for rethinking and integral part of university learning culture

2. College libraries may perform additional tasks in addition to present viz. Collaboration

3. A blend of formal and informal places

4. A home for services e.g. tutoring centers

5. Technology drives the bus for different functions and services

6. Library functions as a place of information and also act as

- Writing centers

- Group study rooms

- Presentation rooms

- Distance Learning rooms with Video Conferencing

- Student and faculty lounges with Podcasting Facilities

- Information gathering node based on Cafe class 24/7

- Breaking the text book monopoly and depend on intellectual content resources in e-forms distributed globally.

Similarly few more common benefits achieved are:

- Quick and pinpointed data searching and information gathering using different resources available globally

- Improvement in quality of library services and integration within the library

- Reduce workload of library profession

- Easy to share the information resources and economical collection development

- Better library network development

There are few issues which affect the implementation of ICT in Libraries

1. Insufficient funds and weak management support

2. Inadequate trained manpower in IT

3. Lack of necessary required infrastructure

4. Lack of standards

5. Networking of libraries have many administrative issues

6. Poor usage of free open source software's and weak connectivity of internet

If these issues are set right then the functions of libraries might change in total.

The best practices to be followed in achieving ICT are:

1. Allocate some budget for information technology in addition to the library budget

2. Capacity building of the technical staff from libraries to undertake new tasks

3. Organize workshops and training programs for library staff to develop their knowledge and IT skills

4. Team working practices need to be adapted

5. AMC for the maintenance of IT instruments with battery backup

4.7 Impact of ICT in Library and Information Centers:

Susan (2011) in his article "Impact of Information Communication Technology (ICT) on Professional Development and Educational Needs of Library Professionals in the Universities of Kerala" defined the different aspects related to impact of ITC in libraries and its advantages and disadvantages. The author summarised and concluded that ICT is necessary to overcome the crises in collection development.

The developments in ICT made tremendous changes in the information handling capabilities of academic libraries and information centres all over the world. ICT is beneficial in all the activities of libraries like acquisition, processing, storage, retrieval and dissemination of information (Housekeeping operations) by means of applications of computers, communicating systems, computer technology, database creation and use, repro-micrographic technology, digital technology, network technology, telecommunication technology, web technology, barcode technology, multimedia technology, etc.

The most prominent role played by ICT is the introduction of advanced communication networks and the internet, which has necessitated a major shift in the role of academic libraries from ownership model to access model, from print to electronic media, from libraries as archives to libraries as access points, and from information collection to information analysis and repackaging (Goswami, 2009). The change from print to digital

information has a high impact on libraries, information centers and other institutions directly involved in processing information. The ability of computers to perform high volume error-free repetitive tasks at speeds and actions much faster than human beings, along with the emerging developments in the area of computing; telecommunications, networking and resource sharing, has made access to information anytime, anywhere possible (David, 2001). Now, in ICT era, librarians in an academic environment have the role of mediator between the vast network of resources and its users, and libraries, an access point providing access to different types of information resources.

4.8 Transformations of Libraries and Information Centers Due to ICT:

Applications of ICT in libraries have made positive changes in its practices. Few prominent activities performed due to IT are discussed below.

4.8.1 Library Automation:

Library automation helped in automating the library processes and provides ease in access to information. Automation brought economy in management of libraries and developed cost effective models for collection development. The management of library is efficient due to reduction in repetitive tasks. Automation also helped in providing efficient and effective services to users in different forms using digital media.

4.8.2 Internet Applications:

Internet is proved as a boon to libraries, librarians and users. Internet is a platform to users which allows to communicate with each other, provide access to internet resources, publish data instantly to establish monopoly, access to all the information sources available like journal articles , magazines, newspapers conferences, primary, secondary and tertiary resources etc. In addition to this internet provide access to databases. Current awareness services, reference services, referral services, selective dissemination services, document delivery services, literature search, searching information from various sources, inter library loan and resource sharing are the services provided by libraries using internet resources. Hence the use of internet is increased in libraries.

4.8.3 Development of Databases and Institutional Repositories:

Databases, OPACS, WEBOPACS are generated and made available to users to make aware of the availability of resources to others. This facility also helps in exchanging the information with others and helps in developing resource sharing practices. Recently Institutional Repositories (IR) is initiated due to need and ICT application to compile the institutional intellectual collection at single source.

4.8.4 Searching Databases Online and Offline:

Databases are developed by the different agencies to provide quick access to information to users and data can be easily accessed, updated, produced and distributed which save the time and cost, as well avoid duplication, saving space, access at any time from anywhere. CAS / STN, Library of Congress (LC), DELNET, WorldCat DIALOG (OPAC), MEDLINE etc. are holding collection of databases and provide access to users in different areas. Searching online is cost involved and hence offline databases are also made available to users on demand.

4.8.5 Development of Digital and Virtual Libraries:

ICT developed new practices in libraries and due to e-publishing, intent applications it is now possible to develop digital and virtual libraries which are more benefited than traditional libraries. These libraries are providing better and enhanced services to the users in electronic or digital form.

4.8.6 Resource Sharing:

Information explosion, rising cost of publications, users increased expectations from libraries, increased value to research and R and D, growing educational base and financial crunches made libraries to hunt for the sharing of information resources by developing different resource sharing projects. Many efforts have been taken so far and in the past like ILL, Library cooperation etc but ICT and availability of e-publications made it possible to develop library networks and consortium of group of libraries and achieved highest level of sharing information among society.

4.8.7 Web Tools and its Usage for Library Cooperation:

Web technologies also assisted libraries in developing different resource sharing application. The sharing is based on user to use, user to organization, organization to group of users etc. The different tools of Web like facebook, twiiter, and blogs are more useful. RSS is the best tool proved for data gathering method. Thus web helped in developing both side communications and proved as a boon to support resource sharing.

4.8.8 Library Networking:

Library networking is sharing of computers, hardware devices, software, data, information and switching all interconnected with communications channels. It is used to establish a connection between network users. Networks can communicate with each other in different geographical areas like in a single room, on a same floor, within a building, in a campus, in between two different campuses and cities, and also communicate in all over the world. According to Tanenbaum (2012) network has three main types LAN, MAN and WAN. Networks allow resource sharing, and provides library services more effectives, facilitate exchange of information and avoid duplication. It saves budget, time, resources, manpower, and energy. Library networks are good in developing resource sharing projects at different level and joining libraries of similar interest.

4.8.9 Consortia:

Library Consortia is nothing but library co-operation, co-ordination and collaboration between groups of libraries for the purpose of sharing of information. A consortium is said to be a co-operative arrangement among groups or institutions or an association or society. Consortia are commonly formed to increase the purchasing capacity of the collaborating institutions, to expand the resource availability and to offer automated services. In other words, it is described as a group of organizations whose purpose is to collectively facilitate and support the work of a service program in ways that add material and human resources beyond those available to each organization/individual (Rajoli, Birdie & Karisiddappa, 2005). Consortia may be formed at a local, regional, national or international level, on a functional or format basis, or on subject basis. Library consortia are really helping the researchers, faculties and the students to retrieve the information

and save their time. Library consortiums help to developed digital library, utilize funds, provides CAS and SDI services. It is available at any time 24/7. It is helpful for subscription of e-resources, preservation of subscribed e-resources. Consortium is accessible to number of users at a time and the users can access huge information base of electronic resources at economical cost.

4.8.10 Bar Code and RFID:

Bar code and RFID technologies are proved profitable as they are used in libraries for circulation operations, theft detection systems and physical verification. RFID-based systems move beyond security to become tracking systems that combine security with more efficient tracking of materials throughout the library, including easier and faster charge and discharge, inventorying, and materials handling (Boss 2004). RFID has improved library workflow, library staff productivity and customer services.

4.8.11 Mobile Technology and Library Services:

ICT has collapsed barriers and promoted fast communication and interactions across boundaries. Libraries are deeply interested in channels for the transmission of information, such as telephones and telephone lines, cellular networks, cable television, and the internet. The internet and websites have made it possible for library users to locate what they need without going to the library. It is useful for marketing communications perspective and the challenge for libraries to attract users to the library and to retain them. It focuses on information provider/user relationship. SMS facility is use to awareness between users and library staff. Library persons can send a renewal notification of library books, message for return the books, overdue library books and notices related libraries through mobile technology. Mobile websites offer free SMS to mobile phone services using internet. Chat, Skype, Smart phones, Web tools assisted in cooperative ventures in libraries.

4.8.12 Advanced Library and Information Service Using ICT:

The following new services can be provided using ICT in libraries in addition to improvements in traditional services.

- e-CAS

- e-SDI

- Alert

- Digest

- TOC

- Database development

- Online and Offline searching

- Internet based services

- Web tool based services

- Digital resource based services

- Network based services

4.8.13 Open Source Software Usage for Developing Libraries:

Libraries are using different library management software's and automating libraries. The further development in libraries brought out by the library professionals by using open source software's for developing IR, digital libraries, and web 2.0 / library 2.0. Open source is softwares are available free and after evaluation can be used for different purposes e.g. e-Granthalay for developing automated libraries, Dspace for developing IR, DL and Koha for developing digital libraries. Thus many open source software's like Koha, PhpMyLibrary, OpenBiblio, GNU Library Management System (GLIBMS), Greenstone, Eprint, Evergreen, NewGenLib are proved beneficial for developing advanced libraries.

4.8.14 Cloud Computing:

A new area developed for resource sharing and running the systems in economical way is cloud computing. Information and communication technology is used extensively in libraries and information centers due to its multifold benefits and new avenues are emerging in the area of LIC. The libraries have been automated, networked and now moving towards paper less or virtual libraries. Cloud computing offer benefits to libraries and helps to reduce technology costs and increase capacity, reliability, and performance

for some type of automation activities. Cloud computing has made strong inroads into other commercial sectors and is now beginning to find more applications in LIC. Cloud computing introduces efficient use of bandwidth, staff, resources, and almost unlimited storage capacity. This also creates a data rich environment where skills to efficiently store, manage, and retrieve information.

4.8.15 Outsourcing and Crowdsourcing:

Outsourcing is the process of hiring outside agencies to perform different type of tasks and relieved the regular staff for the intellectual work. Outsourcing in libraries also proved beneficial in performing different tasks like AMC of computers, data entry, web page design, portal management in addition to regular tasks in the areas of cataloguing, classification, etc.

Crowdsourcing is a type of advanced stage of outsourcing where projects and services are kept open to public to take part and add value to it. It may be voluntarily done or fee based activity. The experts take the lead and develop the information products for the libraries. Use of internet is vital part in such cases. In nearer future these practices are definitely going to be adapted in libraries. Crowdsourcing has not been attempted but initiated the practice slowly. Apart from these social networking, library 2.0 are also practiced.

4.9 Future of Libraries Due to ICT Use:

Dahibhate et al (2011) in their communication elaborated the future of the libraries due to applications of ICT in libraries. Similarly Staley(2010) ACRL reported the top ten trends in academic libraries and pointed out few prominent trends like collection growth which depends on users or patron demands, needs to collect new resources, adapt new professional skill sets, demand for accountability and assessment of resources, digital collection, use of mobile phones, collaboration at different levels, and finally pointed out that libraries may need to be changed from physical to virtual environment for effective use of knowledge and resource sharing.

Staley and Malenfant (2010) expressed views related to future trends in academic library to be faced by the library profession in 2025 and expressed nearly about 26 changes in the

education and infrastructure including library system. He expressed the changes to be followed by 2015 and specified the positive trends and changes like change in academic culture, distance education, funding, globalization, infrastructure facilities, libraries, publishing industries, students learning practices, teaching methods etc. Further he explained the development of academic network, breaking textbook monopoly, development of cyber wars and cybercrimes etc and these forced to change the environment and practices followed in education and libraries.

It is an era of web technology and web tools helps in scholarly communicating interactively and many tools are found useful in academy and library. Libraries of the future called as Library 2.0 as they are using Web 2.0 technology extensively for getting and contributing the information globally and the professionals as Librarian 2.0. The scenario may shift to more usage of e-resources made available through networks, and library systems supports to functions like discover (finding current information), gather (collecting acquiring, organizing), create (annotating, indexing, abstracting analyzing, disseminating, filtering), share (writing, data sharing, teaching, publishing) information and may be called as "scholarly primitive behaviors" and provide advanced library services (Brown 2008).

4.10 Challenges in Developing Future Academic and Management College Libraries:

Following challenges are likely to be faced by the academic libraries, library professionals and while managing the future needs resource sharing through networking to be considered for effective use of information sources.

- Continuous evolution (change) to be faced by information professionals and advanced skills need to be accepted and practiced in profession

- Skills along with traditional, new skills like information collection and methods, e-content management, use of social media and use of traditional sources in new media may emerge.

- Virtual access to information

- Seeking information behavior of users to be analyzed

- Information technology literacy

- Embedded librarians role, which is responsible for training, competitive intelligence, and in depth subject support through research

- Evaluation of resources to select proper online or digital resources

- Cloud applications and web 2.0 technologies might be accelerated

4.11 Issues affect the implementation of ICT in Libraries:

There are many issues and problems faced by librarians while reshaping libraries due to application of ICT and this is true in case of management college libraries. The major problems faced are briefed in following paragraphs:

4.11.1 Major Problems:

- Insufficient funds: Inadequate financial support made use of ICT difficult in libraries. Similarly administrative barriers and weak management support is another cause in hindering application of ICT.

- Lack of e-resources selection and collection development policy: There is no comprehensive collection development policy for e-resources.

- Lack of required infrastructure needed for use of ICT effectively in libraries.

- Lack of long-term planning for collection development.

- Lack of use of standards for applying ICT.

- Inadequate qualified library professionals in IT.

- Lack of shared initiatives in group of libraries for achieving, maximum resource sharing.

- Lack of development of networks in group of subject libraries.

4.11.2 How to meet the Challenges:

Librarianship needs to function in advanced and different ways than in the past to meet the changing situation. The following activities in libraries might help in meeting out the challenges posed due to technologies.

- Manage resources, information services and facilities users

- User need based collection

- Support literacy and learning activities

- Restructuring or re-engineering of libraries to suit to modernization

- Need to develop new services along with enhanced of present services

- Revenue generation and marketing of information (by developing information products and delivering need based information services)

- Development of specialized databases using IR

- Advanced services to the end users (alert, one window service, translation etc)

- Convert libraries to gateway of information

- Follow best practices (in the profession like academic audit, information / knowledge audit, information and technological literacy initiatives, applying management techniques (six sigma) and suitable for lifelong learning etc)

- Capacity building and acceptance of new skills with positive attitude

4.11.3 Recommendations and Best Practices:

Some recommendations and action plans which helps to overcome the barriers to use ICT in library system are listed below:

- Libraries need additional funds for implementing ICT, in addition to library budget.

- Training of library professional: Well-trained and skilled personnel are essential for implementing ICT in libraries. Steps need to taken to develop properly trained and competent staff for this purpose. Organize workshops and training programs for library staff to develop their knowledge and IT skills.

- Collection development in e-form: A comprehensive collection development policy for e-resources needs to be maintained by the libraries, in order to follow a

set of standard practices for acquisition and management of electronic information resources. There should be specific budget for new resources and the renewal of existing resources.

- Team working and capacity building practices need to be adapted for effective development of libraries.

- Library Networking is one of the most effective ways of serving users' needs, and hence Networks need to develop in subject libraries at local level and help to share resources any each other.

- Prepare a long-term plan for the implementation of ICT in management college libraries.

4.12 Role of Academic Library Professionals:

Library functions, services, collections, policies are changing due to ICT applications and similar changes are also expected in library profession. Library profession has to develop greater technical expertise. Future librarians have to exhibit research skills and have to perform collaborative work, team building, competencies needs to be increased. Librarians change their role and work closely with other libraries, information technology and computer science departments, instructional designers, and information architecture specialists to serve users needs. It varies from organization to organization where they work and library managers no longer manage with physical sources and staff and work as educators, as well as collaborators, negotiator and business analyst, who could define the value of information services for their organization, for which they are serving. Next generation information professionals must serve as an agent of change

John Collins (2010), director of the Gutman Library, pointed out that "beyond collections, libraries are learning centers with group study spaces, galleries, cafes, and classrooms. Library certainly is a 'social' and collaborative place to work and a place to receive in-person research support." Now it is not a time for relying on "good will", but understanding organizational mission and business goals and providing information services to users and meets the goals of future. Next generation information professionals must lead their services aggressively. Next Generation college libraries have to be personalized, relevant and convenient for use. Information services may discover

knowledge rather than search for the information. In future libraries might be accessible to i-Google, face book, blackboard and blogs etc and competencies need to be developed.

Summary:

It is observed that there is a tremendous use of ICT in libraries which changed the practices, services and facilities provided by the libraries. Use of ICT in libraries gives the ability and satisfaction user a fulfill needs for information. It is apparent that a time has approached to apply ICT at any level of libraries as the environmental change is very fast. Today's profession may be redefined and practices might be re-engineered even at college libraries also. This chapter gave insight to researcher regarding the future of library functions, services and facilities using ICT. The future is difficult without resource sharing. Use of ICT follows resource sharing and thus possible to achieve future needs comfortably.

References:

- ALA's Interlibrary Loan Fact Sheet. (2013). RUSA STARS' 5 Things Every New Resource Sharing Librarian Should Know. Retrieved from website http://www.ala.org/rusa/sections/stars/5-things-every-new-resource-sharing-librarian-should-know on dated 21 Jan 2014.

- Blogs. Retrieved from http://library.sdsu.edu/guides/sub2.php?id=52&pg=266 on dated 25 Dec 2012.

- Boss. R. W. (2004). RFID Technology for Libraries. PLA Tech Notes. Retrieved from www.ala.org/ala/pla/plapubs/technotes/rfidtechnology.htm on dated 25 May 2013.

- Brown, C., & Czerniewicz, L. (2008). Trends in student use of ICTs in higher education in South Africa. In *10th Annual Conference of WWW Applications. Cape Town.*

- Campbell, J. D. (2006). Changing a Cultural Icon: The Academic Library as a Virtual Destination. *EDUCAUSE Review*, *Jan/Feb*, 16–30.

- Dahibhate, N. B., Dhamdhere, S. N., & Karambelkar, M. A. (2011). Future of

Academic Libraries in ICT Era (pp. 91–93). Presented at the National Seminar on Impact of ICT on College libraries, Jalgaon.

- David, T. L. (2001). ICT for Library and Information Professionals: A Training Package for Developing Countries (ICTLIP). Retrieved from e-Library Download Page: http://www2.unescobkk.org/elib/publications/ictlip/ index.htm on dated 20 Apr 2013.

- Goswami, P. R. (2009). *Academic Librarianship in India: Exploring Strategic Intent and Core Competencies in the Present Era*. International Conference on Academic Libraries ICADL 2009. Retrieved from http://crl.du.ac.in/ical09/papers /index_files/ical-57_148_324_2_RV.pdf on dated 17 Sep 2013.

- IMPACTMAX. (2009). *Sharing Your Knowledge Base: Meet the User Needs, Think Beyond PDF's*. Retrieved from impactmax.wordpress.com/2009/03/22/sharing-your-knowledge-base-meet-the-users-needs-think-beyond-pdf on dated 3 Aug 2012.

- Information and Communication Technology. Retrieved from http://en.wikipedia.org/wiki/Information_and_communications_technology on dated 21 Feb 2012.

- Islam, Md. Shariful, & Islam, Md. Nazmul. (2007). Use of ICT in Libraries: An Empirical Study of Selected Libraries in Bangladesh. *Library Philosophy and Practice (e-Journal.) Paper 143*. Retrieved from http://digitalcommons.unl.edu/libphilprac/143 on dated 15 Jul 2012.

- Iwhiwhu, Basil, Enemute, Ruteyan, Josiah Oghenero, & Eghwubare, Aroghene. (2010). Mobile Phones for Library Services: Prospects for Delta State University Library, Abraka. *Library Philosophy and Practice 2010*.

- John Collins. (2010). Library as Place. Retrieved from http://www.gse.harvard.edu/ppe/enews/hihe/09hihe4/collins.html on dated 21 Mar 2012.

- John, W. C. (1995). *Magnetic Tape Storage and Handling: A Guide for Libraries and Archives*. Washington: The Commission on Preservation and Access.

- Karambelkar, Manjiri, Phugnar, Prashant, & Dahibhate, N. B. (2012). Emerging Technology Trends and its Benefits of the Academic Libraries (pp. 65–70). Presented at the International conference on Knowledge Management and Resource Sharing, Masqat.

- Limbachiya, Suresh. (2010). Outsourcing for Library and Information Services: An Idea. Retrieved from http://sureshlibrarian.wordpress.com/2010/01/26/outsourcing-for-library-and-information-services-an-idea/ on dated 8 Jun 2014.

- Microblogging. Retrieved from http://www.libsuccess.org/index.php?title=Microblogging on dated on dated 12 Sep 2012.

- Rajoli, Iqbalahmad U., Birdie, Christina, & Karisaddappa, C.R. (n.d.). Use of Resources through Consortia Made in Indian Library & Information Centers: A Case Study of FORSA Consortium (Vol. 50(2), pp. 74–82). Presented at the IASLIC Bulletin, 2005.

- Shahid, Syed Md. (2005). Use of RFID Technology in Libraries: A New Approach to Circulation, Tracking, Inventorying, and Security of Library Materials. *Library Philosophy and Practice*, *8*(1).

- Staley, D. J., & Malenfant, K. J. (2010). Future Thinking for Academic Librarians: Higher Education. *ACRL*. Retrieved from www.ala.org/ala/mgrps/divs/acrl/issues/value/futures.cfm on dated 17 Nov 2013.

- Susan, Mathew K. (2011). Impact of Information Communication Technology (ICT) on Professional Development and Educational Needs of Library Professionals in the Universities of Kerala.

- Tanenbaum, Andrew S, & Wetherall, David J. (2012). *Computer Networks* (5th Ed). New York: Pearson Education.

CHAPTER 5

NETWORKS PREREQUISITES

5.1 Introduction:

A network comprises of computing devices connected together to achieve information and resource sharing that naturally leads to collective intelligence in the most cost effective manner. Traditional notion of networking implies design, development, prototyping, management, configuration and maintenance which increasingly scale up with its age. A network consists of two or more computers that are linked in order to share resources such as data, printers and other hardware devices. Computers (nodes, links) connected through cables, telephone lines, radio waves or satellites (Infrared Light Beams), Wi-Fi etc. Typical constituents of a computer network are as follows:

- Server: A computer having relatively advanced technical specifications such as state of art processor, considerable memory and speed which can cater to the communication of the rest of the machines of the network.

- Client: The computers which are beneficiary of the services of the server. They generally have specifications relatively inferior to that of server.

- Network Interface Card (NIC): This is a hardware interface which enables connectivity over the network. In general the wired networks use 'Ethernet' interface, which the wireless makes use of wireless network card or the wireless USB adapter.

- Network Media: Connectivity between the network components and subcomponents is facilitated by the network media.

- Network Operating System (NOS): It is customary for the server of the network to have an operating system such as Linux or Windows NT which is capable of handling various communication aspects as well as the underlying protocols such as TCP/IP or 802.11b.

5.2 What is Network?:

There are different theoretical conceptions of the network as perceived from the scholarly literature. They are as follows:

- Collection of computers, printers and other equipment that is connected together so that they can communicate with each other.
- A set of software services accomplishing communication between computer systems.
- A telecommunications system, facilitating exchange of data.

In computer networks, networked computing devices transfer's data to each other along the data connections. The connections between nodes are established using either cable media or wireless media. The best-known computer network is the Internet. Typical applications of the computer networks are:

- World Wide Web (WWW) which itself has come out with rich source of information
- Shared use of application and storage servers offering cost effectiveness
- Resource sharing of hardware such as printers
- Online services and transformation of traditional services to on-line paradigm such as online fax
- Email and instant messaging applications

The recent transmutation of computer networks towards web2.0 and social media has opened yet another door of opportunity especially for the management professionals and B-schools.

5.3 Advantages and Disadvantages of Networking:

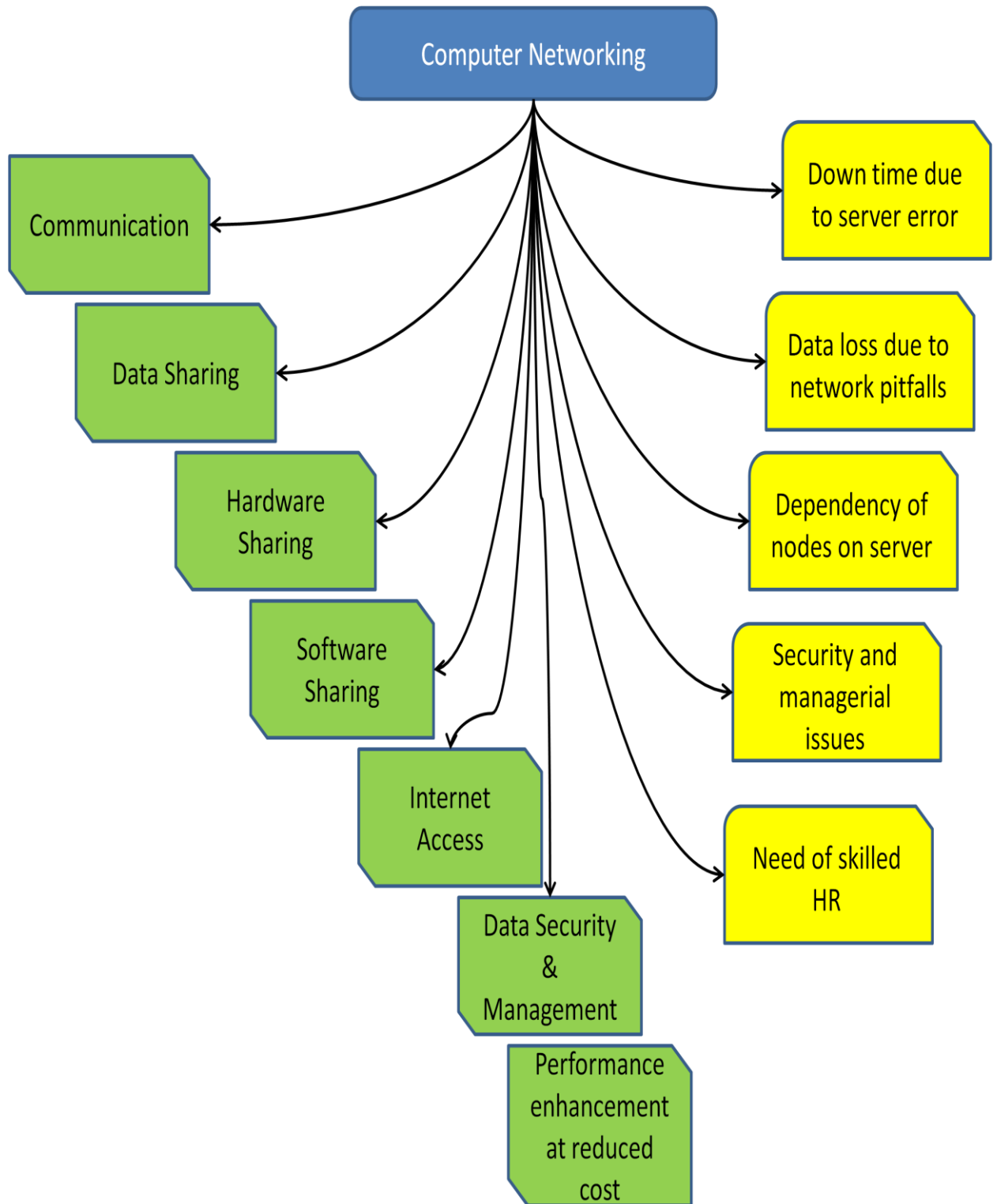Various dimensions of the computer networking wling with their pros and cons have been presented in Figure 5.1.

Figure 5.1 Visualizing Various Dimensions of Computer Networking (Green colour indicates positive while the yellow colour indicate negative aspects)

5.4 Software and Hardware Components:

Computer software is basically listing of instructions to accomplish an intended task. In contrast with software, computer hardware comprises of the physical components. Third and most vital part pertaining to the computer system is the human ware without which the system can't be meaningfully put to the task. There are three types of software viz. system (to aid the operating system), operating system (umbrella underneath other software operate) and application (tools and utilities for the benefit of the user).

Computer hardware is the collection of physical elements that constitutes a computer system. Computer hardware refers to the physical parts or components of a computer such as the monitor, mouse, keyboard, computer data storage, and hard drive disk (HDD), system unit (graphic cards, sound cards, memory, motherboard and chips), etc. The different hardware components are: motherboard, Central Processing Unit (CPU), Random Access Memory (RAM), Power Supply Video Card, Hard Disk Drive (HDD), Solid-State Drive (SSD), Optical Drive (e.g. BD/DVD/CD drive), and Card Reader (SD/SDHC, CF, etc.) some hardware which are connected outside the computers are: Monitor, Keyboard, Mouse, Battery Backup (UPS), Printer and Speakers. Other less common hardware are Sound Card, Network Interface Card (NIC), Expansion Card (Firewire, USB, Thunderbolt, etc.), Hard Drive Controller Card, Analog Modem, Scanner, Floppy Disk Drive, Joystick, Webcam, Microphone, Tape Drive, Zip Drive.

5.5 Pre-requisites for Developing Networks:

The independent at computer workstations to take part in networks need additional hardware and software to joint in networks need additional hardware and software to joint in networks. e.g. NIC card and protocols etc. But the basic hardware and software needs advanced configuration to work effectively and efficiently in networks. To avail the benefits of the resource sharing there is a need to have either centralized institutional network or library network to circulate the data among the end users. There is a need to understand the requirements and the importance of the components required and its functions and operations to library professionals. For the development of any network the major requirements necessary are hardware, software, netware hardware and software, skilled and potential manpower, use of protocols, security and maintenance of network, architecture or structure and type etc. The following paragraphs describe the different elements required in network with its function and role performed in network.

In brief following components are basically required in developing networks.

1. Basic and advanced hardware (workstations) and software, operating system (UNIX, LINUX)
2. Network Operating System (NOS)
3. Network hardware
4. Communication media
5. General software requires for working in network architecture, network environment
6. Skilled and professional human ware
7. Network protocols
8. Network security issues and maintenance issues (AMC)

5.5.1 Basic Hardware:

In networks there is need of advanced hardware which can hold maximum information in its storage unit like sang and high speed to retrieve the data from the huge storage of information. For this purpose in networks it is recommended that high and hardware configured hardware popularly called as workstation with high speed and capacity storage areas are required as well as internet connectivity for downloading data from various workstation.

In addition to hardware along with normal operating system in networks network operating system like Windows NT is necessary. Similarly there is a need of having different software's taking care of security of networks and freely downloaded software's for different uses. Thus system software, programming software, application software and utility software are required to manage the network effectively.

5.5.2 Network Operating System (NOS):

Network Operating System (NOS) is essential that runs on a server to manage data, security, users, groups, applications and other networking functions. Network operating system shares files and printer to access among multiple computers in a network. Network operating systems are based on client server architecture to share resources. Windows NT, Windows XP, Windows 2007, Linux, UNIX and Netware are few Network Operating System (NOS). NOS support hardware likes printers, used for backup, share files, remote access, and security etc. Netware is a computer network operating system

developed by Novell, Inc. It initially used cooperative multitasking to run various services on personal computers. Netware emphasizes file and print serving capabilities, and the predominant use of Netware is as a LAN server.

5.5.3 Network Hardware:

Network hardware is nothing but network equipments and network devices which are responsible for transmitting data and facilitating the operations of a computer network. Network contains hardware components to complete operations of a network system e.g. Network Interface Cards (NICs), Hubs, Bridges, Switches and Routers etc. a brief account of hardware components is discussed in following chapters.

A. Network Interface Cards (NICs):

To joint computers in networks NIC is more important compact reside on mother board. NIC works in physical link layer and data link layer of the OSI model. The most common NIC is Ethernet. Wired and wireless are the two types of network interface cards. Wired NIC uses cables and connectors as a medium to transfer data. In wireless card, the NIC connection is made using antenna. NIC has different speeds like 10 Mbps, 100 Mbps, and 1000 Mbps and so on. Now speed is also available in Gigabits.

Figure 5.2: Network Interface Card (NIC)

(Source: http://www.supermicro.com/products/nfo/networking.cfm)

B. Hubs:

Hub is nothing but equipment which act as distribution center device and splits into multiple computers. This network interface devices use for Local Area Network (LAN) connectivity. Hubs received the requests send by the specific computers from network and transmit it to the entire network. Hubs allow Ethernet wired connections and have minimum 4 to 5 ports and maximum 12 or more than 12 ports also. Hubs use broadcasting method for sending data to all the networks

Figure 5.3: Hub: Eight Port

(Source: http://www.omnisecu.com/basic-networking/network-infrastructure-devices-what-is-a-hub.php)

C. Bridges:

A bridge is a device that filters data traffic at network boundary. Bridges reduce the amount of traffic on a local area network (LAN) by dividing network into two segments. Bridge allows segmenting a large network into two smaller and becomes more efficient networks. A bridge can connect the two networks. A bridge monitors the information traffic on both sides of the network so it can pass packets of information to the correct location. The bridge can inspect each message and if required broadcast it on the other side of the network. The bridge manages the traffic to maintain optimum performance on both sides of the network. Bridge is like a traffic controller at a busy intersection during

rush hour. It keeps information flowing on both sides of the network, but it does not allow unnecessary traffic through. Bridges can be used to connect different types of cabling, or physical topologies. Bridges are used between networks with the same protocol. Bridges operate at the data link layer (Layer 2) of the OSI model. Bridge has only few ports and connects only few collision domains, or Hosts. A Bridge has comparatively less ports than a Switch. A Switch has usually 24 ports or 48 ports also.

Figure 5.4: Wireless Ethernet Bridge

(Source:

http://compnetworking.about.com/od/hardwarenetworkgear/ss/wirelessadapter_4.htm)

D. Switches:

Switch acts as hub but with advanced features. Switch is a telecommunication device grouped as one of computer network components. It uses physical device addresses in each incoming messages so that it can deliver the message to the right destination or port. Switch connects the source and destination directly which increases the speed of the network. Both switch and hub have common features: Multiple RJ-45 ports, power supply and connection lights. An Ethernet switch is a device that provides a central connection point for cables from workstations, servers, and peripherals. In a star topology, twisted-

pair wire is run from each workstation to a central switch/hub. Most switches are active, that is they electrically amplify the signal as it moves from one device to another.

Figure 5.5: 24 Port Switch.

(Source: http://www.omnisecu.com/basic-networking/network-infrastructure-devices-what-are-bridges-and-switches.php)

Difference between Network Switches and Bridges:

Network switches and bridges are both operated at Data Link Layer (Layer 2) of the OSI reference model. Both serve similar functions in OSI Layer 2. But switches are considered as superior devices than bridges.

E. Repeaters:

A repeater is a network device that retransmits the signal and extended geographical or topological network boundary than what would be capable with the original signal. Repeater is a device which electrically amplifies the signal it receives and rebroadcasts it. Repeaters can be separate devices or they can be incorporated into a concentrator. Repeater works on the physical layer of OSI model. They used when the total length of network cable exceeds the standards set for the type of cable being used. A repeater ensures the remote device receives a clear, strong copy of original signal.
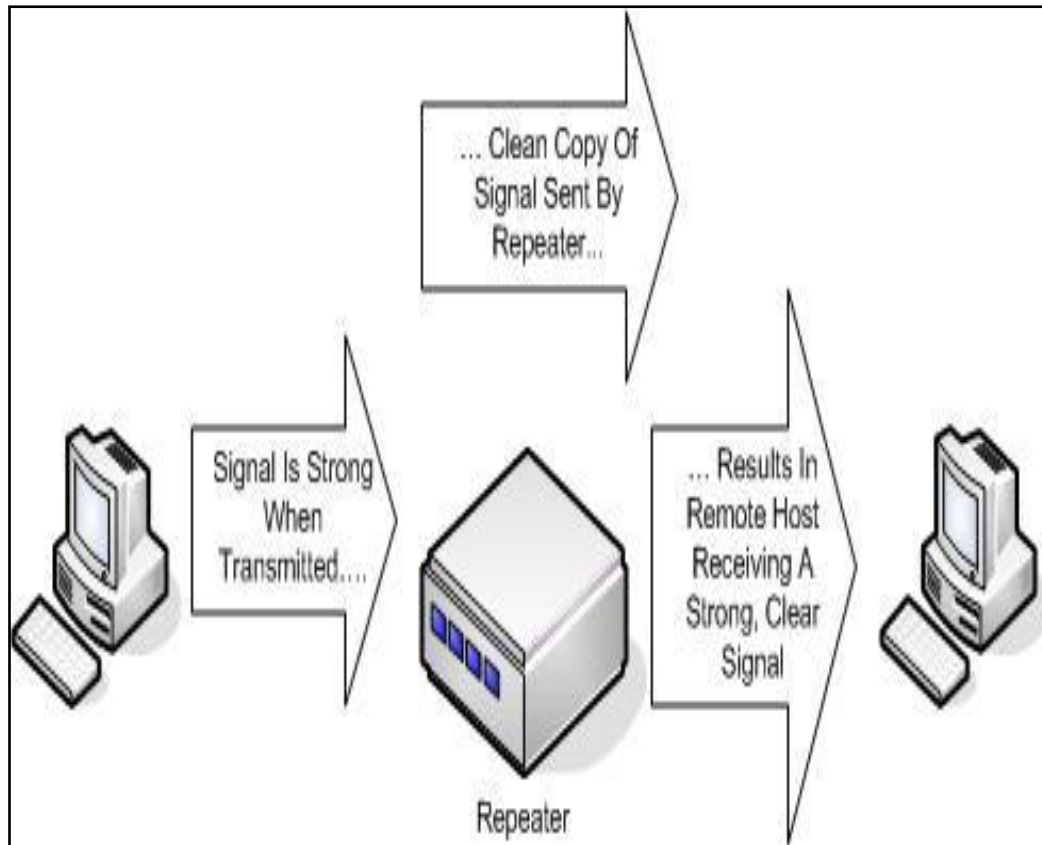
Figure 5.6: Repeater

(Source:http://www.thebryantadvantage.com/CCNACCENTCertificationTrainingHubsCo

llisionDomains.htm)

F. Routers:

Router is a device used to connect a LAN with an internet connection called
Router. Routers communicate and forward network packets out of or into a
network. Routers receive incoming data packets, identify their addressing
information and send them accordingly. It is used for managing traffic in network.
It functions at network layer of OSI model. A router uses a combination of
hardware and software to "route" data from its source to its destination. A router
can be configured to route data packets from different network protocols, like
TCP/IP (industry standard), IPX/SPX, and AppleTalk. Routers assign the IP
address for static and dynamic, implement security protocols. Routers move
network packets from one network to another, and many can convert from one
network protocol to another as necessary. Routers select the best path to route a
message, based on the destination address of the packet. The router can direct

traffic to prevent head-on collisions, and is smart enough to know when to direct traffic along back roads and shortcuts.

Figure 5.7: Router

(Source: http://www.omnisecu.com/basic-networking/network-infrastructure-devices-what-is-a-router.php)

G. Gateways:

Gateway is a meeting point between two different networks, using different protocols. Two different networks use different protocols and they can communicate with each other. A network gateway can be implemented completely in software, completely in hardware, or as a combination of both. Depending on the types of protocols, network gateways operate at any level of the OSI model. Gateway translate request with other machines language without changing their protocols. In enterprises, the gateway node often acts as a proxy server and a firewall. The gateway is also associated with both a router, which use headers and forwarding tables to determine where packets are sent, and a switch, which provides the actual path for the packet in and out of the gateway. The default gateway often connects a local network to the Internet, although internal gateways for local networks also exist.

Internet default gateways are generally of two types: 1) Networks with a broadband router to share the internet connection, the home router serves as the default gateway. 2)

Networks without a router, such as for residences with dialup internet access, a router at the internet service provider location serves as the default gateway.

Default network gateways can also be configured using an ordinary computer instead of a router. These gateways use two network adapters, one connected to the local subnet and one to the outside network. Either routers or gateway computers can be used to network local subnets such as those in larger businesses.

H. Modems:

Modem is used as a converter or translator as it name indicates. It allows digital information or data to transmit over analog media like telephone line. Modem is mixture of two functions modulate and demodulate. It converts digital signals to analog form, sends it to the analog medium and the codes back into its digital form at the receiving end. Hence it is called modulation and demodulation (MODEM). Voice band modem is most familiar example of modem. It turns the digital data of a personal computer into modulated electrical signals in the voice frequency range of a telephone channel. These signals can be transmitted over telephone lines and demodulated by another modem at the receiver side to recover the digital data.

Figure 5.8 Modem

(Source: http://thegadgetsquare.com/1117/what-is-modem-and-types-of-modems)

There are fundamentally three types of modems viz. internal (that comes as built-in peripheral with a OC or laptop), external such as the ADSL that offers capability of broadband over simple copper cables and PC Card Modem essentially combination of

above duo. Dial up and Wi-Fi (Wireless are two internal types of modems. PC Card modem is a combination of internal and external modems.

5.5.4 Network Cabling:

Cables are the medium to connect network devices to each other and move the information one device to other. There are different types of cables like coaxial cable, twisted cable, optical fiber cable etc. the cables are used depending on the networks type, topology, protocols and the size of networks. The cables are used depending on nature of network.

A. Twisted Cable:

Twisted pair cable is the most widely used cable in a local area network. In twisted pair wire pairs are twisted together for the purpose of canceling out electromagnetic (EMI) field from other wire pairs and also from external sources. Shielded Twisted Pair (STP), Unshielded Twisted Pair (UTP) and foil are the tree types of twisted pair cables. Modern Ethernet cables use UTP wiring due to its lower cost, while STP cabling can be found in some other types of networks such as FDDI.
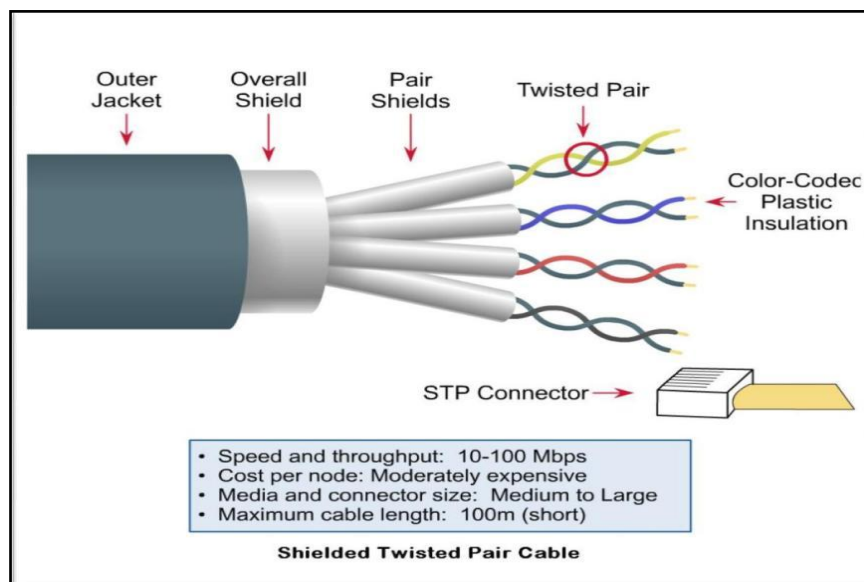

Figure 5.9: Twisted Cable

(Source: http://simuncettnakcakapp.blogspot.in)

Twisted pair cable consists of two strands of insulated copper wire, twisted around each other. This twisted pair configuration some-what reduces interference from electrical field. Data is transmitted through electric signal.

B. Coaxial Cable:

Coaxial cable has a single copper conductor at its center. A plastic layer provides insulation between the center conductor and a braided metal shield. The metal shield helps to block outside interference from fluorescent lights, motors, and other computers signals. The transmission of energy in the line occurs totally through the dielectric inside the cable between the conductors. Coaxial lines can therefore be bent and twisted (subject to limits) without negative effects, and they can be strapped to conductive supports without inducing unwanted currents. This type of cabling is costlier then twisted pair but advantage is less noise.
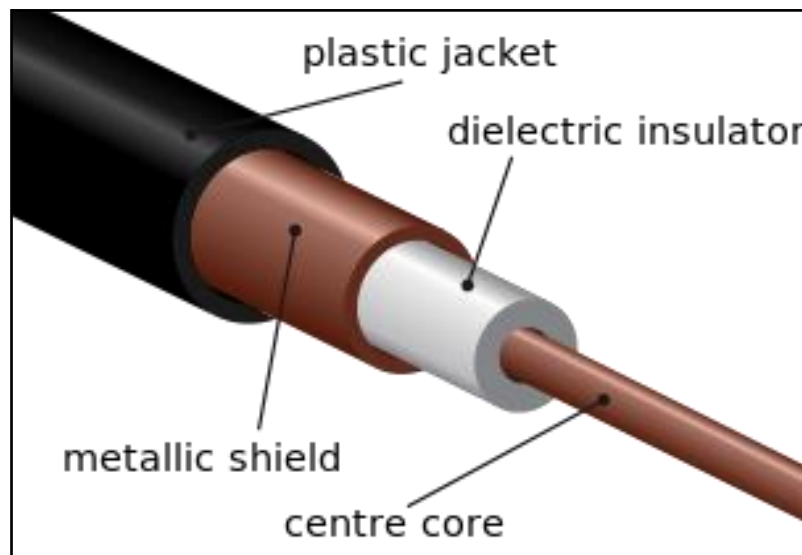
Figure 5.10: Coaxial Cable

(Source: http://en.wikipedia.org/wiki/Coaxial_cable)

C. Fiber Optic Cable:

A Fiber optic cable consists of a center glass core surrounded by several layers of protective materials. It is expensive but has higher bandwidth and can transmit data over longer distances with speed. Fiber optic cable has the ability to transmit signals over much longer distance than coaxial and twisted pair. It has also the capability to carry information at greater speeds. This capacity enhances communication and possibilities to

include services such as video conferencing and interactive services. The cost of fiber optic cable is comparable to copper cabling. However, it is more difficult to install and modify. In this cabling noise is reduced and message is sent error free at faster speed.
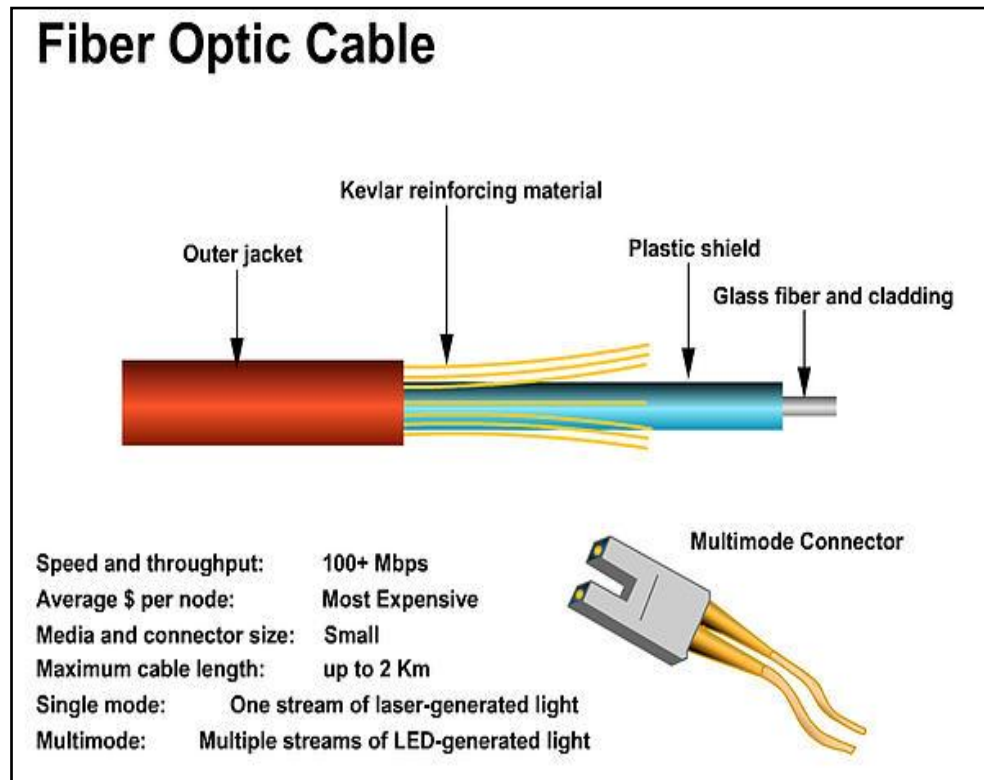
Figure 5.11: Fiber Optic Cables

(Source: http://www.technoriya.in/fiber.php)

D. Ethernet Cable:

Ethernet cable is very popular network cable and used for wired networks. This cable is used to connect computing devices together, hubs, switches, routers etc. A single Ethernet cable, looks like an electric power cord, can extend only limited distances due to their electrical transmission characteristics. Ethernet cables normally support one or more industry standards including "Category 5" (CAT5) and "Category 6" (CAT6).

Figure 5.12: Ethernet Cable

(Source: http://www.cablewholesale.com/products/network-phone/cat-5-e-stp-cables/product-10x6-56103.php)

E. Patch Cord Cable:

A patch cable is an electrical or optical cable used to connect one electronic or optical device to another for signal routing. Different types of devices like switch and router are connected with patch cords. Patch cords are usually produced in many different colors so as to distinguish easily. These are relatively short, perhaps no longer than two meters. Types of patch cords include microphone cables, headphone extension cables, XLR connector, Tiny Telephone (TT) connector, RCA connector and ¼" TRS phone connector cables (as well as modular Ethernet cables), and thicker, hose-like cords (snake cable) used to carry video or amplified signals. However, patch cords typically refer only to short cords used with patch panels.

A patch cord is always fitted with connectors at both ends. A pigtail is similar to a patch cord and is the informal name given to a cable fitted with a connector at one end and bare wires at the other.
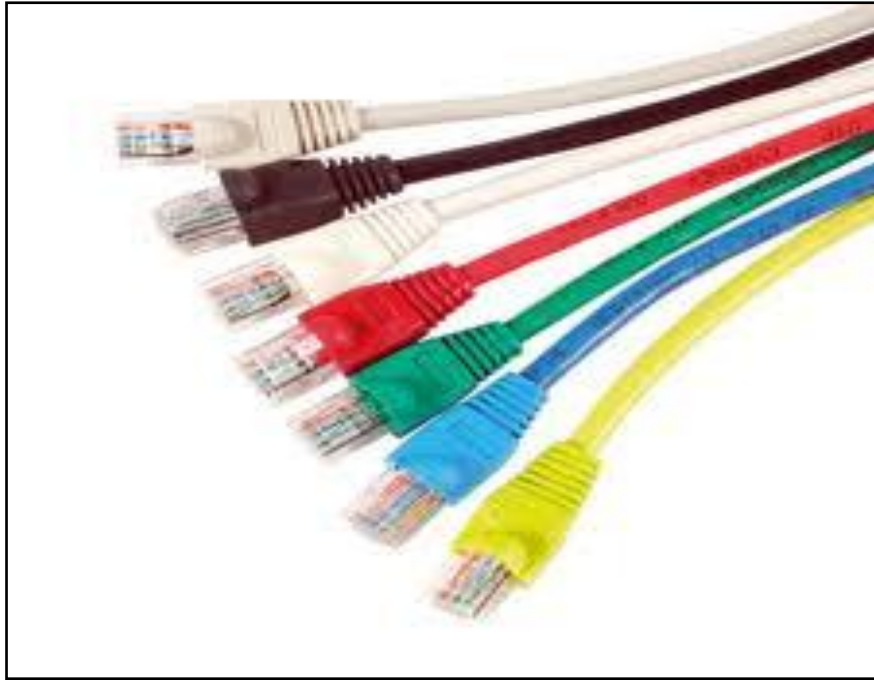
Figure 5.13: Patch Cables

(Source: http://www.videk.co.uk/section.php/178/1/booted-cat5e-utp-patch-cables)

5.5.5 Network Protocols:

Network protocols are nothing but a set of rules and communicate between network devices and generally packet switching techniques uses for sending and receiving messages. It includes mechanism to identify and make connections with each other devices also specify that how data is packaged into messages send and received. Some protocols support data compression and acknowledgement for network communication. Every network is designed for the specific purpose and environment. The different protocols used in networks are briefed under.

A. Transmission Control Protocol and Internet Protocol (TCP/IP):

Transmission Control Protocol and Internet Protocol (TCP and IP) are two distinct network protocols but they are commonly used together. TCP/IP is a communication protocol used to connect host on the Internet. TCP/IP has two layer programmes higher layer is Transmission Control Protocol, which manages the file or message into small packets and transmit over the internet and received by a TCP layer and reassembles the packets into the original message. Lower layer is Internet Protocol, which handles the address part of each packet. TCP/IP is build into the UNIX operating system, and uses the

145

client / server model for communication. TCP/IP provides end-to-end connectivity specifying how data should be formatted, addressed, transmitted, routed and received at the destination. This functionality has been organized into four abstraction layers which are used to sort all related protocols according to the scope of networking involved. Braden (1989).

B. Hyper Text Transfer Protocol (HTTP):

Hyper Text Transfer Protocol (HTTP) allows users to exchange information with each other, and found on web page. HTTP is an application protocol for distributed, collaborative, hypermedia information systems. HTTP is the foundation of data communication for the World Wide Web. It is used in client – server protocol computing model, client submit HTTP request message to the server and server provides resources or reply to the client.

C. File Transfer Protocol (FTP):

FTP is a simple network protocol based on Internet Protocol. It is used to transfer computer and web page files between two and more computers on the internet. FTP uses separate control and data connections between the client and the server. FTP users may authenticate themselves using a clear-text sign-in protocol, normally in the form of a username and password. FTP is often secured with SSL / TLS (FTPS). SSH File Transfer Protocol (SFTP) is sometimes also used instead, but is technologically different. FTP supports two modes of data transfer, plain text (ASCII) and binary text.

D. Simple Mail Transfer Protocol (SMTP):

SMTP is a standard network protocol used for transmitting e-mail messages between servers on the internet. It is a set of commands which authenticate and direct the transfer of electronic mail. When people set up their email programs, they typically have to give the address of their internet service provider's SMTP server for outgoing mail. There are two other protocols - POP3 and IMAP - that are used for retrieving and storing email.

When configuring the settings for e-mail program, usually need to set the SMTP server to local Internet Service Provider's SMTP settings (i.e. "smtp.yourisp.com"). However, the incoming mail server (IMAP or POP3) should be set to mail account's server (i.e. hotmail.com), which may be different than the SMTP server. SMTP servers look at the destination address of a message and the contact target mail server directly. Domain Name Server (DNS) has to be configured correctly otherwise mail could be handled to the wrong server-potentially a big problem.

E. OSI Reference Model:

The Open Systems Interconnection (OSI) is a conceptual model that characterizes and standardizes the internal functions of a communication system by partitioning it into abstraction layers (Wikipedia). OSI reference model is the primary model for network communications. It allows viewing the network functions that occur in each layer. In OSI reference model, there are seven layers which reduces complexity, standardizes interfaces, accelerates evaluation, facilities modular engineering, simplifies teaching and learning and ensures interoperable technology. OSI layers breaks network communication into smaller, simple parts allows different types of network hardware and software to communicate with each other. It standardizes network components to allow multiple-vender development and support and it prevents changes in one layer from affecting the other layers and breaks network communication into smaller parts to make learning it easier to understand. The different layers and their roll are given in the Figure 5.14.

Figure 5.14 is a schematic diagram showing different layers of OSI standard reference model with its function. Every layer has it definite equipments and functions to play which are described in following paragraphs.
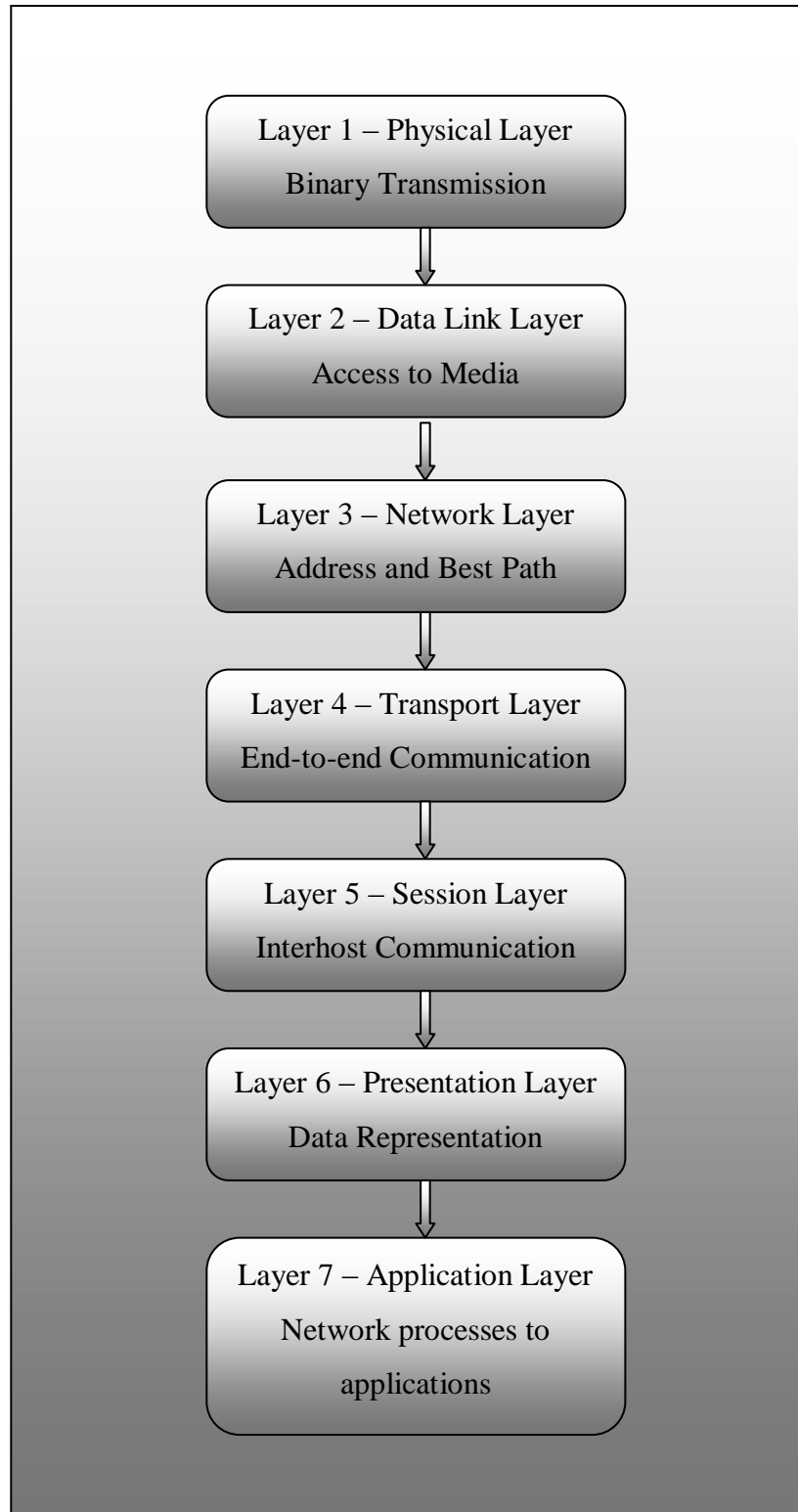
Figure 5.14: OSI Reference Model

Layer 1 - Physical Layer:

The physical layer is a medium to transfer a data from one computer to another. The physical layer defines the electrical, mechanical, procedural and functional specifications for activating, maintaining, and deactivating the physical layer between end systems. Voltage levels, physical data rates, maximum transmission distance, physical connectors are the characteristics of this physical layer. It transmits raw bit stream over physical cable, cards and physical aspects. The main function of physical layer is encoding and signaling, physical data transmission, hardware specifications, topology and design. Copper based cable, fiber cables are used in data networking. Physical layer encodes the binary data into electrical form. Hardware devices like hubs / connectors, repeaters, NICs, and LAN and WAN interfaces such as RS-232, HDLC and Frame Relay. EEE 802, IEEE 802.2, ISO 2110, ISDN are the protocols uses in physical layer.

Layer 2 - Data Link Layer:

The data link-layer protocol provides an interface between the physical network and the protocol stack on the computer. In data link-layer protocol packets are transmitted across the network, packets are transmitted to the next node. It is responsible for controlling access to the shared medium and preventing an excess of collisions. It handles data frames between network layer, physical layer and it receives end packages raw data from the physical layer into data frames for delivery to the network layer. Media access control, logical link control, addressing error detection and handling, data framing, defining requirements of physical layer are the main functions of data link layer. Switches and Bridges devices are uses in this layer. Protocols uses in data link layers are IEEE 802.2, Ethernet, Token Ring, FDDI, ATM, PPP etc.

Layer 3 – Network Layer:

The network layer is complex layer that provides connectivity and path selection between two host systems that can be located in different networks. The network-layer protocol is responsible for the transmission of packets from source to destination. It accepts data from the transport layer and packages into a datagram by adding its own header. The network-layer protocol performs the functions like Routing, Fragmenting, Error Checking, Transport-layer protocol identification. It translates logical network address and names to their physical address i.e. translate computer name to MAC address. The

functions of network layers are logical addressing, routing, datagram, encapsulation, fragmentation and reassembly, error handling and diagnostics etc. Protocols uses in network layers are IP, IPv6, IP, IPX (Internetwork Packet Exchange (Protocol), NAT (Network Address Translation), IPSec, Mobile IP, Routing protocols such as RIP (Routing Information Protocol) and BGP (Border Gateway Protocol), AppleTalk etc.

Layer 4 - Transport Layer:

It manages the flow control of data between networks and provides flow control and error handling. The transport-layer protocols only operate on the two end systems. The main function of the transport-layer protocol is to identify the upper-layer processes generate the message at the source system and that receives the message at the destination system. The functions of transport layer are error detection and correction, flow control, packet acknowledgement, and other connection-orientation services. The transport layer provides different level of services like packet acknowledgement, guaranteed delivery flow control, and end-to-end error checking. Protocols uses in transport layer are TCP, NETBEUI (NetBIOS Extended User Interface) and UDP etc.

Layer 5 – Session Layer:

This layer provides services to the presentation layer. The session layer controls the connection between computers. The main function of session layer is to exchange message between two connected end systems, called a dialog. It provides for full-duplex, half-duplex, or simplex operation, and establishes check pointing, adjournment, termination, and restart procedures. Protocols uses in session layers are SQL, NetBIOS, Sockets and RPC etc.

Layer 6 - Presentation Layer:

The main function of this layer is data translation, compression and encryption. This layer translates between multiple data formats by using a common format. The presentation layer establishes context between application-layer entities, in which the application-layer entities may use different syntax and semantics. This layer provides independence from data representation (e.g., encryption) by translating between application and network formats. The presentation layer transforms data into the form that the application accepts. This layer formats and encrypts data to be sent across a network. It is also called as syntax

layer. This layer includes GIF, TIFF, JPEG, SSL, Shells and Redirectors MIME protocols.

Layer 7 - Application Layer:

The application layer acts as user interface, which provides network services to the user applications and is responsible for displaying data and images to the user and to interface with the presentation layer. It does not provide services to any other OSI layer. Users access information on the network through an application. It allows to access network services to support applications, handles network access, flow control and error recovery. Application-layer functions typically include identifying communication partners, determining resource availability, and synchronizing communication. Protocols used in this layer are Telnet, File Transfer Protocol (FTP), and Simple Mail Transfer Protocol (SMTP), DNS, NFS (Network File System), HTTP etc.

5.5.6 Architecture of Networks:

Network architecture is related to design of a network which is a framework of physical components and their functional organization and configuration in it. The different types of architecture are used based on the functionality of the network. Client-Server architecture and Peer-to-Peer architecture are the two types of architecture. In client server architecture, all client computers are connected to the server computer. Client – server model provides a convenient way to interconnect the programmes efficiently at different locations. A server computer delivers and manages the resources and services. More than one client computers are connected to the server. Client computers make the request to server and server sends answer to the client computers to fulfill their request. In peer-to-peer network every computer in network plays the role of client as well as server at the same time. In P2P network every computer can upload and download at the same time, it's a very easy to add any node / computer in networks. Each node has equivalent capabilities and responsibilities they can communicate directly with each other. It is very common and easy architecture of networks.

The different types of architecture are used based on the functionality of the network. Client-Server architecture and Peer-to-Peer architecture are the two types of architecture. In client server architecture, all client computers are connected to the server computer. Client – server model provides a convenient way to interconnect the programmes efficiently at different locations. A server computer delivers and manages the resources

and services. More than one client computers are connected to the server. Client computers make the request to server and server sends answer to the client computers to fulfill their request. In peer-to-peer network every computer in network plays the role of client as well as server at the same time. In P2P network every computer can upload and download at the same time, it's a very easy to add any node / computer in networks. Each node has equivalent capabilities and responsibilities they can communicate directly with each other. It is very common and easy architecture of networks.

A. Peer-to-Peer:

A Peer-to-Peer network has no dedicated servers. Many workstations are connected together for the purpose of sharing information or devices. All the workstations are considered equal. Any one computer can act as client or server at any instance. This network is ideal for small networks where there is no need for dedicated servers, like home network or small business establishments or shops. Microsoft used the term for peer-to-peer network is "Workgroup". Typically a Workgroup contain less than 10 workstations. Normal workstation operating systems are Windows 95/98 (obsolete), Windows ME (obsolete), NT Workstation (obsolete), Windows 2000 professional (obsolete), Windows XP, Vista, Windows 7, Windows 8, RHEL Workstation etc.
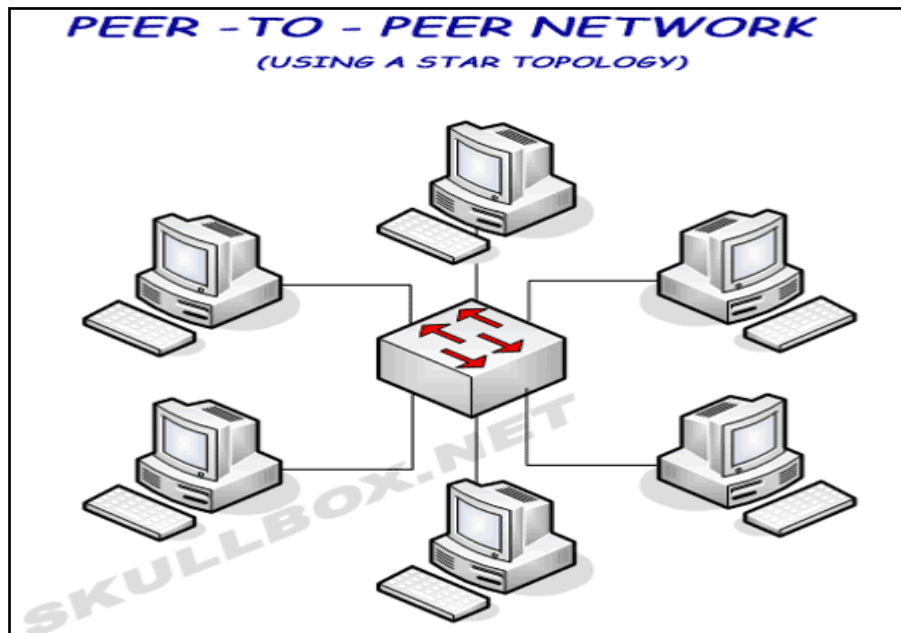

Figure 5.15: Peer to Peer Network

(Source: http://www.skullbox.net/ntoplogy.php)

Peer-to-peer is an alternative network models that provide by traditional client-server architecture. P2P networks use a decentralized model in which each machine, referred as to as peer, functions as a client with its own layer of server functionality (Intel Magazine 2012). At the same time a peer plays the role of a client and a server. i. e. in P2P architecture, each workstation or node has the same capabilities and responsibilities. It is often compared and constructed to the classic client/server architecture, in which some computers are dedicated to serving others. The peer node can requests to other peer node and at the same time respond to incoming requests from other peers on the network. P2P network improves and increase the number of peers is added to the network. Peers can organize themselves into ad-hoc groups as they communicate, collaborate and share bandwidth with each other to complete the tasks at hand (e.g. file sharing). Each peer can upload and download at the same time, and in a process like this, new peers can join the group while old peers leave at any time. This dynamic re-organization of group peer members is transparent to end-users. P2P network may use a single software program to design and developed a program or work done in network. (Cory Janssen).

Peer-to-Peer (P2P) Advantages and Disadvantages:

Advantages:

1. Peer to peer network is that it is easy to install and configure.
2. It is easy to set up, so it takes less time for configuration and implementation.
3. Every nodes in P2P networks act as server as well as client, i.e. all resources are shared by all the peers.
4. The overall cost of installing, maintaining setup is very less, due to this P2P is less expensive network.
5. In P2P networks, all nodes are server and client; in this case central dependency is eliminated failure of one node is not affects the functionality of other peers in network.

Disadvantages:

1. Lack of security is main advantage of P2P network.
2. Network security is applied on each and every node.
3. Backup and data recovery is difficult.

4. Backup facility is also applied for every node separately.

5. A computer can be accessed anytime.

6. Accessing a data from different nodes is difficult to manage and control.

7. Separate user-id and password uses on each computer in network.

B. Client-Server:

The client/server model consists of high-end servers serving clients continuously on a network, by providing them with specific services upon request. The role of different servers is:

- File Server: Used to store the client documents and files centrally. An ideal file server and should have a large storage of memory for storing various data, fast hard-disks, multiple processors, fast network adapters, redundant power supplies etc.

- Print Server: These redirects print jobs from clients to specific printers in network.

- Application Server: Allows clients to run certain programs on the server, and enables multiple users to access common applications across the network. Typically application servers run business logic.

- Database server: Allows authorized clients to view, modify and/or delete data in a common database. Examples of Database Management Systems are Oracle 8i/9i/10g, MS SQL Server 2000/2005/2008/2012, IBM DB2, MySQL etc.

- Directory Servers: Allows the central administration of users and resources, e.g. Active Directory, NDS (Novell Directory Services), Fedora Directory Server, OpenLDAP etc.
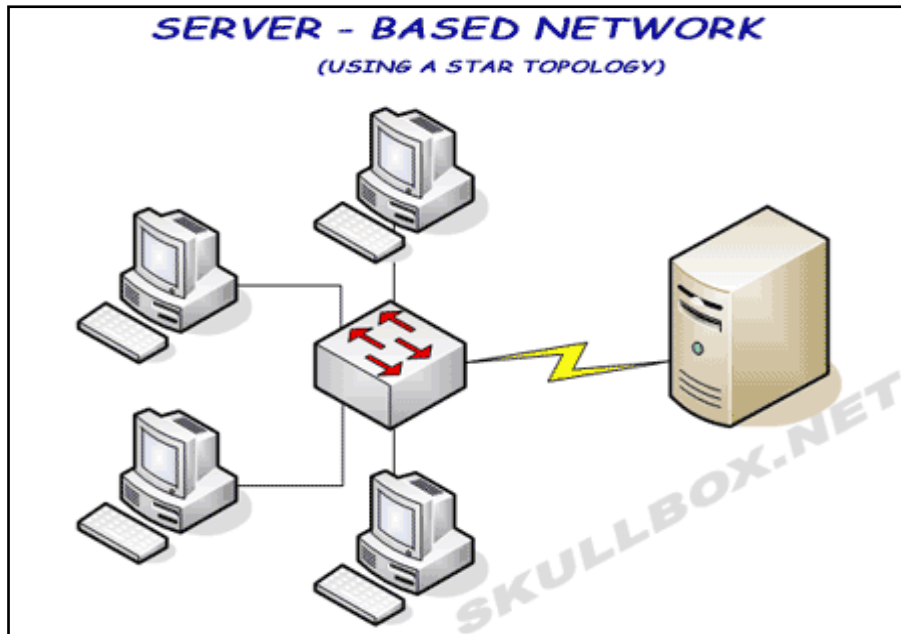
Figure 5.16: Server based / Client-Server Network

(Source: http://www.skullbox.net/ntoplogy.php)

In client-server architecture, each computer or process on the network is either a client or one of them is a server.

Advantages:

1. It helps to create centralized database because all the data is stored on the servers.

2. Updating and maintaining of databases is done from one computer so it is easy to work.

3. Data back-up and recovery is easily possible.

4. Changes, addition and updating can be made easily on the server.

5. From various platforms in the network data can be access, server can be accessed remotely.

6. New information is uploaded in database, it's easily access from client computers

7. Each workstation in network need not have to increase its own storage capacity.

However the disadvantages of this architecture are: Data can access from central place only, it takes time to share data with each other.

5.5.7 Network Topology:

Topologies are an important part of network design. Network topology is the physical and logical arrangement of a computer networks, it is a layout of connected devices. Devices, cables, various network hardware components are part of physical topology whereas data flow, data storage in network is the logical topology. There are different network topologies, and a network may be design using multiple topologies also different types of network topologies are summarized in brief.

5.5.7.1 Physical or geographical classification:

A. Point-to-Point Topology:

This is very simple topology used to link between two endpoints (computers). Circuit switching or packet switching technologies are used in a point-to-point circuit. Depending on its need it can be used and dropped if it is no longer needed. It is a basic mode of conventional telephony system.

B. Bus Topology:

All workstations / computers are connected sequentially to each other through a single cable (link). This cable is a common backbone or transmission line for every workstation in networks. Each workstation is directly connected to each other. It is very low cost, simple topology for a small network. It is very easy to use and simple to understand. Addition and removal of any workstation from a network is also very easy. The drawback of this topology is that it is slow, difficult for troubleshoots a bus and noise in communication is more. There are two topologies in bus, one is Linear Bus topology and other is Stratified Bus topology.
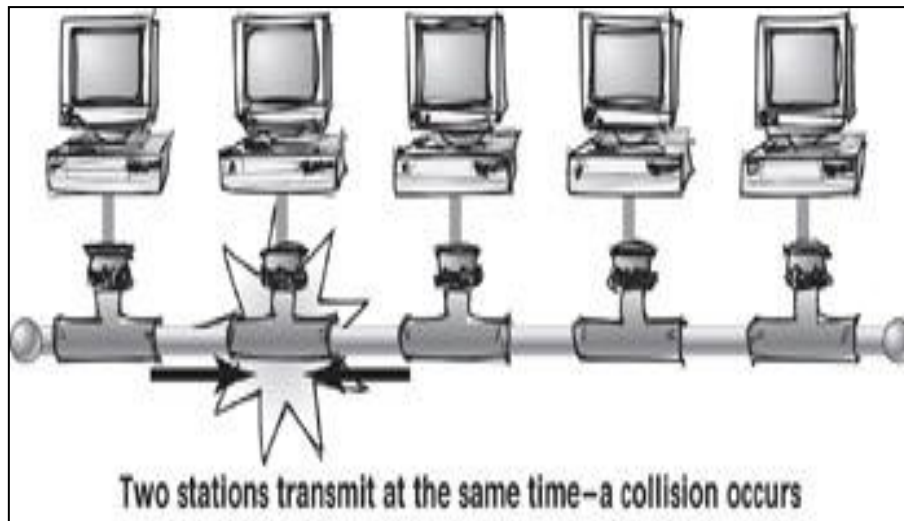
Two stations transmit at the same time—a collision occurs

Figure 5.17: Linear Bus Topology

(Source: http://flylib.com/books/en/2.284.1.107/1/)

BUS Topology

Figure 5.18: Bus Topology

(Source: http://cedtinet.blogspot.in/2013/06/bus-topology.html)
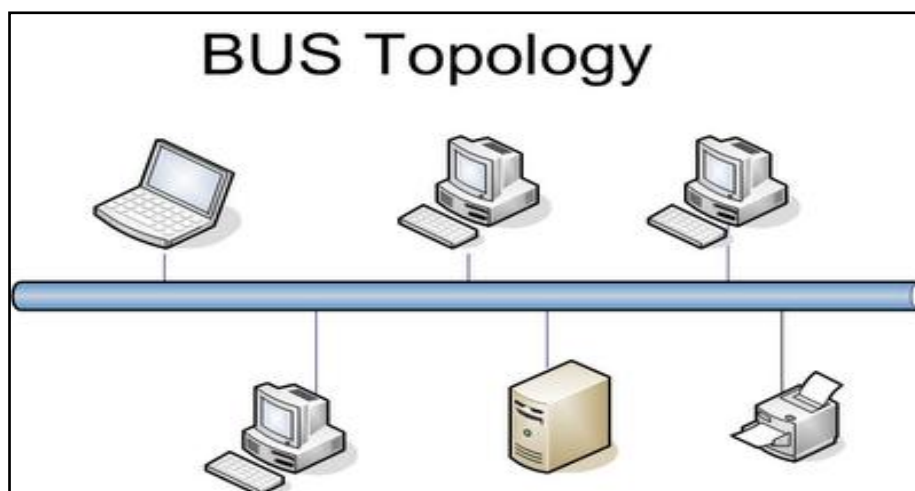
C. Ring Topology:

All workstations in this topology are connected with each other in a close loop, first node connect to the last node of the topology. In ring topology the data travels around the ring in one direction. Each workstation acts as a receiver for the incoming data and sender for sending a data to the next workstation. Failure of one computer in a ring affects the total

network, it is difficult to troubleshooting, adding and removing workstations in topology disturb the whole topology.
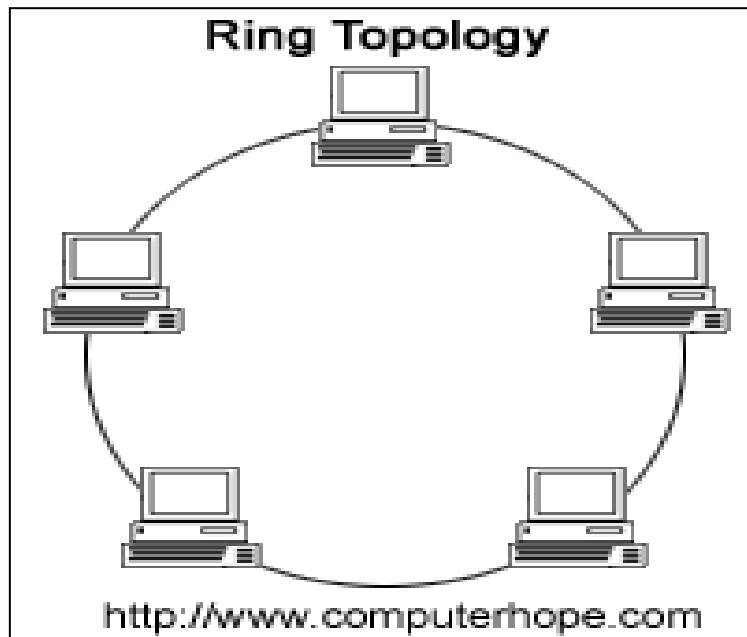

Figure 5.19: Ring Topology

Source: http://www.computerhope.com

D. Star Topology:

In star topology all nodes/ devices/ workstations and server are directly connected to central network hub, switch, or connector. The hub, switch, or concentrator controls and manages all functions of the network. It also acts as a repeater for the data flow. Twisted pair cable, coaxial cable or fiber optic cables are used for the configuration. Each computer in a star network is communicating with a central hub / switch / connector, which respond all the workstations in a network or only to the destination workstation. In star topology central hubs can be active or passive. Active hubs regenerate electronic signals and send to all the workstations in topology. Passive hub does not amplify or regenerate signal and does not require electrical power to run. This network can be expanded by placing another star hub. Star topology is easy to design and implement, install and wire, detect faults and remove parts, add or remove computers from topology. Even if single workstation fails, the complete network is not disturbing it works properly. But if the central hub fails, all workstations in topology fail. All the time data of member nodes to be updated in central node / hubs.
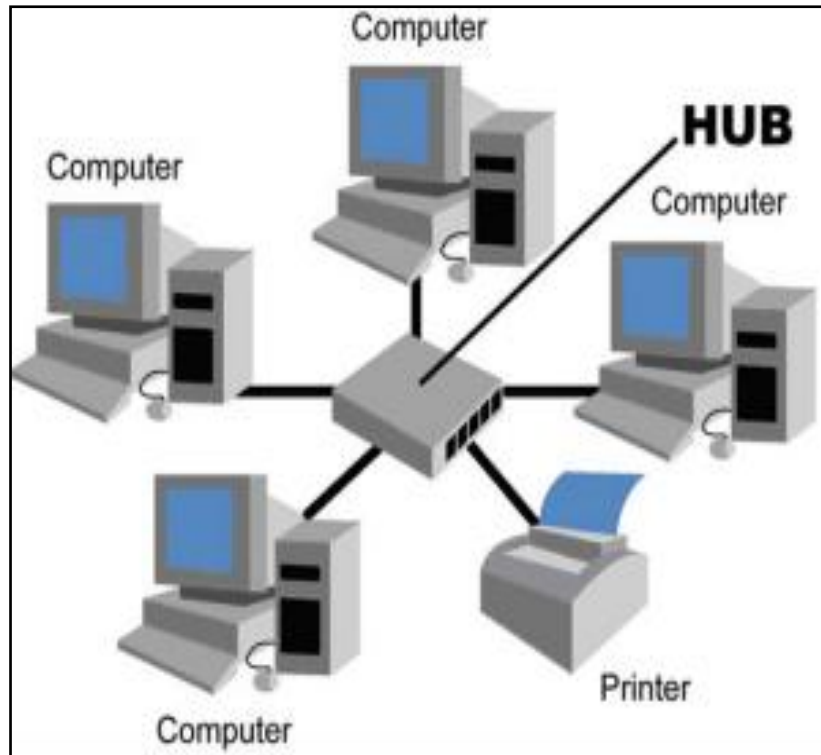
Figure 5.20: Star Topology

(Source: http://technologytwist.com/top-tips-to-choosing-a-network-topology)

E. Mesh Topology:

Each node in this topology is directly connected to all the other nodes in the network. When data or message sent on a mesh network, it takes any of possible paths from the source to destination. A mesh network where every workstation connects to every other workstation in networks is called a full mesh topology. In partial mesh topology some workstations are connected indirectly with each other, they are not connected each other. It is easy to troubleshoot and more advantageous.
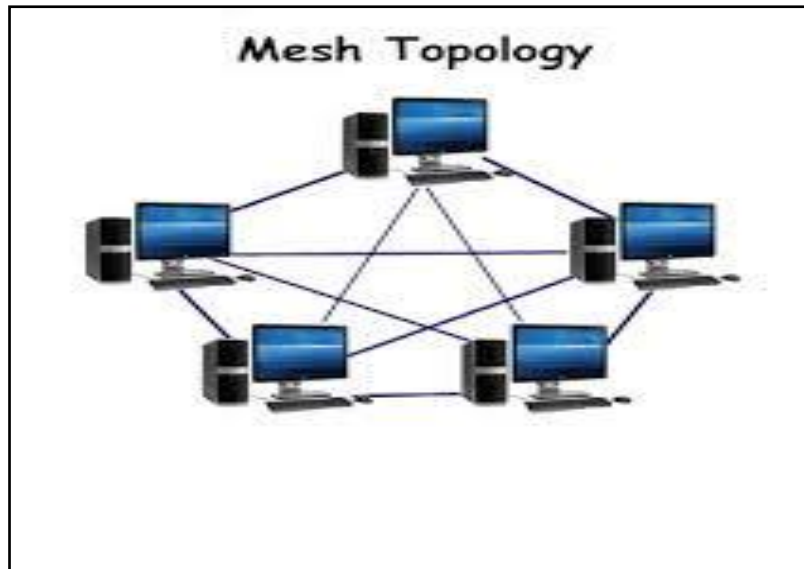
Figure 5.21: Mesh Topology

(Source: http://www.computer-networking-success.com/network-topologies.html)

F. Tree Topology:

In tree topology two or more star topologies are connected together. It takes characteristics of linear bus and star topologies. Tree topology supported by hardware and software. It is a point-to-point connection of workstations in topology. Workstation allows more devices to be connected to a central node. Maintenance of the tree topology is an issue when the network is in large size.
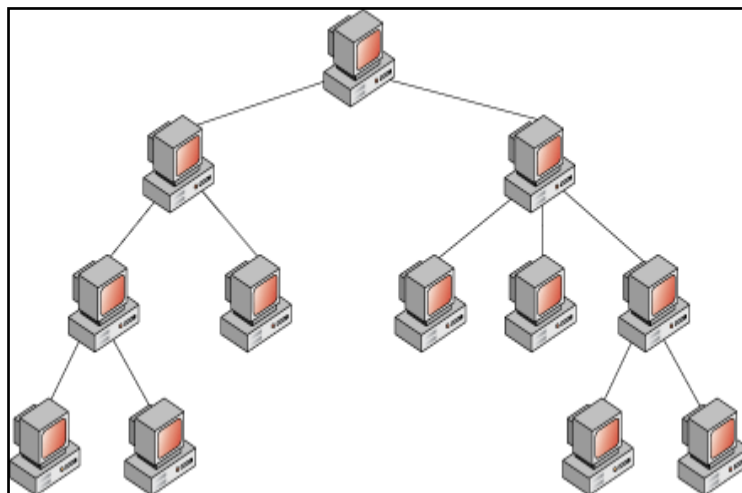
Figure 5.22: Tree Topology

(Source: http://www.ustudy.in/node/5163)

160

G. Hybrid Topology:

It is a combination of two or more topologies, which are not exist any one standard topologies like bus, star, ring etc. hybrid topology produced when two different basic network topologies are connected. This is easy to expand the network economically without distributing the total network.
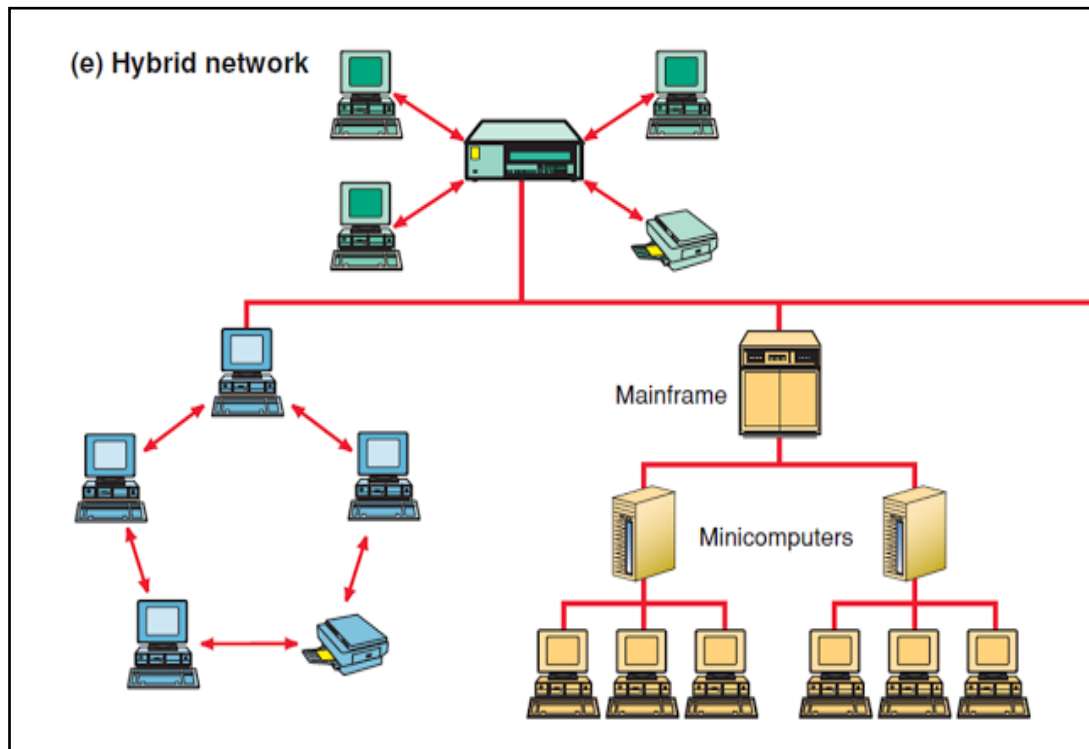
Figure 5.23: Hybrid Topology

(Source: http://infobyaj.blogspot.in/2012/06/computer-network-typologies.html)

5.5.7.2 Network Types:

Networks are also grouped into three types based on the area concerned viz. LAN, MAN and WAN.

A. Local Area Networks (LAN):

This network is used for the small geographical area network such as school, college, organization and small company. TCP / IP protocol is used for the communication

between networks. LAN is flexible, and capacity of high data transfer rate. Bus, ring, star and tree are four prominent LAN topologies.
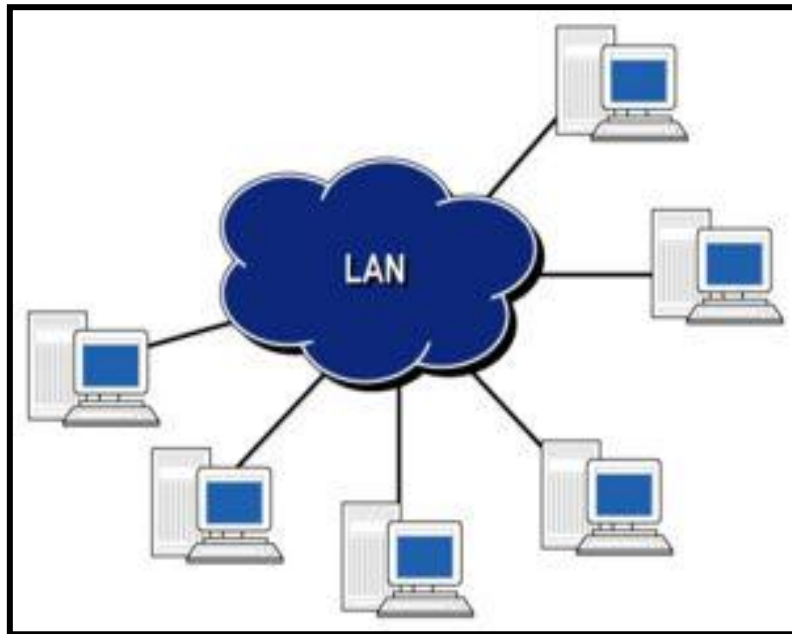
Figure 5.24: Local Area Network (LAN)

(Source: http://mynetworksource.blogspot.in/p/lan-local-area-network-lan-network.html)

One LAN can be connecting to other LAN via linked i.e. telephonic lines and radio waves. In this way a system of LANs connected to wide-area network (WAN). A LAN is useful for sharing resources like files, printers, or other applications. A LAN in turn often connects to other LANs, and to the internet or other WAN. LANs are capable of transmitting data at very fast rates, much faster than data can be transmitted over a telephone line; but the distances are limited, and there is also a limit on the number of computers that can be attached to a single LAN.

The most common type of LAN is an Ethernet LAN. Most local area networks are built with relatively inexpensive hardware such as Ethernet cables, network adapters, and hubs. Wireless LAN and other more advanced LAN hardware options also exist.

Types of Local-Area Networks (LANs):

- Topology: The geometric arrangement of devices on the network. For example, devices can be arranged in a ring or in a straight line.

- Protocols: The rules and encoding specifications for sending data. The protocols also determine whether the network uses a peer-to-peer or client/server architecture.

- Media: Devices can be connected by twisted-pair wire, coaxial cables, or fiber optic cables. Some networks do without connecting media altogether, communicating instead via radio waves.

B. Metropolitan Area Networks (MAN):

MAN is used for the larger geographical area coverage than LAN, large computer network used for a city or a large campus networks. MAN act as a high speed network to allow sharing of resources. It covers an area between 50 kilometer.
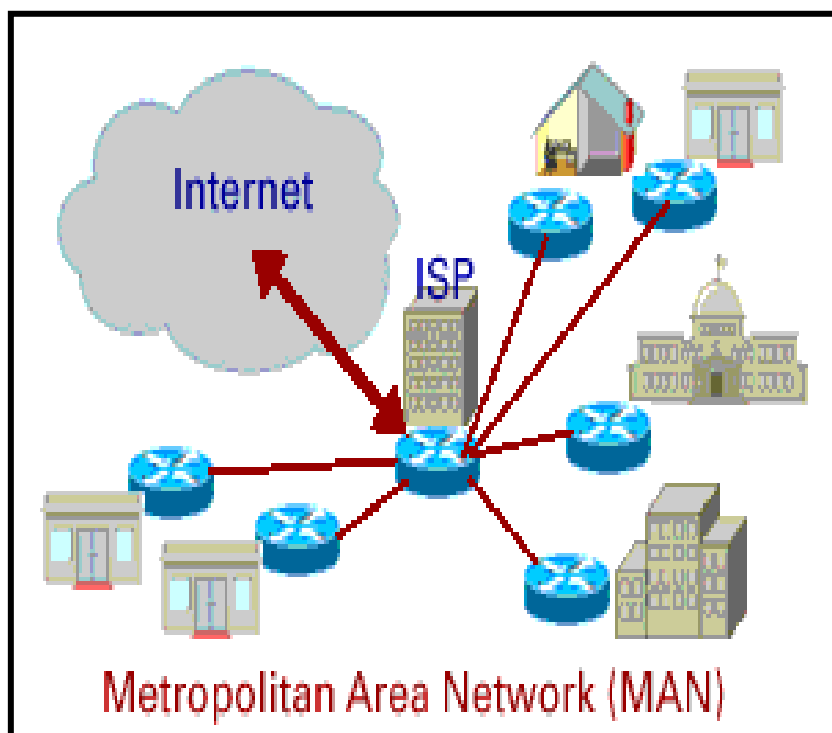

Figure 5.25: Metropolitan Area Network (MAN)

(Source: http://mynetworksource.blogspot.in/p/lan-local-area-network-lan-network.html)

A metropolitan area network (MAN) is a computer network larger than a local area network, covering an area of a few city blocks to the area of an entire city, possibly also including the surrounding areas (IEEE).

"A MAN is optimized for a larger geographical area than a LAN, ranging from several blocks of buildings to entire cities. MANs can also depend on communications channels of moderate-to-high data rates. A MAN might be owned and operated by a single organization, but it usually will be used by many individuals and organizations. MANs might also be owned and operated as public utilities. They will often provide means for inter networking of local networks."

Kenneth and Jane (2001) pointed out that "A Metropolitan Area Network (MAN) is a large computer network that spans a metropolitan area or campus. Its geographic scope falls between a WAN and LAN. MANs provide Internet connectivity for LANs in a metropolitan region, and connect them to wider area networks like the Internet."

Networking technologies used in metropolitan networks include Asynchronous Transfer Mode (ATM), FDDI, and SMDS (Switched Multimegabit Data Service). However, these technologies are increasingly being displaced by Ethernet-based connections (e.g., Metro Ethernet). MAN links between local area networks have been built with wireless links using microwave, radio, or infra-red laser transmission. Most companies rent or lease circuits from common carriers because laying long stretches of cable is expensive (Wikipedia).

C. Wide Area Networks (WAN):

WAN is a collection of computer networks resources connected with each other through internet. It covers very large geographical area. It transmits data using optic fibers, leased high-speed phone lines or wireless links, satellites etc. WAN allows communicating with internet network.

A wide area network (WAN) is a network that covers a broad area (i.e., any telecommunications network that links across metropolitan, regional, national or international boundaries) using leased telecommunication lines. Business and government entities utilize WANs to relay data among employees, clients, buyers, and suppliers from various geographical locations. In essence, this mode of telecommunication allows a business to effectively carry out its daily function regardless of location. The Internet can be considered a WAN as well, and is used by businesses, governments, organizations, and individuals for almost any purpose imaginable. (Groth and Skandler 2009). When an individual company or organization has locations that are separated by large geographical distances, it will be a matter of necessity to connect these individual locations so as to share, exchange and manager data or communication. To achieve this, the organisation needs a Telecommunication Service Provider (TSP) to interconnect the LANs at the different locations.
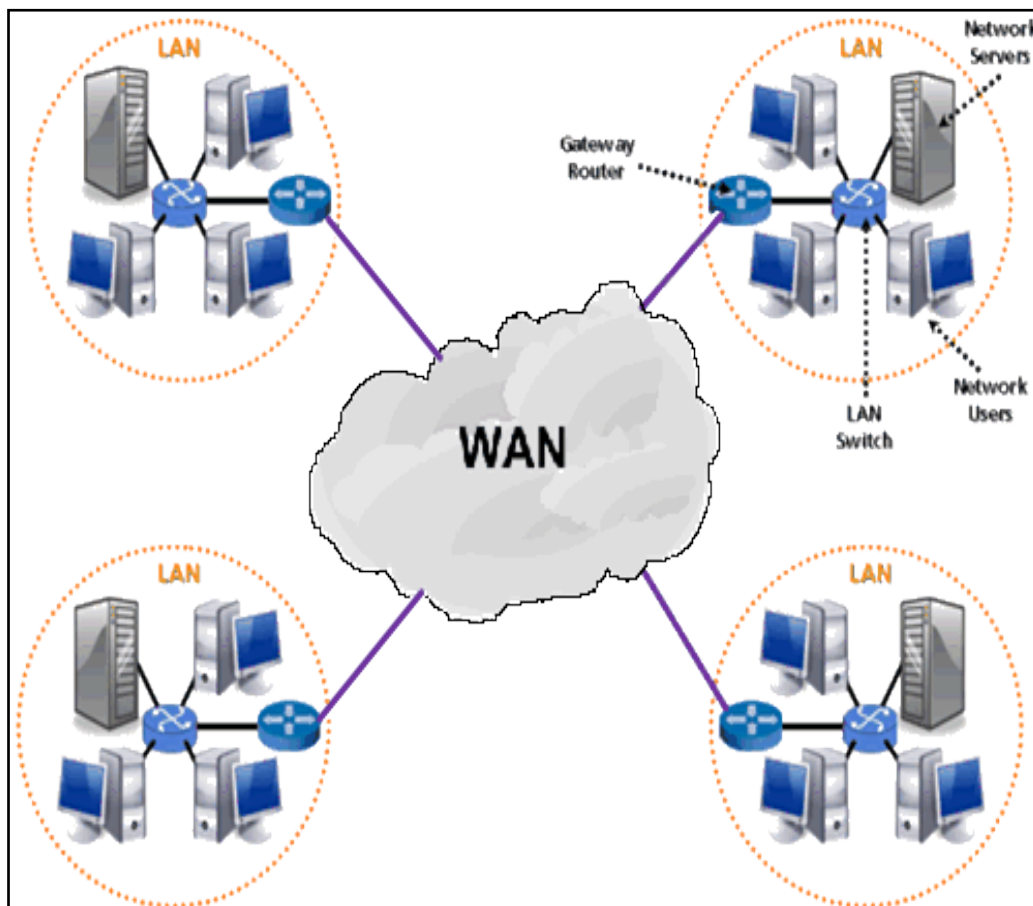
Figure 5.26: Wide Area Networks (WAN)

(Source: http://www.netprivateer.com/lanwan.html)

Telecommunications Service Providers manage large area networks that can span long distances. TSPs transport voice and data communications on separate networks. These networks that connect LANs in geographically separated locations are referred to as Wide Area Networks (WANs).

Major characteristics of WANs:

- WANs generally connect devices that are separated by a broader geographical area than cannot be served by a LAN.
- WANs use the services of carriers, such as telephone companies, cable companies, satellite systems, and network providers.
- WANs use serial connections of various types to provide access to bandwidth over large geographic area.

D. Campus Area Networks (CAN):

It is a connection of many small LAN networks in a campus, university campus, office building departments are the examples of campus area network. This network is very useful for file sharing within the different departments within the campuses and organizations.
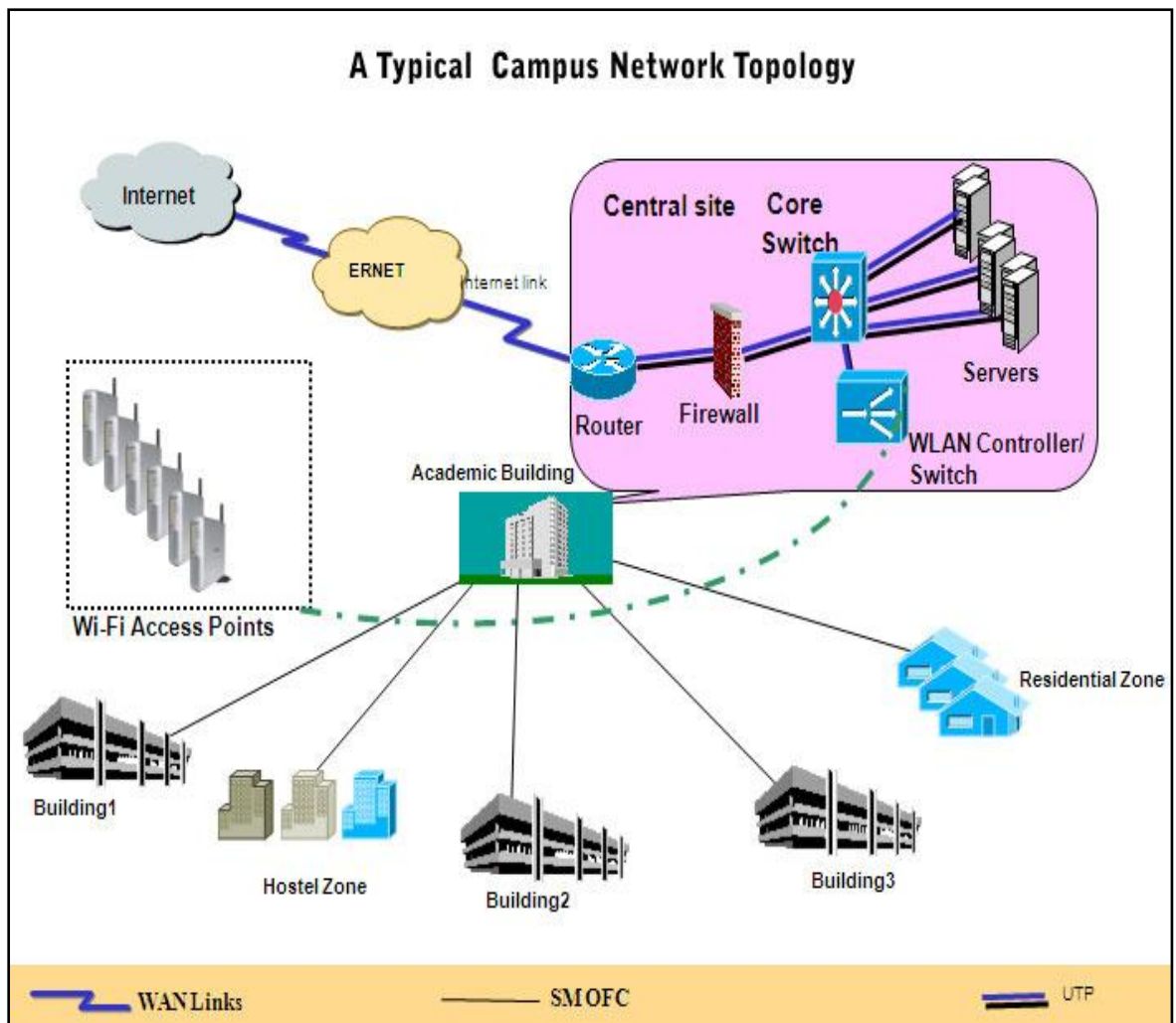
Figure 5.27: Campus Area Network (CAN)

(Source: http://www.eis.ernet.in/services/cwnetwork.html)

E. Storage or System Area Network and System Area Network (SAN):

It is a high speed network of storage devices which uses to connect all the storage devices with server. It is used for the storage of data, information and website for downloading services. Examples of SAN are RFID, disk-based devices, tape libraries etc.

System Area Network provides high speed internet connection; it is used as a server and then connects to all the computers in systems. It is high-performance, connection-oriented networks that link computer clusters. Microsoft SQL Server 2005 uses it for high-performance connectivity through Virtual Interface Adapter (VIA). This technology is used since the advent of Windows 2000 (Wikipedia).

167
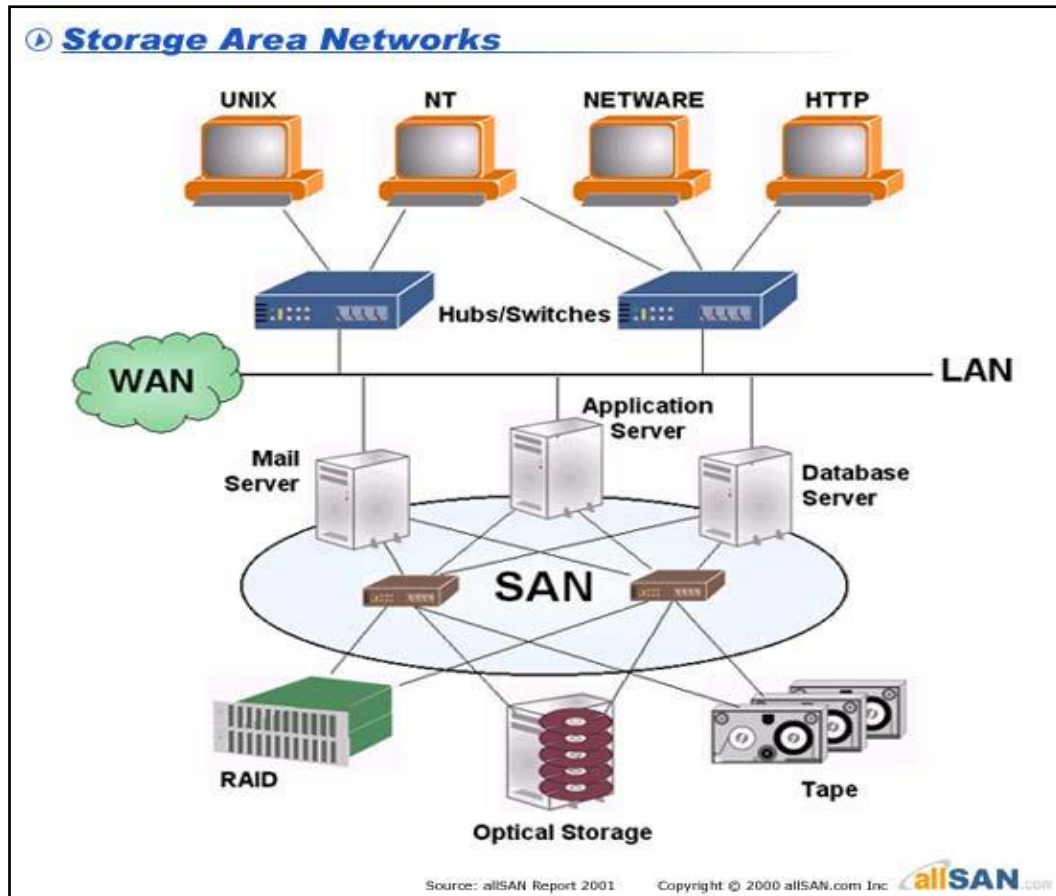
Figure 5.28: Storage or System Area Network (SAN)

(Source: http://www.allsan.com/sanoverview.php3)

F. Virtual Private Networks (VPN):

This network extends a private network across the public network and it uses a public telecommunication infrastructure, such as the internet, to provide remote offices or individual users with secure access to their organization's network. It enables a computer to send and receive data across shared or public networks as if it is directly connected to the private network, while benefiting from the functionality, security and management policies of the private network. A VPN is created by establishing a virtual point-to-point connection through the use of dedicated connections, virtual tunneling protocols, or traffic encryptions. VPNs allow employees to securely access their company's intranet while traveling outside the office. Similarly, VPNs securely connect geographically disparate offices of an organization, creating one cohesive network. VPN technology is also used by Internet users to connect to proxy servers for the purpose of protecting

personal identity and location (Wikipedia). Remote access and site-to-site are two types of virtual private networks.
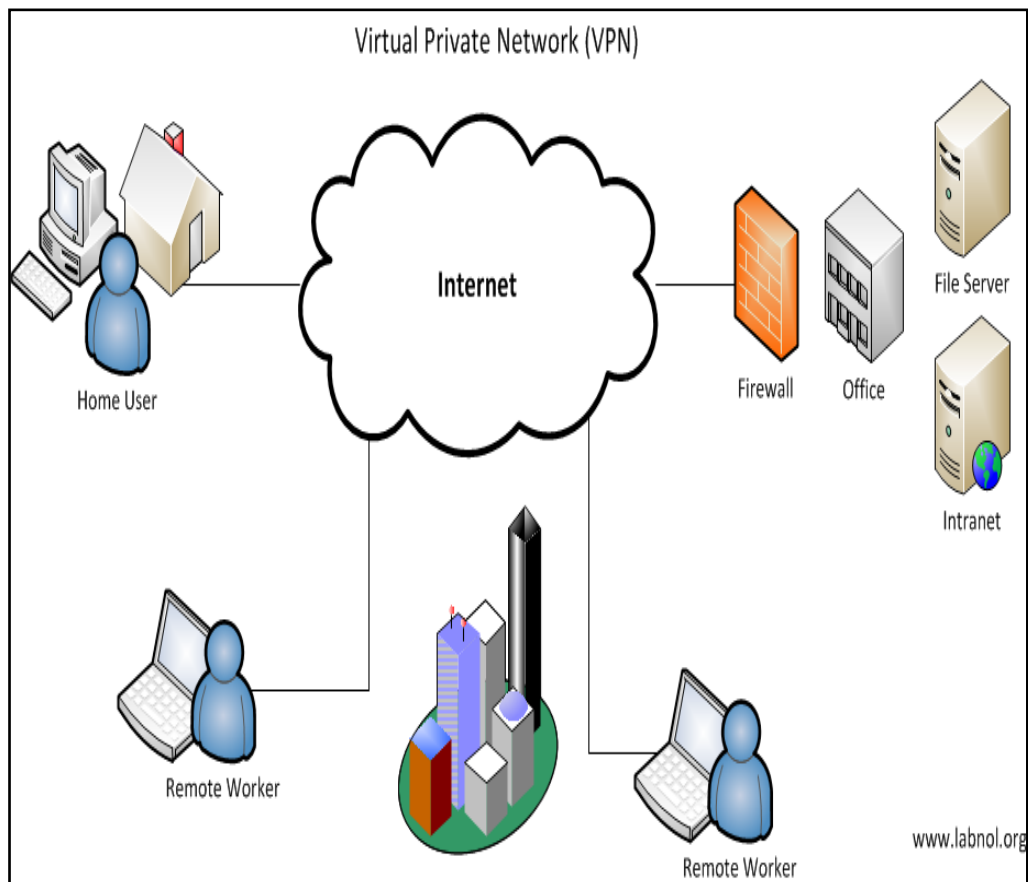
Figure 5.29: Virtual Private Network (VPN)

(Source: http://www.allsan.com/sanoverview.php3)

G. Personal Area Network (PAN):

Personal area network is personal, wireless and short distance area network. It is useful within the range of 10 meters. Mobile computers, cell phones and personal digital assistants, these devices are used for data transmission. It transfers data to each other such as emails, photos, and music etc. Bluetooth, Wireless USB are the technologies use in this network.

5.5.7.3 Internet, Intranet, Extranet:

- Internet: The internet is a worldwide, publicly accessible network of interconnected computer networks that transmit data using the standard Internet Protocol (IP). The terms World Wide Web (WWW) and internet are not the same. The internet is a collection of interconnected computer networks, linked by copper wires, fiber-optic cables, wireless connections, etc. Web is a collection of interconnected documents and other resources, linked by hyperlinks and URLs. The World Wide Web is one of the services accessible via the internet, along with various others including email, file sharing, online gaming etc.
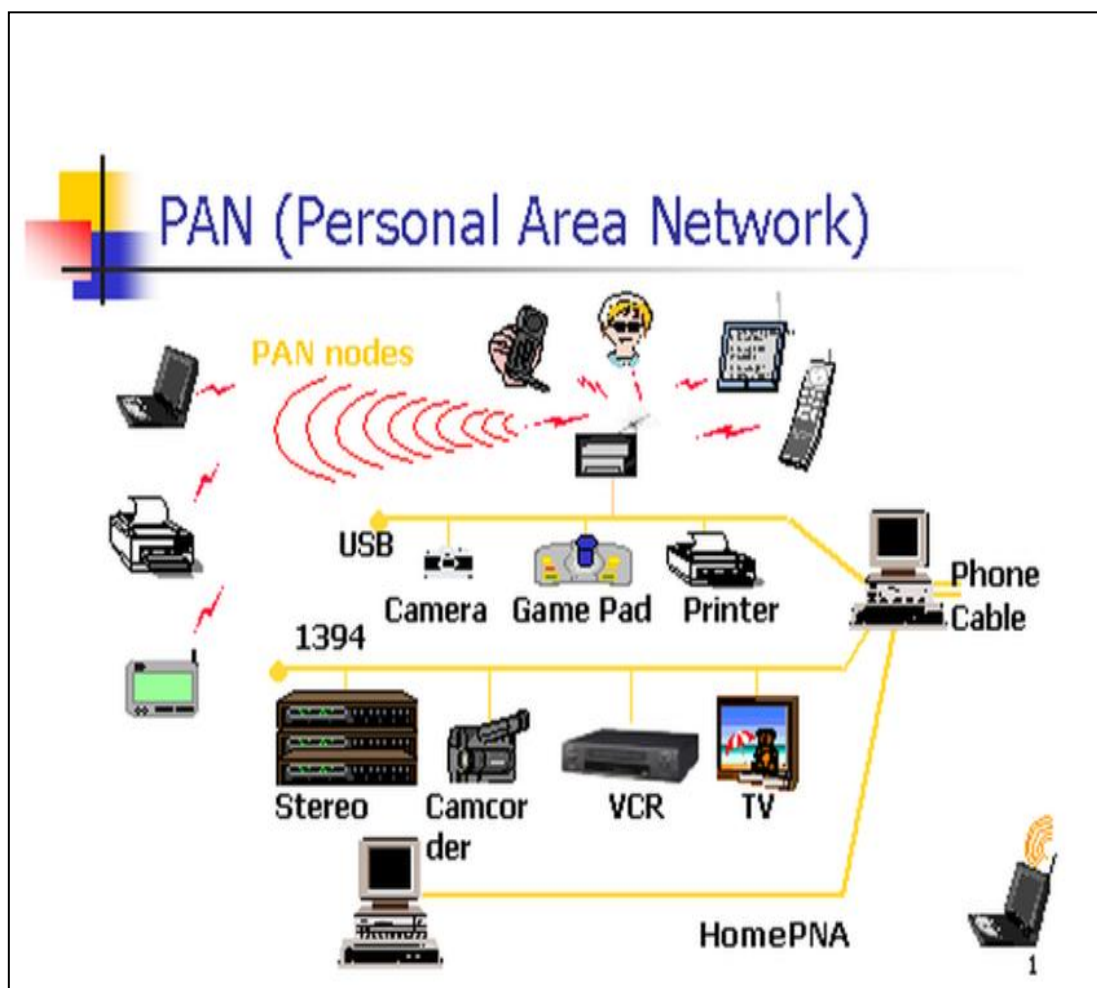
Figure 5.30: Personal Area Network (PAN)

(Source: http://kingofnetworking.weebly.com/different-types-of-computer-networks.html)

- Intranet: An intranet is a private network that is contained within an enterprise. It may consist of many interlinked local area networks and also use leased lines in the wide area network. The main purpose of an intranet is to share company information and computing resources among employees.

- Extranet: An extranet can be viewed as part of a company's intranet that is extended to users outside the company like suppliers, vendors, partners, customers, or other businesses.

5.6 Network Security:

Networks are easy to develop but difficult to operate, manage and protect. Hence network security and maintenance are required. The network needs security against virus, attackers and hackers. Network security includes two basic securities. One is the security of data information i.e. to protect the information from unauthorized access and loss. And another is computer security i.e. to protect data from hackers. This makes individuals, organizations, and nations highly vulnerable to information security attacks.

5.6.1 Network Security Tools:

Hardware and software technologies are very common and important for information security. As per Benjamin Tomhave (2004) described different information security tools and technologies in, 'Information Security Technologies' which are as follows:

A. Software:

Software's are used for virus protection and also used to remove unwanted adware and spyware. It includes a real-time protection feature that attempts to stop potentially harmful programs before they infect computer or workstation, and also scans computer for such threats. The program requires regular updating to remain effective against new malicious applications. Today's applications usually protect against both viruses and adware/spyware. Access control, Anti-keyloggers, Anti-spyware, Anti-subversion software, Anti-tamper software, Antivirus software, Cryptographic software, Firewall, Intrusion Detection System (IDS), Intrusion Prevention System (IPS), Sandbox are different types of software used of information and network security.

B. Hardware:

Hardware plays a role in securing some computer systems. A hardware security module (HSM) is a physical computing device that safeguards and manages digital keys for strong authentication and provides crypto processing. These modules traditionally come in the form of a plug-in card or an external device that attaches directly to a computer or network server (Webopedia). Magnetic stripe cards, smartcards, and RFID tags, memory and microprocessor cards are some hardware devices used for security.

C. Access Control Management (ACM):

Access Control Management (ACM) is a combination of identity, authentication and authorization which is used to restrict what resources a user may access. This solution is based on a number of security models, including Discretionary Access Control (DAC), Mandatory Access Control (MAC), and Role-Based Access Control (RBAC). Access control is at the heart of information security and is the fundamental premise upon which the industry is based (Rotchke 2004). ACM protect the confidentiality of a resource by restricting access to the resource and control the attributes of the access, such as read, write and execute.

D. Password Cracking:

Password cracking is the primary method of authentication and is the process of recovering secret passwords stored in a computer system. (Wikipedia). Password cracking may serve to recover a lost password or to compromise an unknown password for the purposes of gaining unauthorized access to a system or data. Additionally, password cracking may be used as a preventative measure to ensure that strong passwords are being used by system users. The protection of passwords and ensuring strong passwords against simple attacks is of the utmost importance. In addition to requiring users to choose strong passwords (string of eight (8) or more characters), it is also incumbent upon system administrators to require that passwords be changed frequently. Conventional wisdom indicates that no password should have a lifetime greater than 90 days, and for highly critical systems the lifetime should be 30 days or less. One exception to this rule involves two-factor authentication where a password is coupled with a stronger authentication

method, such as tokens or biometrics. Password cracking is primarily a protective countermeasure.

E. Antivirus:

Antivirus software was developed to detect the presence, and eventually the attempted infection, to the system by malware. It can protect the system against an active infection attempt, and able to correct by disinfecting a system from malware. There are two types of antivirus scanning software's: signature-based and heuristic. Signature-based scanning relies on a database of known malware signatures. The purpose of antivirus is to detect, protect and correct the infection or attack.

F. Audit Data Reduction:

Audit Data Reduction (ADR) increasingly becomes a useful and necessary part of the information security solution toolset. The purpose of an audit data reduction system is to reduce the overall cost and complexity associated with combining audit logs into one location and interface. These systems may have direct or indirect impact on the confidentiality, integrity or availability of data or systems, depending on the source of the logs and the type of misuse or abuse detected. In general, ADR system is countermeasure designed to better detect instances of misuse or abuse.

G. Intrusion Detection an Analysis System:

An Intrusion Detection System (IDS) is a device or software application that monitors network or system activities for malicious activities or policy violations and produces reports to a management station. The role of IDS was to detect threats on networks and hosts. This role has evolved to include active response capabilities that allow it to protect resources and correct misuse or abuse on networks or hosts. IDS can serve as impacts confidentiality, integrity and availability, depending on the signature set deployed, the effectiveness of alert management, and whether or not an active response capability exists.

H. Network Mapping:

Network mapping is the study of the physical connectivity of networks. It discovers the devices on the network and their connectivity. It is not to be confused with network discovery or network enumerating which discovers devices on the network and their

characteristics such as operating system, open ports, listening network services, etc. Network mapping is capable of testing for the presence of nodes on a network based on a variety of detection techniques, including the use of Internet Protocol (IP), Transmission Control Protocol (TCP) and Universal Datagram Protocol (UDP). Network mapping is a cheap and valuable tool for reviewing the existence of nodes on a network. Running a network mapping tool on a regular basis and comparing its results can assist an organization in ensuring that no nodes are being added to the network without proper authorization.

I. Public Key Infrastructure (PKI):

Public Key Infrastructure is an arrangement, usually carried out by software at a central location together with other coordinated software at distributed locations, which provides for third party (often termed a trusted third party) vetting of and vouching for user identities and for binding of public keys to users (typically in certificates) and vice versa. The most common form of PKI today is Secure Socket Layer (SSL) certificates used through the internet for securing web browsing sessions. PKI is deployed to an organization for various purposes, such as secure internal communication, providing encryption services to data and systems, digitally signing code, and providing encryption materials allowing users to digitally sign communication. A PKI enables users, to protect from unsecured public network such as the internet to securely and privately exchange data and money through the use of a public and a private cryptographic key pair that is obtained and shared through a trusted authority.

J. Virtual Private Networks (VPN) Security:

A Virtual Private Network (VPN) is a private communications network that makes use of public networks, oftentimes for communication between different organizations. The basic goal of a Virtual Private Network is to ensure the integrity of the connection and communications. When encryption is added, the goal of preserving confidentiality is achieved. One downside to VPNs is that they tend to be built on complex systems and are prone to easy disruption, reducing the overall availability of data and communications. VPN primarily serves to protect data, though it may also dynamically correct. If logging is enabled and monitored, then attacks against the VPN may also result in meeting the need of detection, though that would be ancillary.

K. Vulnerability Scanning Systems:

Vulnerability scanning is the automated process of proactively identifying vulnerabilities of network in order to protect by determining threats. Vulnerability scanning typically relies on a handful of tools that identify hosts and then proceed to test them for known weaknesses. The automated scanning process includes three high-level steps: receiving authority to scan, determining the scope of the program, and establishing a security baseline (Boritz 2005). A good vulnerability scanning program securely manage the results of the scans and have a plan and process in place for remediation of vulnerabilities that are uncovered. Vulnerability scanning occurs as part of an overall risk management framework, not as a standalone security countermeasure. The most popular vulnerability scanning tool available today is also free, open-source software. Vulnerability scanning can contribute to countermeasures in all three areas of protect, detect and correct.

L. Firewalls:

Firewall is software or hardware-based network security system that controls the incoming and outgoing network traffic by analyzing the data packets and determining whether they can be allowed through or not, based on applied set rule. A firewall establishes a barrier between a trusted, secure internal network and another network (e.g. the Internet) that is not assumed to be secure and trusted (Oppliger 1997). All data entering or leaving the intranet pass through the firewall, which examines each packet and blocks those that do not meet the specified security criteria. Firewall is a single device used to enforce security policies within a network or between networks by controlling traffic flows. The main purpose of firewall is to make the most sense to implement a forwarding proxy server to enable requestors in trusted domain to issue requests for services in an untrusted domain such as a client requesting access to a Web site on the internet.

A type of firewalls depends on communication, like packet filtering firewalls, application firewalls and dynamic packet filters. Any firewall can be classified under one or several of these categories.

I. Network Layer or Packet Filters

Network layer firewalls, also called packet filters, operative at a relatively low level of the TCP/IP protocol stack, not allowing packets to pass through the firewall unless they

175

match the established set rule. The firewall administrator can define the rules or default rules can be applied. Network layer firewalls generally fall into two sub-categories stateful firewall and stateless firewalls. It require less memory, and can be faster for simple filters that require less time to filter than to look up a session. They may also be necessary for filtering stateless network protocols that have no concept of a session. However, they cannot make more complex decisions based on what stage communications between hosts have reach.

II. Application Layer Firewall

Application layer firewalls work on the application level of the TCP/IP stack (i.e. all browser traffic, or all telnet or FTP traffic), and may intercept all packets traveling to or from an application. They block other packets by dropping them without acknowledgment to the sender.

M. Proxies

A proxy server (running either on dedicated hardware or as software on a general-purpose machine) may act as a firewall by responding to input packets (connection requests, for example) in the manner of an application, while blocking other packets. A proxy server is a gateway from one network to another for a specific network application, i.e. it functions as a proxy on behalf of the network user.

N. Network address translation (NAT)

Firewalls often have network address translation (NAT) functionality, and the hosts protected behind a firewall commonly have addresses in the 'private address range', as defined in RFC 1918. Firewalls often have such functionality to hide the true address of protected hosts. Originally, the NAT function was developed to address the limited number of IPv4 routable addresses that could be used or assigned to companies or individuals as well as reduce both the amount and therefore cost of obtaining enough public addresses for every computer in an organization. Hiding the addresses of protected devices has become an increasingly important defense against network reconnaissance.

5.7 Benefits of Networking:

The major benefits can be isolated as under:

- File Sharing / Data Sharing: In networking, files sharing between computers in networks. It shares applications related to their work, photos, pictures, music files, and other documents. It provides facilitates to access databases.

- Knowledge Sharing: Discussion with the others and subject experts, feedbacks from the persons, suggestions and their opinion and ideas helps to increase the knowledge. Networking is a platform to share your knowledge with each others.

- Sharing Hardware Devices: In networks all the computers are connected with each other to share information, in networks printers, fax, modems, CPUs, and servers are connected with each other, due to this any user from any computer in networks can share these hardware devices.

- Internet: With the help of internet any person from anywhere in the world can communicate with each other. Internet helps in searching line information from all over the world on any topic.

- Communication: Communicate with each through e-mail, Facebook, Whatsapp etc.

- Save Cost: Sharing hardware devices and software's saves lot of cost.

- Opportunity to learn, access new valuable information.

- Avoid duplication of information resources.

- Networking is a two way process, it is a sharing not only taking and submitting information or data.

- Share ideas with each other, which help to expand knowledge.

- Network helps for personal growth, career development and gives new opportunities.

- Multiple users can access same information at same time from anywhere.

5.8 Skilled Professionals:

The basic aim of libraries is to manage and provide access to information. Librarian is aware of all the technologies which help them to face the challenges of the information era. New technology helps the libraries to convert traditional libraries into advanced network or digital libraries. To sustain in the ICT era library professionals need to

develop their skills in technical, technological and managerial levels. The librarians of present IT era need to adapt skills managed to ICT for better performance.

Librarians have to gain knowledge of information resources, access, technology, network technology and management using ICT and networks, providing the highest quality information services.

Summary:

This chapter elaborates different components of networks and pre requisites as well as types of networks, use of networks, and benefits of the networks, problems faced in networks, networks security and maintenance issues. Thus the requirements for developing networks in terms of hardware, software and manpower, as well as maintenance and security issues are discussed in detailed to set the background of the theme of research work. However it is worth mentioned here that the networking technology is undergoing a rapid transformation. This is the domain of technology wherein the rate of obsolescence is very high. Therefore the devices such as hubs are now getting outdated fast. So is the case with the OSI model. The OSI model which, once a time was taken as the most standard is now evidencing merging of the layers. With the rapid progress in the device technology, now the functioning of more than one layer is being handled by a single device. The network operating system is also inclining more towards the open source i.e. Linux. The rate of influx of new technology is prohibitively high in the off-shore B-schools. Indian B-schools are no doubt catching the phenomenon, however at fewer paces.

Reference:

- Advantages of Networks. Retrieved from http://www.brighthub.com/computing/hardware/articles dated 21 Nov 2013.

- Advantages of Networks. Retrieved from http://www.buzzle.com/articles/advantages-and-disadvantages-of-computer-networks.html dated 21 Nov 2013.

- Allen Robert. What Is Networking Software? eHow Contributor. Retrieved from http://www.ehow.com/about_5507248_networking-software.html on dated 25 Mar 2012.

- Bakardjieva, Teodora. Introduction to Computer Networking. Varna Free University "Chernorizec Hrabar" p. 1- 23. Retrieved from http://vfu.bg/en/e-Learning/Computer-Networks--Introduction_Computer_Networking.pdf dated 21 Nov 2013.

- Benjamin Tomhave (2004) Research Paper: Information Security Technologies. (Washington University) Retrieved from http://www.secureconsulting.net/Papers/218-Research-Paper-FINAL.pdf on dated 24 Apr 2013.

- Boritz, J. E. (2005). CICA Research Report on Secure it Infrastructure for E-commerce. Retrieved from http://accounting.uwaterloo.ca/uwcisa/symposiums/symposium_2005/Boritz.pdf on dated 24 Dec 2013.

- Braden, R. (1989). Requirements for Internet Hosts – Communication Layers (Wikipedia of Internet Layer) Retrieved from http://en.wikipedia.org/wiki/Internet_layer on 30 Sep 2011.

- Bridges and Switches. Retrieved from http://www.omnisecu.com/basic-networking/network-infrastructure-devices-what-are-bridges-and-switches.php on dated 25 Apr 2012.

- Bus Topology diagram. Retrieved from http://cedtinet.blogspot.in/2013/06/bus-topology.html on dated 25 Jan 2011.

- Campbell, Jim. Network Software Requirements. eHow Contributor. Retrieved from

http://www.ehow.com/list_6729465_network-software-requirements.html   on
dated 25 Mar 2012.

- Campus   Area   Network   (CAN).   Retrieved   from
  http://www.eis.ernet.in/services/cwnetwrok.html on 25 Apr 2013.

- Coaxial   Cable   diagram.   Retrieved   from
  http://en.wikipedia.org/wiki/Coaxial_cable on dated 21 June2012.

- Competencies for Information Professionals of the 21st Century. (2003) Retrieved
  from http://www.sla.org/about-sla/competencies/ on dated 20 May 2012.

- Computer   Hardware.   Retrieved   from
  http://en.wikipedia.org/wiki/Computer_hardware dated 21 Nov 2013.

- Computer   Network.   Retrieved   from
  http://en.wikipedia.org/wiki/Computer_network on dated 21 Nov 2013.

- Computer Software. Retrieved from http://en.wikipedia.org/wiki/Software dated
  22 Nov 2013.

- Confidentiality Integrity Availability (CIA). Retrieved from Wikipedia
  http://whatis.techtarget.com/definition/Confidentiality-integrity-and-availability-
  CIA on dated 06 Mar 2012.

- Cory Janssen. Peer-To-Peer Network (P2P Network). Retrieved from
  http://www.techopedia.com/definition/25777/peer-to-peer-network-p2p-network
  on dated 16 Jun 2012.

- Definition   of   Network   Security.   Retrieved   from   Wikipedia
  http://en.wikipedia.org/wiki/Network_security on dated 5 Feb 2013.

- Definition   of   Network   Security.   Retrieved   from
  www.webopedia.com/TERM/N/network_security.html on dated 5 Feb 2013.

- Ethernet   Cable   diagram.   Retrieved   from
  http://www.cablewholesale.com/products/network-phone/cat-5-e-stp-
  cables/product-10x6-56103.php on dated 21 June 2012.

- Fiber Optic Cables. Retrieved from website http://www.technoriya.in/fiber.php
  on dated 18 Jan 2013.

- File   Transfer   Protocol.   Access   from
  http://en.wikipedia.org/wiki/File_Transfer_Protocol on dated 28 Jan 2013.

- Fyodor,   Nmap   Security   Scanner.   Retrieved   from
  http://www.insecure.org/nmap/index.html; Internet on dated 24 Feb 2012.

- Gateway. Retrieved from http://compnetworking.about.com/od/internetaccessbestuses/f/default_gateway.htm on dated 15 Jan 2013.

- Gateway. Retrieved from Website http://www.webopedia.com/TERM/G/gateway.html on dated 21 on dated 15 Jan 2013.

- Groth, David and Skandler, Toby (2009). Network+ Study Guide, Fourth Edition. Sybex, Inc. ISBN 0-7821-4406-3.

- Hardware Security Model. Retrieved from Wikipedia http://en.wikipedia.org/wiki/Hardware_security_module on dated 11 Dec 2011.

- Hartley, Judy (2012). Peer-to-Peer Networking: A Mobile Coming of Age. *Intel Magazine*. Retrieved from https://software.intel.com/en-us/articles/peer-to-peer-networking-a-mobile-coming-of-age on dated 12 Oct 2013.

- Hubs. Retrieved from http://www.omnisecu.com/basic-networking/network-infrastructure-devices-what-is-a-hub.php on dated 20 May 2012.

- Hybrid Topology diagram. Retrieved from http://infobyaj.blogspot.in/2012/06/computer-network-typologies.html on 28 Jan 2011.

- IBM Cooperation (1994). Introduction to Networking Technologies. International Technical Support Organization Raleigh Center. P.202. Access from http://www.redbooks.ibm.com/redbooks/pdfs/gg244338.pdf dated 21 Nov 2013.

- IEEE Std 802-2002, IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture, page 1, section 1.2: "Key Concepts", "basic technologies" Retrieved from http://standards.ieee.org/getieee802/download/802-2001.pdf on dated 20 July 2012.

- Internet Protocol (IP). Retrieved from http://en.wikipedia.org/wiki/Internet_protocol_suite on dated 17 Feb 2013.

- Jestin, Joseph and B. Parameswari (2002). Challenges for Library Professionals in India in the New Millennium. Library Philosophy and Practice Vol. 4, No. 2 Retrieved from http://unllib.unl.edu/LPP/jestin1.html on dated 15 June 2012.

- Kenneth C. Laudan and Jane P. Laudon (2001), Management Information Systems: Managing the Digital Firm, 10th ed.

- Linear Bus Topology. Retrieved from http://flylib.com/books/en/2.284.1.107/1 on dated 16 June 2012.

- Local Area Network (LAN). Retrieved from http://compnetworking.about.com/cs/lanvlanwan/g/bldef_lan.htm on dated 21 June 2011.

- Local Area Network (LAN). Retrieved from http://mynetworksource.blogspot.in/p/lan-local-area-network-lan-network.html on 12 July 2012.

- Local Area Network (LAN). Retrieved from http://www.webopedia.com/TERM/L/local_area_network_LAN.html on dated 12 Jun 2012.

- Mesh Topology diagram. Retrieved from http://www.computer-networking-success.com/network-topologies.html on dated 21 Jan 2011.

- Metropolitan Area Networks (MAN). Retrieved from http://en.wikipedia.org/wiki/Metropolitan_area_network on dated 20 May 2013.

- Modems. Retrieved from http://thegadgetsquare.com/1117/what-is-modem-and-types-of-modems on dated 23 Apr 2012.

- Multiple Operating Systems. Retrieved from http://www.wisegeek.com/what-is-a-multi-user-operating-system.htm on dated 25 Aug 2011.

- Netware. Retrieved from http://en.wikipedia.org/wiki/NetWare dated 22 Nov 2013.

- Network Architecture. Retrieved from http://en.kioskea.net/faq/2761-what-is-network-architecture#definition dated 25 June 2012.

- Network Components. Retrieved from http://www.all-about-computer-parts.com/computer_network_components.html dated 21 Jan 2013.

- Network Hardware. Retrieved from http://www.buzzle.com/articles/types-of-network-hardware.html on dated 21 Jan 2013.

- Network Mapping. Retrieved from Wikipedia http://en.wikipedia.org/wiki/Network_mapping#Notable_network_mappers on dated 28 Sep 2012.

- Network Mapping. Retrieved from Wikipedia http://en.wikipedia.org/wiki/Network_Mapping; Internet on dated 20 Aug 2012.

- Network Security. Retrieved from Wikipedia https://security.untsystem.edu/resources/networksecurity on 30 Mar 2012.

- Network Software. Retrieved from http://www.webopedia.com/TERM/N/network_software.html on dated 25 Mar 2012.

- Network Topology. Retrieved from http://ecestudyaid.blogspot.in/2012/07/different-kids-of-network-topology-in.html on dated 21 Jan 2013.

- Network Topology. Retrieved from Wikipedia http://en.wikipedia.org/wiki/Network_topology on dated 15 Feb 2013.

- Network. Retrieved from http://fcit.usf.edu/network/chap3/chap3.htm on 28 May 2012.

- Networking Cables. Retrieved from http://compnetworking.about.com/od/networkcables/a/network-cables-introduction.htm dated 25 Jan 2013.

- Networking Cables. Retrieved from http://en.wikipedia.org/wiki/Networking_cables on dated 27 Jan 2013.

- Networking Components and Devices. Retrieved from http://gonda.nic.in/swangonda/pdf/0789732556.pdf on 21 Oct 2012.

- Networking. Retrieved from http://www.supermicro.com/products/nfo/networking.cfm on dated 20 May 2012.

- Networking. Retrieved from http://www.tcpipguide.com/free/t_WhatIsNetworking.htm dated 21 Nov 2013.

- Networks. Retrieved from http://fcit.usf.edu/network/chap4/chap4.htm on dated 24 Jan 2013.

- Networks. Retrieved from http://homepages.uel.ac.uk/u0306091/Network.htm dated 21 Nov 2013.

- Networks. Retrieved from website http://fcit.usf.edu/network/chap5/chap5.htm on dated 21 Jan 2013.

- Oppliger, Rolf (1997). "Internet Security: FIREWALLS and BEYOND". *Communications of the ACM* **40**(5): 94. Retrieved from http://en.wikipedia.org/wiki/Firewall_(computing) on dated 20 Jul 2012.

- OSI Model. Retrieved from http://en.wikipedia.org/wiki/OSI_model on dated 15 Feb 2013

- OSI Model. Retrieved from http://gtcc-it.net/billings/osi1.htm on dated 15 Feb 2013.

- Password Cracking. Retrieved from Wikipedia http://en.wikipedia.org/wiki/Password_cracking; Internet retrieved from 21 Jan 2014.

- Patch Cables diagram access from http://www.videk.co.uk/section.php/178/1/booted-cat5e-utp-patch-cables on dated 18 Jan 2013.

- Patch Cables. Retrieved from http://en.wikipedia.org/wiki/Patch_cable on dated 18 Jan 2013.

- Paul Innella. The Evolution of Intrusion Detection Systems. Retrieved http://www.securityfocus.com/infocus/1514; Internet on dated 28 July 2011.

- Peer to Peer Network. Retrieved from http://www.skullbox.net/ntoplogy.php on 15 Feb 2013.

- Personal Area Network (PAN) diagram. Retrieved from http://kingofnetworking.weebly.com/different-types-of-computer-networks.html on 21 Jan 2013.

- Personal Area Network (PAN). Retrieved from http://en.wikipedia.org/wiki/Personal_area_network dated 25 Jan 2013.

- Protocols. Retrieved from http://compnetworking.about.com/od/networkprotocols/g/protocols.htm on dated 18 Feb 2013.

- Public Key Infrastructure (PKI). Retrieved from Wikipedia http://searchsecurity.techtarget.com/definition/PKI on dated 25 May 2012.

- Public Key Infrastructure (PKI). Retrieved from Wikipedia http://en.wikipedia.org/wiki/Public_key_infrastructure; Internet on dated 25 May 2012.

- Repeater. Retrieved from http://www.thebryantadvantage.com/CCNACCENTCertificationTrainingHubsCollisionDomains.htm on dated 22 Nov 2013.

- Ring Topology diagram. Retrieved from http://www.computerhope.com on 24 Jan 2011.

- Rotchke, Ben (2004). Access Control Systems & Methodology. New York: SecurityDocs.com. Retrieved from http://www.securitydocs.com/go/69; Internet on dated 28 Aug 2012.

- Router. Retrieved from http://www.omnisecu.com/basic-networking/network-infrastructure-devices-what-is-a-router.php on dated 27 Apr 2012.

- Security Software. Retrieved from Wikipedia http://en.wikipedia.org/wiki/Security_software.

- Simple Mail Transfer Protocol (SMTP). Retrieved from http://www.techterms.com/definition/smtp on dated 20 Aug 2012.

- Star Topology diagram. Retrieved from http://technologytwist.com/top-tips-to-choosing-a-network-topology on 12 Jan 2011.

- Storage Area Network / System Area Network (SAN). Retrieved from http://en.wikipedia.org/wiki/Storage_area_network dated 23 Jan 2013.

- Tanenbaum, Andrew S, and Wetherall, David J. (2012). *Computer Networks* (5th Ed). New York: Pearson Education.

- TCP/IP protocols Retrieved from http://searchnetworking.techtarget.com/definition/TCP-IP on dated 17 Feb 2013.

- Tree Topology diagram. Retrieved from http://www.ustudy.in/node/5163 on dated 21 Feb 2011.

- Twisted Cable. Retrieved from website http://simuncettnakcakapp.blogspot.in/ on dated 15 Jan 2013.

- Types of Operating System. Retrieved from http://computer.howstuffworks.com/operating-system3.htm on dated 25 Aug 2011.

- Virtual Private Network (VPN) diagram. Retrieved from http://www.allsan.com/sanoverview.php3 on dated 20 June 2013.

- Virtual Private Network (VPN). Retrieved from http://searchenterprisewan.techtarget.com/definition/virtual-private-network on dated 25 Jan 2013.

- Virtual Private Network (VPN). Retrieved from Wikipedia http://en.wikipedia.org/wiki/Virtual_private_network on dated 25 Jan 2013.

- Virtual Private Network (VPN). Retrieved from Wikipedia http://en.wikipedia.org/wiki/Virtual_private_network; Internet on dated 25 Jan 2013

- Wide Area Network (WAN). Retrieved from http://en.wikipedia.org/wiki/Wide_area_network on dated 2 May 2012.

- Wide Area Network (WAN). Retrieved from http://orbit-computer-solutions.com/WAN.php on dated 12 May 2012.

- Wide Area Network (WAN). Retrieved from http://www.netprivateer.com/lanwan.html on dated 25 May 2012.

- Wireless Adapter. Retrieved from http://compnetworking.about.com/od/hardwarenetworkgear/ss/wirelessadapter_4.htm on dated 27 June 2012.

CHAPTER 6

LIBRARY NETWORKS IN INDIA - AN OVERVIEW

6.1 Introduction:

In the era of information explosion, it is important that libraries have to develop a network or link among themselves to other networks using the networking technologies to able themselves to meet the users need in very cost effective ways. The network environment offer very effective and useful opportunities to member libraries like online access and dissemination is possible without physical visiting to the library, many users can access a single source of information at a time. The information divide can only be bridged by pulling all the resources in one nutshell. (Manhas 2010).

Networking and resource sharing are one of the thrust areas in library and information, for long time, Dr. S. R. Ranganathan has emphasized much on this concept regarding library co-operation in his book 'Five Laws of Library Science'. Indeed all five laws warrant the practice of networking and resource sharing for better and effective library operations and services. Network of college libraries under the umbrella of universities have been widely discussed, many projects have been initiated and undertaken at global level. In India particularly, UGC and other educational bodies recommendations also emphasized the necessity of networking of college libraries. The role of university library in clustering, resource sharing among the colleges and information access by avoiding the duplication of efforts and resources is immense. The INFLIBNET and NAAC are also emphasizing university and college libraries network and ensuring the role of university library in promoting the information environment of affiliated institutions.

Application of new information technology has brought dramatic changes in the library and information field. With technological advancement, libraries and information centers around the world have computerized their library routines, developed databases for shared use on computer networks. Besides, improving services and operations for improved performance, libraries have also been able to evolve effective computer networks with an

aim to optimize utilization of resources and facilities. The library and information networks have potential to improve library services in several ways. It brings down the cost of information products and services in the network environment. It enables libraries to offer need-based services to the end users eliminating the limitation of size, distance and language barriers among them. Due to library networks, the emphasis has moved from physical entities to the resources sharable entities through the networks. The network accessible resources include databases of libraries journal articles, electronic text, images, video and audio files, scientific and technical data etc.

There has been a voluminous growth of published documents in the recent past due to both print and digital. As a result no library is in a position to procure process or store all documents that its users demand. According to Kent (1978) "It is difficult to anyone single library to acquire even one percent of the total document published in the world". Due to one or more of the following reasons:

1. Knowledge explosion
2. Literature (both print and digital) explosion
3. Explosion of users
4. Augmentation of specializations
5. Declining funds
6. Declining cost per publication
7. Varying need of information
8. Limitations of libraries in making the environment conducive for ICT

All the above referred factors have compelled the libraries to go for consortium or sharing approach which is the sole theme of the present research work.

6.2 Background of Resource Sharing and Networking:

In libraries and information centers the resource sharing concept was used since very long and the activity initiated with "Inter Library Loan (ILL)". Initially the efforts for resource sharing were good but they were concentrated more at local level only and the tool used was "Union Catalogue" and only books or library material was considered. This was the limitation in the process. However the concept of resource sharing was initiated and also worked well at local level. Later different activities related to resource sharing were

carried out in the area of libraries like "Library Cooperation", "Resource Sharing" etc and the resources of the libraries considered for the sharing purpose. Due to applications of ICT in libraries, resource sharing turned in to "Library Networks". The computers were used for developing databases and the communication technology used for connecting the libraries located at distances and sharing of information, faster than before. The library networks were very popular and UGC, NISSAT took a lead in developing different library networks of cities in different parts of the countries. The effort was so fruitful that the flow of information was enhanced and sharing concept was entered in the profession. Thus ICT played a pivotal role in the development of RS globally. Currently the internet and web technology added more benefits to resource sharing and new concept developed is consortium. Different organizations share the access to the e-resources by establishing consortium and developing economic knowledge base in the limited funds.

It is now a challenge to access the information published in the world due to information explosion, hence resource sharing was initiated in libraries and developed library networks, found essential and suitable for the sharing purpose. Using the technology effectively, computer networks are developed to access remote information and databases faster than any other facilities. In the information overload, it is not possible to hold all the collection at a single place and hence to meet the needs of users, resource sharing through networks is essential. The main purpose of computer networks is sharing resources, sharing meaningful information and data among each other. The development of network needs sufficient and advanced hardware, software, netware and skillful manpower for developing and functioning effective networks.

6.3 Resource Sharing:

The real essence of resource sharing is formation of library networks. Through library networking, users can scan and monitor the information they require, not available in a particular library but other library holds that particular information, without loss of time and at a minimum cost. Resource sharing networks offer:

- Document delivery and interlibrary loan services
- Shared cataloguing
- Cooperative collection development

- Coordinated acquisition

- Reference and referral assistance

- Consultation and staff training

- Email, facsimile service, bulletin boards etc.

Access through any network in the globe can be obtained virtually through internet which is widely used international network. Automated libraries can also help sharing of information through CD-ROM networking. With the increasing trend in electronic publications particularly on CD-ROMs and networks, automated libraries are going to be converted into electronic libraries. The introduction of multi-user and multi task CD-ROM systems has made more economic for most of the organizations, especially where the same data or database are required for several users.

The term resource sharing has been used in the library profession since 1960. It is method of co-operation and co-ordination among participating libraries. Need of resource sharing was realized by libraries a long back. Besides entering into inter-library loan practice, libraries also thought seriously of resource sharing in many other areas, such as co-operative acquisition, co-operative cataloguing, co-operative classification, etc. Inter-library loan has been practiced as one of the most popular resource sharing activity amongst libraries. Inter-library loan in a traditional library is severely affected by barriers of information communication, such as apathy of the lending library, distance, language, time etc. A computerized inter-library loan system overcomes these limitations. For resource sharing, the participating libraries need to come together and co-operate in two broad areas: (a) Developing the collection on shared basis and (b) Developing services for exploiting such collection (Dhawan, 1999).

Libraries exist for users any change in their demands and requirements need libraries to adapt. Users are now more demanding, expecting from libraries and have to show their accountability they have to satisfy the users in the best possible way. Customized services are the talk of the time. Staff has to be more interactive with the users knowing about their area of interest and their requirements to serve them in the best possible way. Sharing of resources may solve the problem by acquiring all the documents that they require in corporation. They would share the documents thus overcoming the problem of increased prices and space for storing them. Libraries by sharing would have access to the

large number of documents and satisfying the increasing demands for documents. Sharing would also allow libraries to use documents in different formats.

6.4 Library Networking:

The term networks generally reflect to computer networks which allow different configured computers to communicate among them and share resources and information available with them. UNISIST – II (UNESCO 1979) defines information networks as "A set of inter-related information systems associated with communication facilities, which are cooperating through more or less formal agreements in order to implement information handling and to offer better services to the users". A computer network or data network is a telecommunications network that allows computers to exchange data. In computer networks, networked computing devices pass data to each other along data connections. The connections (network links) between nodes are established using either cable media or wireless media. The best-known computer network is the internet (Wikipedia). The National Commissions on Libraries and Information Centers in its National Programme Document (1975) defined a network as "Two or more libraries engaged in a common pattern of information exchange, through communications for some functional purpose". (Sahoo, 2004).

6.5 Objectives of Library Networks:

Potdar and Joshi (1997) had discussed the main aim and objectives of library networks, which are as follows:

1. Improving resources utilization and service through automation at various levels.
2. Facilitating access to composite databases.
3. Implementation of inter library loans, document delivery services etc.
4. To aid swap of spare publications.
5. Facilitating central catalogue search
6. Harping on ICT in every aspect of library functioning.
7. Forming benchmarks and sharing of best practices at every level.

6.6 Need of Library Networks:

From the above discussions it is conducted that there is a need of resource sharing among group of libraries to develop economic ventures even in narrow discipline. Among the various reasons information explosion, is the main cause and it continuous increase, made it is possible for every library to procure each and every document in the library. The other prime factor is of the library budget which never increased proportionately and it is difficult for libraries to purchase required documents and rising cost of documents never matches with funds. The value to education and research is increasing and the growth in institution demand for more facilities. The users expectations for libraries are increasing due to advent of ICT usage. To meet the needs of users under such conditions libraries have to face the different challenges. The need of resource share is felt enormously due to these reasons. The advanced programs are being under taken continuously to match the situation. The ICT applications fulfilled the desire of resource sharing by networking libraries and exchanging information. The library networked developed to get the benefits like:

- Access to centralized databases at economical cost
- Collectively acquiring information resources
- Qualitative need based core collection development useful to the users
- Consortium benefits like specialized database collection
- Increased resource sharing efforts
- Develop different projects like IR
- Providing better and enhanced library services to users for group of library's collection.
- Developing economical aspects while subscribing to resources and hardware.

6.7 Development of Library Network:

In 1960s Centre for Resource Libraries was built in Chicago. This center co-operate among 162 institutions to acquire, store and preserve information. The cost of library materials increases but library budgets remains as it is. As a result, in 1974 the Columbia, Harvard and Yale research libraries and other libraries in New York established the Research Libraries Group (RLG). This was born out of the belief that no library can be self sufficient to satisfy the information needs of all its patrons materially and service-

wise. RLG provided databases of library holding created cooperatively by member libraries. (Martey, 2002).

Resource sharing and library networks have grown mostly during the last thirty years in different geographical environment in order to cater to the specific needs of the users. United States and in other countries library networks are also growing and have emerged several models that provided specific services. The essential functions included were promotion of resource sharing, creation of resource sharing tools like union catalogues, rationalization of acquisition and maintenance of international standards for creation of records uniformly etc. Libraries have to be joining different networks depending upon the need and select a model, which conforms to its requirements. (Kaul, 1999)

In the developed countries resource-sharing and networking was started long back. For instance the growth of networks in the United States traced from the mid of 1960. USA is the birthplace of library networking and by now libraries in each state are networked to local, regional and national network. It is important to note that the United States Department of Education has been advocating a vigorous policy of promoting library networking. It offers networking grants, supports inter-library loan projects, automation and retro conversion projects, resource sharing schemes, etc. besides providing regular federal grants annually to the public and academic libraries.

Dickson and Holley (2010), examines the use of the major social networking tools in academic libraries in the USA. Social networking can be an effective method of student outreach in academic libraries if libraries take care to respect student privacy and to provide equal coverage for all subject areas. The author provides a snapshot on the use of social networking in academic libraries through a review of the available literature and an examination of the libraries' presence on the most popular social networking sites. It also provides help for academic libraries wishing to implement social networking.

Resource sharing worked very well in United Kingdom also. The best example is Birmingham Library Co-operative Maintenance Project (BLCMP) in Birmingham, has 13 million bibliographic records of books, serials, music etc. in its database and its catalogues get a hit rate of above 90% with more than 60 libraries comprising public libraries, college libraries, university libraries, national and special libraries. BLCMP has introduced EDI clearing house service in about 25 libraries. Networking of libraries is one of the most important issues in library and information community. The convergence of

computing and communications technology helps in developing resource sharing activities and manages use of information in different ways.

In Australia the resource sharing tools have grown from catalogue cards to national databases with the contributions of many old and large libraries. In Australian Bibliographical Network, the national and central bibliographic databases are maintained and co-ordinate and maintained by a national agency. Roxanne Missingham, (2007) describes the developments in Australian libraries and in particular the national inter library loan and document delivery systems, the outcomes of the Local Inter-lending and Document Delivery Administration Systems (LIDDAS) projects. Australian libraries have highly cooperative approach to resource sharing for many years. Inter library loan has become increasingly automated since the introduction of the online union catalogue in 1981 and the national inter-lending system in 1989. In 2004 interoperability was introduced, with developments in directories completing the national connected system. Rapid and easy access to interlibrary lending has increased significantly through automation of local and national systems. While the overall number of loans and copies has not increased the speed of delivery and efficiency of ILL has increased significantly. By understanding the environment that led to a coordinated approach to automation by libraries in a variety of sectors, and evaluating the outcomes of the technological developments.

Library co-operative programmes in Japan also initiated but not at high scale. The academic libraries of Japanese have made great efforts in co-operative programmes producing some fruitful results in library cooperation. Among national university libraries for instance a "Lending and Borrowing Agreement" was made in 1989 (Oshiro 2000).

Resource Sharing networks in the developing countries face problems of financial resources. In developed countries there is no such problem. In developed countries, government is taking active interest in promoting cooperative networks. However, in developing countries, Government is not showing much interest. In India, there is a problem of financial resources. However, there is no dearth of skilled human resources to manage such networks.

6.8 Development of Library Networks in India:

Library networking as a mean of resource sharing has its beginning in late 1970's and developed during 1980's. It is no wonder that libraries in all the countries of the world have adopted networking (Sivaraj, Esmail and Kanakaraj, 2007). Due to factors which are responsible for the development of library and information networks in India. The report of the working planning commission on modernization of library services and informatics for the seventh five year plan, 1985-1990 emphasized on resource sharing and networking of libraries. The National Policy on library and information systems submitted a document (1986) which was accepted by the ministry of HRD, Government of India. The report on national policy on university libraries is also prepared by the Association of Indian Universities (1987). The UGC report on information systems for science and technology under the Department of Science and Industrial Research (DSIR) Government of India has been vigorously promoting an integrated approach to library automation and networking. This move indicated the developments of library networks in India.

6.9 Library Associations and Networks:

The library associations and national organizations are working for the development of library profession in national and international level. The efforts of NISSAT and UGC are remarkable in achieving resource sharing with developing library networks at diffident levels e.g. local, national and international etc.

6.9.1 Library Networks in India: brief overviewed:

It is observed that the development of library networks in India took place massively during 1991 to 1995 due to efforts of NISSAT, UGC, DST, Library associations and different organizations. In the following table the development of network is in chronological manner and also discussed their role in the following paragraphs.

Table 6.1: Library Networks in India.

Sr. No.	Abbreviation of Library Networks	Full Title of Library Networks	Place Located	Establish ment Year	URL
1	BONET (BOSALA)	Bombay Library Network	Mumbai	1975 (1992)	http://www.bosla.org.in
2	INFLIBNET	Information and Library Network	Ahmadabad	1991	http://www.inflibnet.ac.in
3	PUNENET	Pune Library Network	Pune	1992	http://punenet.ernet.in
4	CALIBNET	Calcutta Library Network	Calcutta	1993	http://www.calibnet.org
5	MALIBNET	Madras Library Network	Madras	1993	www.malibnetonline.com
6	ADINET	Ahmadabad Library Network	Ahmadabad	1994	http://www.alibnet.org
7	MYLBNET	Mysore Library Network	Mysore	1995	http://mylibnet.org
8	BALNET	Bangalore University Academic Library Network	Bangalore	1995	www.bangaloreuniversity.ac.in
9	DELNET	Developing Library Network	New Delhi	1998-99	http://delnet.nic.in
10	MANLIBNET	Management Library Network	New Delhi	2000	http://manlibnet.in
11	NODLIBNET	National Open and Distance Learner's Library and Information Network	New Delhi	2007	http://nodlibnet.blogspot.com
12	INDOLIBNET	Indore Library Network	Indore		http://indolibnet.blogspot.com

Apart from this different organization like DESIDOC, DRTC, ILA, MALA, NASDOC, NCSI, NISCAIR, NISARRI, SLIS also made efforts to developed resource sharing activity in the country.

1. Bombay Science Librarian's Association (BOSLA):

It is a professional association of library and information professionals and working since 1970's. It is one of the oldest library associations in Mumbai. Academic libraries, college libraries, corporate and special libraries are the members of BOSLA. It has provided a platform to its members for professional development through organizing conference, workshops, seminars and training programmes.

The initiative was then taken by the librarians of Bhabha Atomic Research Centre (BARC), Department of Chemical Technology, Bombay University (UDCT), and Indian Institute of Technology (IIT), Bombay and Tata Institute of Fundamental Research (TIFR). They started meeting frequently to discuss and explore the possibilities of developing closer ties than routine inter-library loan. As a result of these efforts, the Mumbai Science Librarian's Association (BOSLA) was formed in October 1975. The objectives of the BOSLA were to improve the services of the Mumbai science libraries, to cooperate actively so as to benefit mutually by the resources available to the libraries, to strengthen the financial resources of the science libraries in Mumbai, to raise the professional standard of library staff in the Mumbai science libraries, to improve the status and service conditions of the library staff in Mumbai, to maintain liaison between the professionals and the government.

1.1. Bombay Library Network (BONET):

BONET was established in 6 November 1992. It was setup at the National Centre for Software Technology (NCST), Mumbai. The Network is sponsored by NISSAT. The main objective is to build a low cost of library information system which can possibly be used by members or participants of Bombay Library Network (earlier it was BOSLA).

BONET provided significantly benefits from the experience gained, and facilities created, by the Education and Research Networking (ERNET) project of the Department of Electronics, Govt. of India, assisted by the United Nations Development Programme (UNDP). BONET is aimed at promoting cooperation between libraries in Mumbai. It has focused on inter-library and resource sharing activities rather than on computerizing

individual libraries. BONET offers training related to library computerization and networking and speed up computerization of Mumbai libraries. BONET provided access to its centralized catalogues and E-mail facilities to BONET members. The access to library related services outside Mumbai in India and Abroad established because of ERNET. Organized training for staffs of participating libraries, online cataloguing, inter library loan facility, information retrieval services, online document delivery and many more services are offered by BONET.

2. Information and Library Network (INFLIBNET):

INFLIBNET center is an autonomous Inter-University Centre (IUC) of University Grants Commission, Government of India. It involved in creating infrastructure for sharing of library and information resources and services among academic and research institutions and it involves modernizing university libraries in India and connecting them to information centers in the country through a nation-wide high speed data network using the state-of-art technologies for the optimum utilization of information. INFLIBNET works collaboratively with Indian university libraries to shape the future of the academic libraries in the evolving information environment. It is national programme initiated by the UGC in 1991 with its Head Quarters at Gandhinagar, Ahmadabad. Initially started as a project under the IUCAA and became an independent Inter-University Centre in 1996. INFLIBNET is set out to be a major player in promoting scholarly communication among academicians and researchers in India.

INFLIBNET works towards modernization of libraries and information centers for transfer and access of information, supporting scholarships and learning and academic pursuits through a national network of libraries in around 264 universities, colleges and R&D institutions across the country.

INFLIBNET in India is the core autonomous body under University Grants Commission (UGC) for facilitation of library networks. The UGC INFONET is an excellent resource sharing program of INFLIBNET.

3. Pune Library Network (PUNENET):

PUNENET - Pune Libraries Networking is a joint programme of the University of Pune, National Chemical Laboratory (NCL) and Centre for Development of Advanced Computing (C-DAC) funded by National Information System for Science and

Technology (NISSAT), Department of Scientific and Industrial Research (DSIR), Government of India. It is hosted in the Bioinformatics Centre in University of Pune. It had maintained acentralized databases of information resources available in the member libraries of PUNENET. Other libraries also had access to database using link http://punenet.ernet.in or at http://202.41.70.50/index.html.

The main objectives behind establishing PUNENET was to interconnect all the libraries in Pune city through computer networking to increase the cooperation amongst the participating libraries and coordinate the activities to serve the user community efficiently and provide various information services to all the users by using various information sources and also provide active information exchange to users to keep themselves up-to-date in their information needs. 30 libraries and 15 library professionals were involved in PUNENET. They access Pune library network through modem. Users access data and use e-mail and internet facilities. Union catalogue is available for all users. Users can access publishers and book seller's databases, NICNET databases MEDLINE, US patent database, available on internet, Patent information, and Union catalogues of books available in British Libraries in India. The network was based on star topology the data was collected by the central team of PUNENET from all libraries and uploaded other the central server. The member libraries have access to it. Unfortunately this network could not survive.

4. Calcutta Library Network (CALIBNET):

CALIBNET is a Government of India project and has been launched by the National Information Systems for Science and Technology (NISSAT), Department of Scientific and Industrial Research (DSIR) and managed by the CALIBNET Society established under the West Bengal Government's Societies Registration Act 1961.

Main aim of CALIBNET is to provide the individual libraries and their reading members with cost-effective solutions to their information needs. The objective is building access to library and information resources available in the eastern region. It implements a series of databases, bibliographic, factual and intellectual assets of West Bengal. Members and users of CALIBNET have facilities to access Indian library and network resources, worldwide library catalogues, and data of national libraries of the World, electronic reference tools, newspapers and journals and provide information services. It

supports users for information services, services for library automation, manpower development opportunities and IT applications etc.

5. Madras Library Network (MALIBNET):

The need for interconnecting libraries and information centers in Madras was visualized in 1991. MALIBNET is a registered society of Tamil Nadu Government (Reg. No. 45/1993). It was founded in 1993. Initially six major academic institutions were directly linked to the MALIBNET host system. Two important databases have been created utilizing the resources available in Madras libraries. Nearly 83 libraries are contributing actively to MALIBNET and 37 major Education / Research institutions have joined as members of MALIBNET. Directory Database of Current Serials in Madras covering 30 libraries and contents database covering articles published in 300 journals available in Madras libraries are information products brought out by MALIBNET. Both these databases are continuously updated and also expanded regularly. They are available for online- access to any user photocopies of articles from member libraries can be supplied within two days.

The main aim and objectives behind establishing network is to undertake scientific research in the field of library and documentation evolves a network of libraries and information centers in India. Establish appropriate links to national and international libraries and networks and facilitate resource sharing and information dissemination through networks. Membership of MALIBNET is open to universities, colleges, R&D institutions, industries and individuals.

6. Ahmadabad Library Network (ADINET):

ADINET is a network of libraries and information centers in Gujarat which was established in 1994. It was established by National Information System for Science and Technology (NISSAT), Department of Science and Industrial Research, Government of India, New Delhi. The main aim of ADINET is to join libraries for resource sharing. The objective is to co-ordinate with other regional and national networks, to integrate the economic, scientific and technical information system into an effective network, to provide library consultancy services, to develop databases of AV materials and institutions and to help library and information users.

The different publications like ADINET Newsletter (Quarterly), Directory of Institutions, Colleges, Universities in Ahmadabad and Gandhinagar in Gujarat, Union list of 5540 Current Journals, Current Contents for Library and Information Science (CUCOLIS), Book of papers of seminars held each year, course materials of workshops and training programs are being brought out as intellectual output.

Similarly services provided through ADINET is maintaining a database of over 5500 current periodicals which received by over 140 libraries in Ahmadabad. Document delivery and inter-library loan, library staff development programme, digitization work, organized seminars on current trends in libraries to make aware of current developments in library professionals.

All institutions, corporate houses, booksellers, libraries and information centers, individual library professionals and students are member of ADINET and taking benefit of library network based activities. ADINET is functional library network in the area of Gujarat state.

7. Mysore Library Network (MYLBNET):

Mysore city is unique compared to any other metropolitan city due to the richness in information resources. It is also unique in a way where one can find information on many areas like food science, sericulture, speech and hearing, pharmacy, dentistry, polymer, medicine, archeology, anthropology, Indian languages and engineering at one place. Considering this uniqueness, the Mysore Library Network (MYLIBNET) was established at Mysore in the year 1995 and the Central Food Technological Research Institute (CFTRI) Mysore, being an active member of Mysore City Library Consortium (MCLC) and hosting this network in its premises. The Mysore Library Network was setup under the financial assistance from NISSAT. CFTRI is one of the premier sectoral centers of NISSAT in the area of food science and technology. With this added advantage, MYLIBNET is working closely with MCLC to promote information services in Mysore city.

There are 16 institutional members. The holding list of Mysore city libraries has been computerized and software has been developed to enable users to access the catalogue and information on-line. MYLIBNET provides e-mail facilities to its members.

MYLIBNET is also having the same objectives like other library networks in India. One of the main objectives of this network is to prepare a union catalogue of periodicals subscribed by the member libraries. Accordingly most of the library networks have been compiling the catalogue either in hard copy or in electronic form. Due to advancement in information technology, catalogue is now made available on the internet. MYLIBNET has also compiled this catalogue in the year 1996 in the machine-readable form and developed a software package for searching this catalogue either by institution name, journal title or by keywords. This software was released to its members in July 1996. MYLIBNET is organizing various programmes regularly for the benefit of library and information science professionals. Some of them are workshops.

8. Bangalore University Academic Library Network (BALNET):

Bangalore Academic Library Network (BALNET) is sponsored by JRD Tata Memorial Library, Bangalore. It was established in 1995. More than 100 Libraries are become members of this network. Bangalore University has a central library at a sprawling campus called Jnana Bharati and a Branch library in the heart of the city at the Central College campus. All the affiliated colleges have independent libraries. Libraries in this area been have already computerized and also have created bibliographical databases of their collections. BALNET developed a resource sharing model benefited to all participating libraries and avail inter-library loan and document delivery services. In the proposed model, the online union catalogue is prepared for students and faculty at the BU and any member colleges can search for required monographs, serials, conference proceedings, articles etc.

9. Developing Library Network (DELNET):

DELNET is the first operational library network in India. It was started as a project of the India International Centre in January 1988 and registered as a society in 1992. DELNET was supported by National Information System for Science and Technology (NISSAT), Department of Scientific and Industrial Research, Govt. of India. It was registered as a society in June 1992 under the Societies Registration Act of 1860 and is currently being promoted by the National Informatics Centre (NIC), Planning Commission, Govt. of India and India International Centre, New Delhi.

DELNET has been established with the prime objective of promoting resource sharing among the libraries of Delhi through the development of a network with aims to collect, store, and disseminate information besides offering computerized services to users, to coordinate efforts for suitable collection development and also to reduce unnecessary duplication wherever possible. Initially it was Delhi Library Networks but later it becomes Developing Library Networks.

DELNET has emerged as the first major operational library network in South Asia. It has more than 970 libraries as its members and includes 163 libraries in Delhi, 812 libraries outside Delhi in 30 States and Union Territories and 14 in overseas countries. DELNET maintains a Union catalogue of books and more than twenty other databases including National Bibliographic Database. DELNET offers access to more than fifty five lakh bibliographic records of books, journals, articles, CD's through online. The databases are growing in size every day. DELNET extensively provide inter library loan and document delivery services to its member libraries. The books can be select on ILL as well as the full text of the journal articles can be arranged through DELNET. This is also most functional library network.

10. Management Library Network (MANLIBNET):

Management Libraries Network (MANLIBNET) was established for sharing of resources and information among the management libraries by fostering a spirit of cooperation and weaving these together in a networking arrangement. The primary objective of MANLIBNET is to provide a common forum to the professionals and to develop understanding and co-operation particularly among management and business libraries and the librarians. MANLIBNET promotes outstanding library practices. On professional platforms MANLIBNET tries to put in contact with current and future leaders in the library profession.

MANLIBNET was established in year 1998 at the first convention held in Ahmadabad which was jointly organized by the IIM, Ahmadabad and Ahmadabad Management Association. This was followed by a series of conventions and seminars at various places including the IMT (Ghaziabad), IIM (Lucknow), IIM (Kozhikode), XLRI (Jamshedpur), NIFM (Faridabad), Nirma University (Ahmadabad), ICSSR (Mumbai and Delhi), KIIT University (Bhubaneswar), SSIM (Secundrabad), IIHMR (Jaipur) and University of Delhi South Campus.

11. National Open and Distance Learner's Library and Information Network (NODLIBNET):

NODLIBNET is a national network of distance learning for sharing collections, e-resources and providing services on a common platform. Currently access to the network resources is open to IGNOU student and academic community and soon be extended to state open universities and distance education institutes attached to conventional universities. Its mandated is to offer 24x7 online accesses to electronic resources anywhere anytime to authorize members of the NODLIBNET network.

NODLIBNET is a platform for libraries and information centers for Open and Distance learning system of the country and provide information resources and digitized content to its stakeholders from anywhere at any time using advanced technologies to enhance the quality of education at par with the conventional education system. The main aim is to create an integrated e-platform for scattered e-resources i.e. access to e-books/journals and digitized contents of library resources unique and relevant to target beneficiaries. This network and consortium involves all the participating institutions of the ODL State Open Universities (SOUs), Distance Education Institutes (DEIs) of conventional universities, National Institute of Open Schooling (NIOS), and IGNOU.

The inter-working of relevant accessible content from other national library network and consortia is planned to be forged to economize the efforts. The activities and services shall be on suitable architecture, technology based options, and type of infrastructure available at DLIs (Distance Learners Institutions) with a suitable model.

12. Indore Library Network (INDOLIBNET):

Indore Library Network has been designed for link and networks all the libraries available in the Indore city. The main objectives of Indore library network is resource sharing, developing forums for interaction among information professionals and helping those seeking solutions to common problems. To supports the library operation and forming Indore Library Consortia.

Increase in number of educational institutes there is a need felt to have a resource sharing between academic institutes. The idea for Indore Library & Information Network (INDOLIBNET) came up for the Indore city to utilize the resources in a better way and generate new services and professional forums for interaction among information

professionals and users. INDOLIBNET promoted better understanding among participating institutions and libraries for optimum utilization of the existing national information resources, systems and services and support exchange of information among institutions and prepare a common platform for the available information resources for better and effective usage. Network organized seminars and group discussions among professionals to offer services using IT and consortia.

Summary:

It is observed that the city library networks were established in different states of India due to efforts of NISSAT and UGC (DSIR/DST). The period 1991-1995 was the glorious period in which maximum networks have been established for achieving resources sharing among city libraries. The plan was to coordinate all the city network and established a national grid of information and provide services to users. But in mean time few networks like PUNENET stopped functioning and the scope restricted to city level only. After 1995 only countable networks like MANLIBNET (2000) established for management libraries. But no more progress visualized later. No doubt INFLIBNET is doing best at its level but some supporting city networks need to be developed to enhance the national activities. In the era of ICT it is now possible to develop advanced library networks easily then before. Due to ICT storing and transferring information is fast as compared to previous days in which any databases were established.

6.10 Role of NISSAT in Resource Sharing:

The efforts of National Information System for Science and Technology (NISSAT -1977) in this direction was appreciated as they have established national / regional information centers for specific subjects nearly at 12 places in India to strengthen the subject collection an provide information services based on charging.

NISSAT has established following national centers in India**.**

Table 6.2: Information and Research Centers developed by NISSAT

Sr. No.	Acronym	Concerned Institution	Subject Area
1	NICLAI	Central Leather Research Institute, Chennai	Leather Technology
2	NICFOS	National Information Centre for Food Science and Technology (NICFOS) Mysore	Food Technology
3	NICMAP	Central Manufacturing Technology Institute, Bangalore	Manufacturing Technology
4	NICDAP	Central Drugs Research Institute, Lucknow	Drugs and Pharmaceutical
5	NICTAS	Ahmedabad Textile Industry's Research Association, Ahmedabad	Textiles and Allied Subjects
6	NICHEM	National Chemical Laboratory (NCL), Pune	Chemicals & Allied industries
7	NICAC	Central Glass and Ceramic Research Institute, Calcutta	Advanced Ceramics
8	NCB	National Center on Bibliometrics (NCB)	Bibliometrics
9	NICRYS	National Information Center for Crystallography, Madras	Crystallography
10	NICDROM	National Information Center on CD-ROM (NICDROM) at National Aeronautic Laboratory (NAL), Bangalore,	CD-ROM (Compact Disk)
11	NICMAR	National Information Center for Material and Research, Pune	Materials Science
12	NICRYS	National Information Center for Crystallography, Chennai	Materials Science

Table 6.3: NISSAT Access Centres to International Database Services

Sr. No.	Concerned Institutions	Place
1	National Aerospace Laboratory	Bangalore
2	Indian Association for Cultivation of Science	Kolkata
3	Central Leather Research Institute	Chennai
4	NISCAIR	New Delhi
5	National Chemical Laboratory	Pune
6	Ahmedabad Textile Industry's Research Association	Ahmadabad
7	Victoria Jubilee Technical Institute	Mumbai
8	Centre for Cellular and Molecular Biology	Hyderabad
9	Kerala State Industrial Development Corporation	Thiruvananthapuram

The activities of NISSAT were very essential and also assisted very well but the project of NISSAT developed by DST stopped since 2005.

Similar efforts have been made by DESIDOC, DRTC, NASSDOC, INSDOC now NISCAIR, SALIS and SATKAL.

Table 6.4: Library Association in India.

Sr. No.	Abbreviation of Library Networks	Full Title of Library Networks	Place Located	Establishment Year	URL
1	MALA	Madras Library Association	Madras	1927	http://mala.managedbiz.com/index.htm
2	ILA	Indian Library Association	New Delhi	1933	http://www.ilaindia.net
3	DLA	Delhi Library Association	Delhi	1939	http://www.dlaindia.org

4	IASLIC	Indian Association of Special Libraries and Information Centers	Kolkata	1955	http://www.iaslic1955.org.in
5	DESIDOC	Defense Scientific Information and Documentation Centre	New Delhi	1958	http://drdo.gov.in/drdo
6	KLA	Kerala Library Association	Kerala	1961	http://www.keralalibraryassociation.org/
7	DRTC	Documentation Research and Training Centre	Bangalore	1962	http://drtc.isi.bang.ac.in/DRTC/
8	NASSDOC	National Social Science Documentation Center	New Delhi	1969	http://www.icssr.org
9	NCSI	National Center for Science Information	Bangalore	1983	http://ncsinet.org/ncsi
10	NISCAIR	SAARC Documentation Centre	New Delhi	2002	http://www.sdc.gov.in
11	SALIS	Society for Advancement of Library and Information Science	Chennai	2002	http://autolib-india.net/salis/salis-about.asp
12	SATKAL	Satinder Kaur Ramdev Memorial Trust for Advancement of Leadership	Chandigarh	2000	http://www.satkal.org/SATKAL-INDEX/

These organizations made efforts towards resource sharing by developing information centers at their institutional level and made efforts towards sharing resources. Viz.

- DESIDOC - for DRDO Laboratories
- NISCAIR (INSDOC) - for CSIR Laboratories
- NASSDOC - for Social Science Academics
- DRTC - for Library and Information Science
- SALIS - for Library and Information Science
- SATKAL - for Library Professionals

In recent period IIM, IISC, IISER made efforts in coordinating resource sharing activities at their institutional digital libraries by establishing or joining consortium ventures.

6.11 Role of Indian Library Associations in India:

Apart from library networks few library associations in India also made efforts and shared the resource sharing task by acting as information providers from their centers. Library associations in India also supported to resource sharing by developing are windows services to users. They provide the services to users. The library associations Delhi library associations, IASLIC, ILA, KLA, MALA, SIS, IATLIS and national library of India made maximum efforts towards resource sharing.

Thus the progress of resource sharing initiated in Indian scenario and now currently in the ICT era. It is observed that new methods of resource sharing have been introduced by means of consortia practices. The efforts of CSIR, UGC, IIM, IIT, ISIISER, Astronomy, Astrophysics, ICMR, ICAR etc also developed consortia for achieving economy in subscribing to e-resources further development of institutional repository at different educational and academic level developed resource sharing activities by compiling full text literature published by them.

6.12 International Association and Networks:

Library association working at international level has made maximum efforts to achieve resource sharing. International library association listed in Table 6.5 are prominent in providing user services based on sharing resources from local and international libraries.

Table 6.5: International Library Associations and Networks

Sr. No.	Abbreviation of Library Networks	Full Title of Library Associations	Place Located	Establish ment Year	URL
1	ALA	American Library Association	United States	1876	http://www.ala.org/
2	SLA	Special Library Association	United States	1909	http://www.sla.org
3	ALISE	Association for Library and Information Science Education	Chicago	1915	www.alise.org/
4	ASLIB	Association for Information Management	United Kingdom	1924	www.aslib.co.uk
5	IFLA	International Federation of Library Associations and Institutions	Scotland	1927	www.ifla.org
6	ASIST	American Society for Information Science Technology	USA	1937	https://www.asis.org/
7	ALIA	Australian Library and Information Association	Australia	1937	www.alia.org.au
8	SCURL	Scottish Confederation of University and Research Libraries	Scotland	1950	www.scurl.ac.uk
9	SCONUL	Society of College, National and University Libraries	UK	1950	www.sconul.ac.uk
10	IATUL	International Association of Technological University	Germany	1955	www.iatul.org

		Libraries			
11	OCLC	Online Computer Library Center	Europe	1967	www.oclc.org
12	ALPSP	Association of Learned and Professional Society Publishers	UK	1972	www.alpsp.org
13	NFIL	National Forum on Information Literacy	Cambridge	1989	www.infolit.org
14	CNI	Coalition for Networked Information	Washington	1990	www.cni.org
15	JISC	Joint Information Systems Committee	United Kingdom	1993	www.jisc.ac.uk
16	CLIR	Council on Library and Information Resources	Washington	1997	www.clir.org
17	ILIAC	International Library Information and Analytical Center	Washington	1997	www.iliac.org
18	CILIP	Chartered Institute of Library and Information Professionals	UK	2002	http://www.cilip.org.uk/Pages/default.aspx

The brief activity of each association is narrated below:

1. American Library Association (ALA):

The American Library Association (ALA) is a non-profit organization in United States in 1876 and promotes libraries and library education internationally. It is the oldest and largest library association in the world with more than 62,000 members. The main purpose of the association is "to promote library service and librarianship." Members may also join any of seventeen round tables that are grouped around more specific interests and issues than the broader set of ALA divisions.

2. Special Library Association (SLA):

Special Libraries Association (SLA) is an international professional association for library and information professionals working in business, government, law, finance, non-profit and academic organizations and institutions. SLA was established in 1909 in the United States. It is now an international organization with over 9,000 members in over 75 countries.

While special libraries include law libraries, news libraries, corporate libraries, museum libraries, medical libraries, and transportation libraries many information professionals today do not actually work in a library setting. They actively apply their specialized skills to support the information needs of their organizations. Members of SLA typically possess a master's degree in library or information science. Given the rapid adoption of information technologies for selecting, analyzing, managing, storing, delivering information and knowledge the average SLA member might be performing a range of services and employing a diverse mix of skills related to but not exclusive of library science. Association activities include conferences, professional education, networking and advocacy.

3. Association for Library and Information Science Education (ALISE):

Association for Library and Information Science Education (ALISE) was founded as the Association of American Library Schools. The original association grew out of a series of informal meetings of library school faculty at American Library Association (ALA) conferences which was known as the Round Table of Library School Instructors. The Round Table voted in 1915 to form a permanent organization and to be identified as the Association of American Library Schools. The association has provided a forum for library educators to share ideas, to discuss issues and to seek solutions to common problems. In 1983 the association changed its name to its present form to reflect more accurately the mission, goals, and membership of the association.

4. Association for Information Management (ASLIB):

ASLIB serve information professionals and librarians across all sectors. ASLIB supports members to enhance their own performance through the provision of comprehensive resources, specialist training, communities of practice, advice and international networking. ASLIB has a key focus on presenting essential reading and services for busy

information professionals, translating research and policy for application. ASLIB provides expertise in information governance, management and the development of procedures and skills to steer organizations successfully in these areas.

5. International Federation of Library Associations and Institutions (IFLA):

The International Federation of Library Associations and Institutions (IFLA) is a leading international association of library organizations. It is a global voice of the library and information profession, and its annual conference provides a venue for librarians to learn from one another. The IFLA forum promotes international cooperation, research and development in all fields related to library activities. A very important and close partner of the IFLA is UNESCO. Several of the manifestos prepared by committees of the IFLA and have been recognized as UNESCO manifestos. IFLA is part of the International Committee of the Blue Shield (ICBS), which works to protect the world's cultural heritage threatened by wars and natural disaster. IFLA was founded in Edinburgh, Scotland, in 1927. IFLA has now grown to over 1,600 members in approximately 150 countries. It is headquartered in the Koninklijke Bibliotheek, the national library of the Netherlands, in The Hague. The objectives of IFLA are to represent librarianship in matters of international interest, to promote the continuing education of library personnel, to develop, maintain and promote guidelines for library services. IFLA Journal, Annual Report, IFLA Publication Series, IFLA Professional Reports are the publications of IFLA.

6. American Society for Information Science Technology (ASIST):

The American Society for Information Science and Technology (ASIST) is a non-profit membership organization for information professionals.   Established in 1937 as American Documentation Institute, the organization sponsors an annual conference as well as several serial publications, including the Journal of the American Society for Information Science and Technology (JASIST) and the Society Bulletin. The Society has special-interest groups or SIGs which provides administration for geographically defined chapters connects job seekers with potential employers and provides organizational support for continuing education programs for information professionals.

7. Australian Library and Information Association (ALIA):

The Australian Library and Information Association (ALIA) is the peak professional organization for the Australian library and information services sector. Established in

1937 as the Australian Institute of Librarians, the association assumed the title of the Library Association of Australia in 1949 and in 1989 adopted the new name of the Australian Library and Information Association in recognition of the broadening scope of the profession. The association is governed by a constitution and is guided by a vision, mission, objects and values.

8. Scottish Confederation of University and Research Libraries (SCURL):

Scottish Confederation of University and Research Libraries (SCURL) collaborate on behalf of Scottish Higher Education and Research Libraries achieving best value for the investment on content for the benefit of our users. Collections sharing, electronic content licensing, electronic content loading/presentation, storage facilities and training are the main functions of SCURL. With this collaborative professional development opportunities for our colleagues, collection management policies for Scottish academic and research libraries, disaster and business recovery community of practice, Library Services Platform Task Force investigating potential for one LMS for SCURL members, Scottish Metadata Platform Group, Open Access Working Group and Scottish Higher Education Digital Library are few important functions of SCURL.

9. Society of College, National and University Libraries (SCONUL):

SCONUL (Society of College, National and University Libraries) is the membership organization for all academic and national libraries in the UK and Ireland. SCONUL was established in 1950 as the Standing Conference of National and University Libraries. In 1994 when British polytechnics became universities it merged with COPOL, the Council of Polytechnic Librarians, and in 2001 it extended its membership to libraries of colleges of higher education and changed to its current name. The current membership of SCURL comprises the Scottish University and HEI libraries, the two major public reference libraries in Glasgow and Edinburgh, the National Library of Scotland, National Museums Scotland, and the Open University. SCONUL's activities include advocacy for the higher education library community, training and sharing best practice, making arrangements for reciprocal access to libraries, and the collection of statistics. The Society of College, National and University Libraries (SCONUL) represents all university libraries in the UK and Ireland, irrespective of mission group as well as national libraries and many of the UK's colleges of higher education.

SCONUL promotes awareness of the role of academic libraries in supporting research excellence and student achievement and employability and represents their views, interests to government, regulators and other stakeholders. It helps academic libraries collaborate to deliver services efficiently, including through shared services, to share knowledge and best practice.

10. International Association of Technological University Libraries (IATUL):

The International Association of Technological University Libraries (IATUL) was established in Düsseldorf, Germany in May 1955, as an international forum for the exchange of ideas relevant to librarianship in technological universities throughout the world. IATUL is a voluntary international non-governmental organization of a group of libraries, represented by their library directors or senior managers, who have responsibility for information services and resources management. The expanded name of IATUL was changed to the International Association of Scientific and Technological University Libraries in 2009 General Assembly to reflect the broader range of institutions which now make up the membership of the association. IATUL is an excellent example of the development of an effective informal international network between libraries of similar type, with a common high level of professional expertise and offering a similar range of services to their users. The main objective of IATUL is to provide a forum where library directors and senior managers can meet to exchange views on matters of current significance and to provide an opportunity for them to develop a collaborative approach to solving problems.

11. Online Computer Library Center (OCLC):

Online Computer Library Center, Inc. (OCLC) is a nonprofit membership computer library service and research organization dedicated to the public purposes of furthering access to the world's information and reducing information costs. Established in 1967 as the Ohio College Library Center, OCLC and its member libraries cooperatively produce and maintain WorldCat, the largest Online Public Access Catalog (OPAC) in the world. OCLC provides bibliographic, abstract and full-text information to anyone.

OCLC database contains records in Machine Readable Cataloging (MARC) format contributed by library catalogers worldwide who use OCLC as a cataloging tool. These MARC format records are then downloaded into the libraries local catalog systems. This

allows libraries to find and download records for materials to add to their local catalog without the lengthy process of cataloging each individually.

12. Association of Learned and Professional Society Publishers (ALPSP):

The Association of Learned and Professional Society Publishers (ALPSP) is an international trade association of non-profit publishers created in 1972 with 24 society members. It is the largest association of scholarly and professional publishers in the world and claiming "more than 360 members in 36 countries". This association was granted in 2004 the International Information Industry Award. The association has committees on copyright, marketing, professional education and training and electronic developments. Recent work has included policies and practice in online publishing. The main aim of this association is to serve, represent and strengthen the community of scholarly publishers and those who work with them. ALPSP provides information, education, representation, cooperative initiatives and guidelines for good practice. ALPSP always conducts different activities like training, seminars, webinars etc.

13. National Forum on Information Literacy (NFIL):

The National Forum on Information Literacy (NFIL) was created in 1989 as a response to the recommendations of the American Library Association's Presidential Committee on Information Literacy. These education library and business leaders stated that no other change in American society has offered greater challenges than the emergence of the information age. The mission of the National Forum on Information Literacy is to mainstream information literacy philosophy and practices throughout every sector of American society. Information is expanding at an unprecedented rate and enormously rapid strides are being made in the information and communication technology universe for storing, organizing and accessing the ever-growing tidal wave of information. The combined effect of these factors is an increasingly fragmented information base a large component of which is available only to people with money and/or acceptable institutional affiliations. In the recent past the outcome of these challenges has been characterized as the "digital divide".

14. Coalition for Networked Information (CNI):

The Coalition for Networked Information (CNI) is an organization whose mission is to promote networked information technology as a way to further the advancement of

intellectual collaboration and productivity. The Coalition for Networked Information (CNI) is a joint initiative of the Association of Research Libraries (ARL) and EDUCAUSE. It was established in 1990 CNI works on a broad array of issues related to the development and use of digital information in the research and education communities. CNI fosters connections and collaboration between library and information technology communities, representing the interests of a wide range of member organizations from higher education, publishing, networking and telecommunications, information technology, government agencies, foundations, museums, libraries and library organizations. Paul Evan Peters was the founding Executive Director.

15. Joint Information Systems Committee (JISC):

JISC (formerly the Joint Information Systems Committee) is a United Kingdom non-departmental public body whose role is to support post-16 and higher education and research, by providing leadership in the use of ICT in learning, teaching, research and administration.

JISC was established on 1st April 1993 under the terms of letters of guidance from the Secretaries of State to the newly-established Higher Education Funding Councils for England, Scotland and Wales, inviting them to establish a Joint Committee to deal with networking and specialist information services. JISC was to provide national vision and leadership for the benefit of the entire higher education sector. The organization inherited the functions of the Information Systems Committee (ISC) and the computer board which had served universities. JISC supports the development of innovative uses of ICT helping the education and research communities to exploit the full potential of information technologies.

16. Council on Library and Information Resources (CLIR):

The Council on Library and Information Resources (CLIR) was created in 1997 through the merger of the Council on Library Resources and the Commission on preservation and access. To understand CLIR, one must first look at its two parent organizations. The Council on Library and Information Resources is an independent, nonprofit organization that forges strategies to enhance research, teaching and learning environments in collaboration with libraries, cultural institutions and communities of higher learning. CLIR aspires to transform the information landscape to support the advancement of

knowledge. CLIR promotes collaborative solutions that transcend disciplinary, institutional, professional and geographic boundaries in support of the public good.

17. International Library Information and Analytical Center (ILIAC):

International Library Information and Analytical Center (ILIAC) is a non-profit US-based corporation of international status set up to contribute to the development of educational, scientific, cultural and business cooperation between Russia, CIS, USA and other countries. ILIAC is an information gateway to Russia and the CIS countries for the American public primarily in library and information field but also in wider areas of culture science and education.

ILIAC is an associative member of the International Federation of Library Associations and Institutions a member of the International Association of Users and Developers of Electronic Libraries and New Information Technologies (ELNIT) a co organizer of major international conferences "CRIMEA" and "LIBCOM" in library-information sphere.

Its mission is to ensure efficient and multidimensional international cooperation in library and information field, to contribute to the development of science-tech, cultural and educational links between Russia, CIS, USA and other countries. Organization of international professional research, study and training programs on current problems of library information and publishing business, web technologies, legal and other aspects of the information society development serving as a multi-purpose clearing house and gateway to library and information resources of Russia.

18. Chartered Institute of Library and Information Professionals (CILIP):

The Chartered Institute of Library and Information Professionals (CILIP) is the leading professional body for librarians, information specialists and knowledge managers in the United Kingdom. CILIP's vision is a fair and economically prosperous society underpinned by literacy, access to information and the transfer of knowledge. CILIP has approximately 15,000 members (May, 2012). It is established in 2002 by the merger of the library association.

6.13 Library Consortia - Trends in Resource Sharing:

In the era of information explosion and ICT development of digital libraries, research and development activities all over the world are now trying to satisfy the information need of

users by developing consortium. According to users demands of information libraries need to share their resources with each other. Resource sharing is based on networking of resources and sharing them. Use of internet is essential part of resource sharing.

Library consortia are a new trend for sharing resources among the participant's libraries. Library consortium development is based on library type academic, special, public etc. A consortium is an agreement, a common platform, aiming to reduce costs per unit through or group of libraries formatting consortia. A consortium is an association of two or more individuals, companies, organizations or governments with the objective of participating in a common activity or pooling their resources for archiving common goal. Consortium is a Latin word, meaning partnership, association or society and derives from consors partner itself from con-together and sors 'fate', meaning owner of means or comrade.

According to Wikipedia, the free encyclopedia, A library consortium is a group of libraries that partner to coordinate activities, share resources, and combine expertise. The international coalition of library consortia is an informal discussion group of such consortia. Library consortia concepts came first time from academic libraries for the sharing printed and e-resources materials. Recently academic libraries are having consortia to provide common access to electrical resources across the internet and they are forming these consortia on a statewide basis library. This task is very difficult for single library however by forming a consortium among libraries. It becomes possible to purchase in stabilized and reasonable prices.

A library consortia can be at local, state, national and inter-institutional levels for making the resources and services available both within the premises of members and outside for the benefit of members. There are a number of basic issues that consortia members should be aware of like number of participants in the consortium, security methods, pricing formula, and negotiation for consortia which may differ according to the setup. Successful consortia exist to expand further the mission of member- institutions by strengthening them.

6.13.1 Types of Consortia:

A wide variety of consortia exists presently all over the world ranging from very simple to very complex organizations. The different patterns that are found in the nature of the consortia are narrated in Figure 6.1
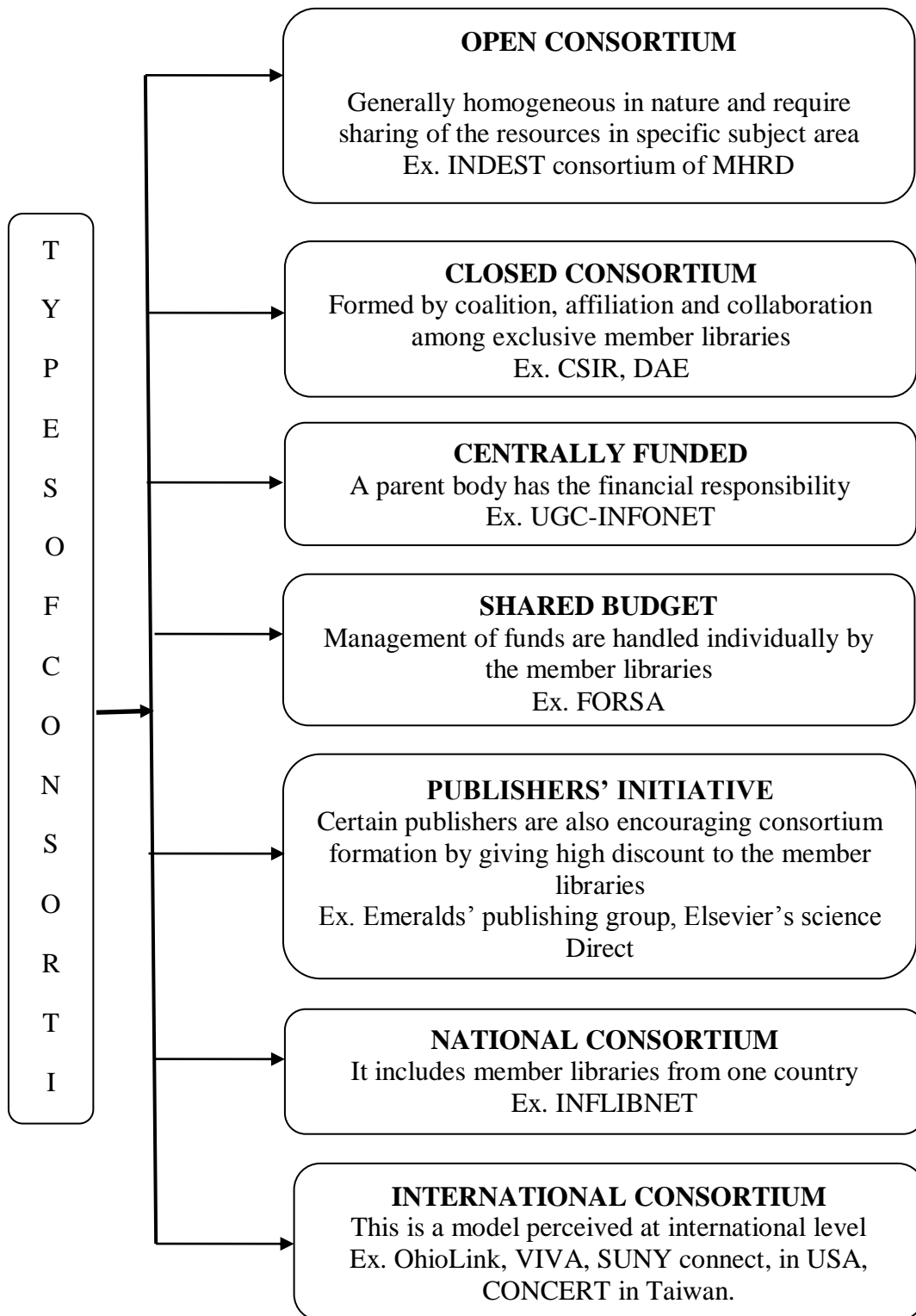
Figure 6.1 Types of Consortium

TYPES OF CONSORTI

OPEN CONSORTIUM

Generally homogeneous in nature and require sharing of the resources in specific subject area
Ex. INDEST consortium of MHRD

CLOSED CONSORTIUM
Formed by coalition, affiliation and collaboration among exclusive member libraries
Ex. CSIR, DAE

CENTRALLY FUNDED
A parent body has the financial responsibility
Ex. UGC-INFONET

SHARED BUDGET
Management of funds are handled individually by the member libraries
Ex. FORSA

PUBLISHERS' INITIATIVE
Certain publishers are also encouraging consortium formation by giving high discount to the member libraries
Ex. Emeralds' publishing group, Elsevier's science Direct

NATIONAL CONSORTIUM
It includes member libraries from one country
Ex. INFLIBNET

INTERNATIONAL CONSORTIUM
This is a model perceived at international level
Ex. OhioLink, VIVA, SUNY connect, in USA, CONCERT in Taiwan.

Table 6.6 Library Consortia

Sr. No.	Consortium	Name of Organization	Place and Area	Year of Establishment	URL
1	ICMR	Indian Council of Medical Research	New Delhi Medical	1911	http://icmr.nic.in/icmrnews/e_consortia.htm
2	CSIR	Council of Scientific and Industrial Research	New Delhi S&T	1942	www.csir.res.in/
3	FORSA	The Forum for Resource Sharing in Astronomy & Astrophysics	Bangalore Astronomy & Astrophysics	1982	http://www.iiap.res.in/library/forsa.html
4	UGC-DAE	UGC-DAE Consortium for Scientific Research	Indore Nuclear Science	1990	http://www.tifr.res.in/~libws/
5	IIM's Library Consortia	Indian Institute of Management (IIM) Library Consortia	Ahmadabad Management	1991	http://www.iimsworld.in/consort.htm
6	ISRO	Indian Space Research Organization	Bangalore Space Technology	1992	http://www.isro.org/satellites/studsat.aspx
7	HELINET	Health Sciences Library & Information Network	Karnataka Medical	1994	http://www.rguhs.ac.in/hn/newhell.html
8	INDEST-AICTE	Indian National Digital Library in Engineering Sciences and Technology	New Delhi Engineering	2003	http://paniit.iitd.ac.in/indest/
9	UGC-INFONET	INFONET Digital Library Consortium	Ahmadabad Education and Academics	2003	http://www.inflibnet.ac.in/econ/ http://web.inflibnet.ac.in/info/ugcinfonet/ugcinfonet.jsp

10	ICICI Knowledge Park	Industrial Credit and Investment Corporation of India (ICICI) Knowledge Park	Hyderabad Industries		www.ikpknowledge park.com/

1. Indian Council of Medical Research (ICMR):

The council has under taken many new initiatives like subscribing to JCC@ICMR and full text electronic databases i.e. ProQuest. To keep pace with the rapidly changing information technology scenario, the council entered into the e-journal arena through developing an e-journal consortium. In phase–I of this activity, the ICMR has identified five core bio-medical journals and subscribed for e-version in consortia mode to all ICMR institutes. These include Lancet, Science, BMJ, NEJM and Nature. E-journal consortium is beneficial for cross sharing of information among the ICMR Institutes. ICMR library has taken a major project of a compilation of the union catalogue of journals available in ICMR Libraries in the year 2001. This union catalogue of journals in ICMR libraries would help serve scientists working in ICMR for quickly accessing information on all the journals subscribed by the ICMR.

2. Council of Scientific and Industrial Research (CSIR):

CSIR is established in 1942, is an autonomous body under the provision of the registration of societies ACT XXI of 1860. CSIR is India's largest Research and Development (R&D) organization. CSIR is mainly funded by the Ministry of Science and Technology. The Research and Development activities of CSIR includes various fields such as aerospace engineering, structural engineering, ocean sciences, life science, metallurgy, chemicals, mining, food, petroleum, leather and environment.

3. The Forum for Resource Sharing in Astronomy & Astrophysics (FORSA):

The Forum for Resource Sharing in Astronomy & Astrophysics (FORSA) came into existence in the year 1982 for sharing the resources available in astronomy libraries in the country. In 2004 this group has extended its membership to Physics and Mathematics libraries in the country who have common interests to carry forward the aim of FORSA and its activities. Currently FORSA has twelve members and it works towards the goals and services which the founder members have started.

4. UGC-DAE Consortium for Scientific Research (UGC-DAE):

UGC-DAE was created in the year 1990 with the broad objective of developing competence and promoting research in front line areas of science and technology in Indian universities by providing institutional framework for optimum utilization of major research facilities established by the department of Atomic Energy such as Dhruv Reactor of Mumbai, VECC at Kolkata and Synchrotron Radiation Sources at Indore. The facilities of IUC can be availed by scientists from any university. UGC-DAE consortium for Scientific Research located in Indore, India has three centres Mumbai (Maharashtra), Kolkata (West Bengal), Kalpakkam (Tamilnadu). It was formerly known as Inter University Consortium for DAE facilities.

5. Indian Institute of Management (IIM) Library Consortia:

IIM library consortia is a digital library network system based on internet technology to provided the IIM community (faculty, students and staff) an online web enabled access to the information resources available in all the IIMs without any barriers of time and distance. It will be a simple, efficient and cost effective system. The basic operating principle of this system is decentralized acquisition, decentralized processing and centralized utilization. IIM/INDEST consortia have the distinction of representation of almost all major publishers in the field of Management such as Elsevier, Kluwer, John Wiley, Blackwell, Taylor & Francis, and MCB University Press (Emerald Full-Text Intelligent Library). Also world renowned aggregators such as EBSCO and PROQUEST and a number of corporate information content providers/vendors participate in the consortium. The end result has been highly praiseworthy, that over 1050 E-journals directly are sourced from various publishers and over 10000 aggregated full-text E-Journals. IIMs are able to get online access across all the campuses by paying a nominal additional amount.

6. Indian Space Research Organization (ISRO):

Indian Space programme started for promoting space activities in the country and concentrated on achieving self reliance and developing capability to build and launch communication satellites for television broadcast, telecommunications and meteorological applications remote sensing satellites for management of natural resources.

The objective of ISRO is to develop space technology and its application to various national tasks. Accordingly Indian Space Research Organisation (ISRO) has successfully operationalised two major satellite systems namely Indian National Satellites (INSAT) for communication services and Indian Remote Sensing (IRS) satellites for management of natural resources also Polar Satellite Launch Vehicle (PSLV) for launching IRS type of satellites and Geostationary Satellite Launch Vehicle (GSLV) for launching INSAT type of satellites.

7. Health Sciences Library & Information Network (HELINET):

It is hosted by Rajiv Gandhi University of Health Science, Bangalore. It is the first medical consortia launched in the country. The main objective of network the libraries affiliated to the university to promote resource sharing especially with reference to international medical journal and databases. HETNET is the first resource sharing network and e-journal consortium in the medical education sector. The main goal of HELINET is to deliver information to user's desktop with round-the-clock access.

8. Indian National Digital Library in Engineering Sciences and Technology (INDEST) Consortium (INDEST – AICTE):

The Ministry of Human Resource Development (MHRD) has set-up the Indian National Digital Library in Engineering Sciences and Technology (INDEST) consortium on the recommendation made by the expert group appointed by the ministry under the chairmanship of Prof. N. Balakrishnan. The Ministry provides funds required for subscription to electronic resources for institutions including IISc, IITs, NITs, IIMs and a few other centrally-funded Government institutions through the consortium headquarters set-up at the IIT Delhi. Besides, Government of Government-aided engineering colleges and technical departments in universities have joined the consortium with financial support from the AICTE. Moreover the INDEST-AICTE consortium as an open-ended proposition, welcomes other institutions to join it on their own for sharing benefits it offers in terms of highly discounted rates of subscription and better terms of agreement with the publishers. All electronic resources being subscribed are available from the publisher's website. The consortium has an active mailing list and a website hosted at the IIT Delhi.

9. INFONET Digital Library Consortium (UGC-INFONET):

The UGC-INFONET Digital Library Consortium was formally launched in December 2003 after providing the internet connectivity to the universities under the UGC-INFONET programme. The consortium proved to be a recipe to university libraries which have been discontinuing subscription of scholarly journals because of 'Serials Crisis'. The term 'Serials Crisis' refers to exponential and continuing increase in subscription cost of scholarly journals. The crisis is a result of rise in cost of journals much faster than the rate of inflation, increase in number of journals and the paucity of funds available to the libraries.

The consortium provides current as well as archival access to more than 7000+ core and peer-reviewed journals and 10 bibliographic databases from 26 publishers and aggregators in different disciplines. In the first phase that began in 2004 access to e-resources was provided to 50 universities who had internet connectivity under the UGC-INFONET connectivity programme of the UGC. In the second phase, 50 more universities were added to the programme in the year 2005. So far 160 Universities out of 181 that come under the purview of UGC have been provided differential access to subscribed e-resources. These e-resources covers almost all subject disciplines including arts, humanities, social sciences, physical sciences, chemical sciences, life sciences, computer sciences, mathematics and statistics etc. The programme is wholly funded by the UGC and executed by the INFLIBNET (Information and Library Network) Centre, Ahmadabad.

10. Industrial Credit and Investment Corporation of India (ICICI) Knowledge Park:

ICICI Knowledge Park is the joint venture of the government of Andhra Pradesh. Industrial Credit and Investment Corporation of India (ICICI), Hyderabad aimed at offering state of art infrastructure and facilitating collaborative research and knowledge share in the area of biotechnology, bulk drugs, pharmaceuticals, information technology (hardware), agro industries and new materials. The new ICICI Knowledge Park in Hyderabad offers world-class infrastructure and also support facilities for business driven research in India, a country that offers an inexpensive source of knowledge workers the Industrial Credit and Investment Corporation of India claims. The park also seeks to build

a knowledge network to facilitate collaborative research and knowledge sharing with world-renowned academic and research organizations in the country.

Library consortia are providing physical and electronic document delivery of materials and integrating the collection development process. Consortia are tools which aids in exploiting the features of the e-resources as well as in effecting savings.

Summary:

The world has been witnessing a knowledge and information explosion during the past decades. Information technology is evolving at a rapid pace worldwide to cater to the need for providing information in any form at anywhere. Access to information holds the key to development. While there is a deluge of information on one hand, the cost of collecting, processing, storing and disseminating information has been spiraling up on the other hand. Because of this resource sharing and co-operative functioning through networking have become inescapable for libraries and information centers worldwide.

They are trying to form a larger community in an effort to take the ever increasing demands for better services. This was resulted in discernible change in the information scenario. Library and information activities have entered in new era. Today information and communication technology (ICT) has made resource sharing a reality. In fact networking of libraries is a crucial factor in today's ICT era. It has extended the mutual co-operation, fast retrieval of information and efficient service among the libraries. Resource sharing and networking is a great boon in which needs to be implemented progressively and professionally. This initiative generated optimum satisfaction among users and also save considerable national resources.

It is noticed that after networking of libraries and internet facilitates made it now possible to develop consortium. But consortiums are limited at higher level or institute or organizational level. But an effort to network local group of libraries is need of present time. An effort towards this direction is required and researcher tried to cover in the present study.

References:

- Ahmadabad Library Network (ADINET). Retrieved from http://www.alibnet.org on dated 22 Feb 2012.

- American Library Association (ALA). Retrieved from http://www.ala.org/aboutala/on dated 12 Oct 2013.

- American Library Association (ALA). Retrieved from http://en.wikipedia.org/wiki/American_Library_Association on dated 12 Oct 2013.

- American Society for Information Science and Technology (ASIST). Retrieved from

  http://en.wikipedia.org/wiki/American_Society_for_Information_Science_and_Technology on dated 25 Oct 2013.

- American Society for Information Science Technology (ASIS). Retrieved from https://www.asis.org/about.html on dated 18 Oct 2013.

- Association for Information Management (ASLIB). Retrieved from http://www.aslib.com/about/about_us.htm on dated 16 Jan 2013.

- Association for Information Management (ASLIB). Retrieved from http://www.aslib.co.uk on dated 20 Jan 2013.

- Association for Library and Information Science Education (ALISE). Retrieved from http://www.alise.org/index.php?option=com_content&view=article&id=437 on dated 16 Oct 2013.

- Association of Learned and Professional Society Publishers (ALPSP). Retrieved from http://www.alpsp.org/Ebusiness/Home.aspx on dated 15 May 2013.

- Association of Learned and Professional Society Publishers (ALPSP). Retrieved from

  http://en.wikipedia.org/wiki/Association_of_Learned_and_Professional_Society_Publishers on dated 15 May 2013.

- Australian Library and Information Association (ALIA). Retrieved from http://www.alia.org.au/ on dated 15 Sep 2013.

- Australian Library and Information Association (ALIA). Retrieved from http://en.wikipedia.org/wiki/Australian_Library_and_Information_Association on dated 12 Sep 2013.

- Bangalore University Academic Library Network (BALNET). Retrieved from

www.bangaloreuniversity.ac.in on dated 15 May 2012.

- Bombay Library Network (BOSLA). Retrieved from http://www.bosla.org.in on dated 28 March 2011.

- Buckeley, Barbara. (1999). Library Cooperation and Partnerships, in the United Kingdom: How joined up government is leading to joined up Libraries. Retrieved from http://www.cus.edu.au/special/raiss99/papers/bbuckley.html on 10 Dec 2013

- Calcutta Library Network (CALIBNET). Retrieved from http://www.calibnet.org on dated 21 Aug 2011.

- Chartered Institute of Library and Information Professionals (CILIP). Retrieved from http://www.cilip.org.uk/about-us/business-areas/pages/default.aspx dated 16 Oct 2013.

- Chartered Institute of Library and Information Professionals (CILIP). Retrieved from

  http://en.wikipedia.org/wiki/Chartered_Institute_of_Library_and_Information_Professionals on dated 12 Oct 2013

- Coalition for Networked Information (CNI). Retrieved from http://en.wikipedia.org/wiki/Coalition_for_Networked_Information on dated 25 Oct 2013.

- Coalition for Networked Information (CNI). Retrieved from www.cni.org on dated 18 Oct 2013.

- Council of Scientific and Industrial Research (CSIR). Retrieved from http://en.wikipedia.org/wiki/Council_of_Scientific_and_Industrial_Research on dated 12 Dec 2013.

- Council of Scientific and Industrial Research (CSIR). Retrieved from www.csir.res.in on dated 15 Jun 2012.

- Council on Library and Information Resources (CLIR). Retrieved from website http://www.clir.org/about dated 16 Jul 2012.

- Defense Scientific Information and Documentation Centre (DESIDOC). Retrieved from http://drdo.gov.in/drdo on dated 5 Dec 2012.

- Definition Retrieved from www.DictionaryBoss.com on dated 20 Oct 2013.

- Delhi Library Association (DLA). Retrieved from http://www.dlaindia.org on dated 28 Jan 2012.

- Developing Library Network (DELNET). Retrieved from http://delnet.nic.in on

dated 22 June 2012.

- Dhawan, S.M. (1999). Towards an Effective Solution for Resource Sharing. In *Proceedings on Libraries and Information Services in the Electronic Information Era*. 214–219.

- Dickson, Andrea, & Holley, Robert P. (2010). Social Networking in Academic Libraries: The Possibilities and the Concerns. *New Library World*, *111*(11/12), 468–479.

- Documentation Research and Training Centre (DRTC). Retrieved from http://drtc.isi.bang.ac.in/DRTC/ on dated 19 Frb 2013.

- Dubey, Y. P., Menon, V. V., & Prasad, H. H. (1994). *Information Technology and National Development*. Agra: Y. K. Publishers.

- e-Granthalaya: A Digital Agenda for Library Automation and Networking from NATIONAL INFORMATICS CENTRE, Government of India

- Health Sciences Library & Information Network (HELINET). Retrieved from http://www.rguhs.ac.in/hn/newhell.html on dated 15 Jan 2013.

- IISC. Retrieved from http://www.iisc.ernet.in/insa/ch25.pdf dated on 16 Oct 2013

- Indian Association of Special Libraries and Information Centers (IASLIC). Retrieved from http://www.iaslic1955.org.in on dated 15 Sep 2012.

- Indian Council of Medical Research (ICMR). Retrieved from http://icmr.nic.in/icmrnews/e_consortia.htm on dated 15 Sep 2013.

- Indian Institute of Management (IIM) Library Consortia (IIM's Library Consortia). Retrieved from http://www.iimsworld.in/consort.html on dated 29 Aug 2012.

- Indian Library Association (ILA). Retrieved from http://www.ilaindia.net on dated 28 Jan 2011.

- Indian National Digital Library in Engineering Sciences and Technology (INDEST-AICTE). Retrieved from http://paniit.iitd.ac.in/indest on dated 28 Sep 2012.

- Indian Space Research Organization (ISRO). Retrieved from http://www.isro.org/satellites/studsat.aspx on dated 29 Aug 2012.

- Indore Library Network (INDOLIBNET). Retrieved from http://indolibnet.blogspot.com on dated 20 Nov 2012.

- Industrial Credit and Investment Corporation of India (ICICI) Knowledge Park (ICICI Knowledge Park). Retrieved from www.ikpknowledgepark.com/ on dated 12 Apr 2013.

- Information and Library Network (INFLIBNET). Retrieved from http://www.inflibnet.ac.in/econ/ dated on 31 March 2011.

- Information and Library Network (INFLIBNET). Retrieved from http://en.wikipedia.org/wiki/INFLIBNET on dated 12 Oct 2013.

- Information and Library Network (INFLIBNET). Retrieved from http://web.inflibnet.ac.in/info/ugcinfonet/ugcinfonet.jsp on dated 20 Oct 2013.

- International Association of Technological University Libraries (IATUL). Retrieved from www.iatul.org on dated 18 Sep 2013.

- International Association of Technological University Libraries (IATUL). Retrieved from http://en.wikipedia.org/wiki/International_Association_of_Scientific_and_Techno logical_University_Libraries dated 15 Oct 2013.

- International Federation of Library Association and Institutions (IFLA). Retrieved from http://en.wikipedia.org/wiki/International_Federation_of_Library_Associations_a nd_Institutions on dated 15 Mar 2013.

- International Federation of Library Associations and Institutions (IFLA). Retrieved from www.ifla.org on dated 18 Mar 2013.

- International Library Information and Analytical Center (ILIAC). Retrieved from http://www.iliac.org/about-iliac/general-information.html dated on 16 Oct 2013

- Jharotia, Anil Kumar, & Shukla, Deepak. (2010). Development of Consortia and Library Networking in India. In *National Conference held at J. K. Business School*. 164–176. Gurgoan.

- Joint Information Systems Committee (JISC). Retrieved from http:// www.jisc.ac.uk on dated 28 Mar 2012.

- Kaul, H. K. (1993). DELNET: An Overview. In *IASLIC Bulletin* Vol. 38(3), 113–122.

- Kaul, H. K. (1999). *Library Resource Sharing and Networks*. New Delhi: Virgo Publications. 63–101.

- Kent, Allen. (1978). Encyclopedia of Library and Information Science. New

York: Marcel Dekker Inc.

- Kerala Library Association (KLA). Retrieved from http://www.keralalibraryassociation.org/on dated 25 Dec 2013.

- Kuldeep Kumar. (2013). An Overview of IT Application in Special Libraries and Information Centers In Modern Age. *Journal of Indian Research*, 1(3), 146-150.

- Madras Library Association (MALA). Retrieved from http://mala.managedbiz.com/index.htm on dated 20 Jan 2011.

- Madras Library Network (MALIBNET). Retrieved from www.malibnetonline.com on dated 12 Dec 2012.

- Management Library Network (MANLIBNET). Retrieved from http://manlibnet.in on 8 Aug 2012.

- Manhas, Rajeev. (2010). Bridging Information Divide among Health Science Libraries in Punjab: A Health Science Library Network System. *IASLIC Bulletin*, *55*(1), (pp.29–34).

- Martey, A. K. (2002). Building Consortia in Nigeria and Senegal: Learning from the Ghana Experience. *SCALNULWA News Letter*, *3*(1). 44–60.

- Mitra, A. C. (1996). CALIBNET on Stream. *DESIDOC Bulletin of Information Technology*, *16*(2), 35–40.

- Mysore Library Network (MYLBNET). Retrieved from http://mylibnet.org on dated 18 Apr 2012.

- Nagarkar, Shubhada. (2000). Pune-Net: Current Status. *Information Today and Tomorrow*, *19*(3), 16–18. Retrieved from http://itt.nissat.tripod.com/itt20003/punenet.html on dated 20 May 2012.

- National Center for Science Information (NCSI). Retrieved from http://ncsinet.org/ncsi on dated 15 Sep 2013.

- National Forum on Information Literacy (INFOLIT). Retrieved from http://infol it.org/ on dated 18 May 2013.

- National Information System for Science and Technology (NISSAT) Newsletter (1993). Vol. 12 No. 3. INFLIBNET: Current Programme. P. 19.

- National Open and Distance Learner's Library and Information Network (NODLIBNET). Retrieved from http://nodlibnet.blogspot.com on dated 17 Oct 2012.

- National Social Science Documentation Center (NASSDOC). Retrieved from http://www.icssr.org on dated 19 Sep 2013.

- Okeagu, Glory, & Okeagu, Blessing. (2008). Networking and Resource Sharing in Library and Information Services: the Case for Consortium Building. *Information, Society and Justice*, *1*(2), (pp.255–262).

- Online Computer Library Center (*OCLC). Retrieved from www.oclc.org* on dated 20 Aug 2013.

- Oshiro, Zensei. (2000). Co-operative: Programmes and Networking in Japanese Academic Libraries. *Library Review*, *49*(8), 370–379.

- Potdar, S. P., & Joshi, D. K. (1997). Library Networking : A Proposal for Amravati University Region (p. 112). Presented at the Fourth National Convention for Automation of Libraries in Education and Research of INFLIBNET on IT Application in Academic Libraries, Patiala.

- Pune Library Network (PUNENET). Retrieved from http://itt.nissat.tripod.com/itt20003/punenet.htm dated 15 Feb 2013.

- Pune Library Network (PUNENET). Retrieved from http://punenet.ernet.in or at http://202.41.70.50/index.html 15 Feb2013.

- Reitz, Joan M. (2004). Dictionary for Library and Information Science. *Westport: Libraries Unlimited.*

- Roxanne, Missingham. (2007). Networking a nation: ILL developments in Australia. *Library Hi Tech*, *25*(2), 188–196.

- SAARC Documentation Centre (NISCAIR). Retrieved from http://www.sdc.gov.in on dated 31 Sep 2013.

- Sahoo, K. C. (2004). Information Management with IT Application. 134–154. Ludhiana: Medallion Press.

- Satinder Kaur Ramdev Memorial Trust for Advancement of Leadership (SATKAL). Retrieved from http://www.satkal.org/SATKAL-INDEX/ on dated 25 May 2012.

- Scottish Confederation of University and Research Libraries (SCURL). Retrieved from http://icolc.net/consortia/230 on dated 28 June 2012.

- Scottish Confederation of University and Research Libraries (SCURL). Retrieved from http://www.scurl.ac.uk on dated 30 June 2012.

- Sivaraj, S., Esmail, S. M., & Kanakaraj, M. (2007). Bridging Information Divide

among Engineering College Libraries in Tamil Nadu, India: A Network. *Library Progress (International)*, *27*(2), 107–117.

- Society for Advancement of Library and Information Science (SALIS). Retrieved from http://autolib-india.net/salis/salis-about.asp on dated 31 Jan 2013.

- Society of College, National and University Libraries (SCONUL). Retrieved from http://www.sconul.ac.uk/ dated on 29 Oct 2013.

- Special Library Association (SLA). Retrieved from http://en.wikipedia.org/wiki/Special_Libraries_Association dated 15 May 2013.

- Special Library Association (SLA). Retrieved from http://www.sla.org on date 21 Apr 2012.

- The Forum for Resource Sharing in Astronomy & Astrophysics (FORSA). Retrieved from http://www.iiap.res.in/library/forsa.html on dated 20 Dec 2012.

- UGC-DAE Consortium for Scientific Research (UGC-DAE). Retrieved from http://www.tifr.res.in/~libws on dated 12 Oct 2011.

- UNESCO (1979). *United Nations Educational, Scientific and Cultural Organization. UNISIST II: main working document.*

- Usman, Ibrahim. (2006). New Approaches in Library Resources Sharing in the Digital Age. In *Conference Proceeding of the Nigerian Library Association.* 45–52. Abuja.

CHAPTER 7

DATA ANALYSIS AND INTERPRETATION

7.1 Introduction

Pune city is known as a hub of education and industry (IT and Engineering) and for the same reason is quite popular in the state of Maharashtra. All the streams of education are represented in this city with dignified and ranked institutes and universities. It is noticed that the more prospective education systems are available in Pune city with medicine, engineering, agriculture, architecture, mass communication, law just to name a few. In past few years management education stream is escalating and the growth in this domain of professional competency seems to be nurturing at a phenomenal pace. The foremost reason is industrialization, globalization and collaboration which have become the *mantra* of the modern society. The modern society perpetuated with the information arena associated with management discipline needs unique information sources and services that to at their fingertips without the constraints of time and place. No doubt that information system through libraries is being provided by the management institutes to support the education system with qualified library professionals, but trends in education system and information system is changing constantly due to adaption of technologies and need to assess the facilities provided to users from time to time to amend the facilities and provide value added information to users. The Libraries associated with management education are facing challenges due to ICT, digital information and e-publishing. Similarly the information explosion which is also on its peak makes librarians to rethink on the policies of collection development. It is now obligatory for the LIS professionals now to serve the users in better way in spite of crunching budgets and rising cost of publications. They are adapting and adopting to different policies and joining the resource sharing programs to satisfy the needs of their users. To assess the present status of management institute libraries a cursory review has been taken through feedback of the librarians. To access the status of library system the researcher decided to circulate a brief but informative questionnaire amongst the libraries of management institutes in Pune city

which can be a mile stone and useful in general as well as management libraries. The questionnaire circulated (Appendix A) among the population considered for survey of management libraries and the data collected from them libraries as per (Annexure A) is analyzed, interpreted and presented in the following paragraphs.

7.2 Data Analysis and Interpretation

7.2.1 Questionnaire: Structure

The questionnaire prepared and selected for the survey of management libraries in Pune city has covered about 66 prominent questions and sub questions which give status of the present management libraries. Various sections of the questionnaire has been prominently shown in Fig. 7.1. These questions are divided into sections:

i. Deals with information about the management institutes. The information related to institutes is gathered for developing proper communication among them and record name of the institute, address, contact details (phone number, fax number, website address and e-mail), establishment year, number of employees in institute (teaching and non-teaching staff), student strength, nature of institute (aided /non-aided / autonomous etc), courses conduced, specializations, distance learning facility etc. This is developing the background for understanding the status of institutes.

ii. Covers the information about libraries and getting information like name of the librarian, pay scale, qualifications, communication details, working hours of library, library staff, total collection in library, annual addition, classification and cataloguing systems used, library committee, open access or closed access and services provided from libraries like CAS, SDI and so on.

iii. Focused on library collection development and deals with collection of print and e–resources availability.

iv. Library automation status is analyzed by asking different questions like status of library automation, number of PC's in library, library

management software being used, its utility etc, E-collections in library, and internet facility availability etc.

v.   Internet availability in library is assessed covering, type of internet, Wi-Fi, how often internet is used by librarians (hourly, daily, weekly etc), users feedback of internet service, types of users used this facility (student, faculty and researchers) etc

vi.   Resource sharing activities are analyzed asking information about resource sharing methods / programs used and services provided, resource sharing policy, documents loaned, terms and conditions for issuing and receiving library materials etc.

vii.   Computer Network and need of library networking is assessed asking about efforts made towards networking and how many PCs are in networks, type of networks (LAN/WAN/MAN), topology of networks, membership with other library networks like DELNET, MNALIBNET etc. is analyzed.

viii.   Hardware and Software requirements for establishing networks, equipments used for building networks (switches, hubs, modems, bridges etc), network protocols, network server, operating system used, ISP (Internet Service Provider) used, DNS (Domain Name Server) and MPLS (Multiple Label Switching) are analyzed in this section is also accessed to find out value of equipments available in present condition.

ix.   Network Security efforts taken by the institute or library are also assessed and evaluated asking availability of different equipments or software's etc. like Firewall, Proxy server, Mirror server, User-Id password, Virus Protection systems, Anti-viruses software's used, Problems faced in networking etc.

Thus different types of questions are used in questionnaires covering objective and subjective questions, compulsory and optional questions, and open ended questions.
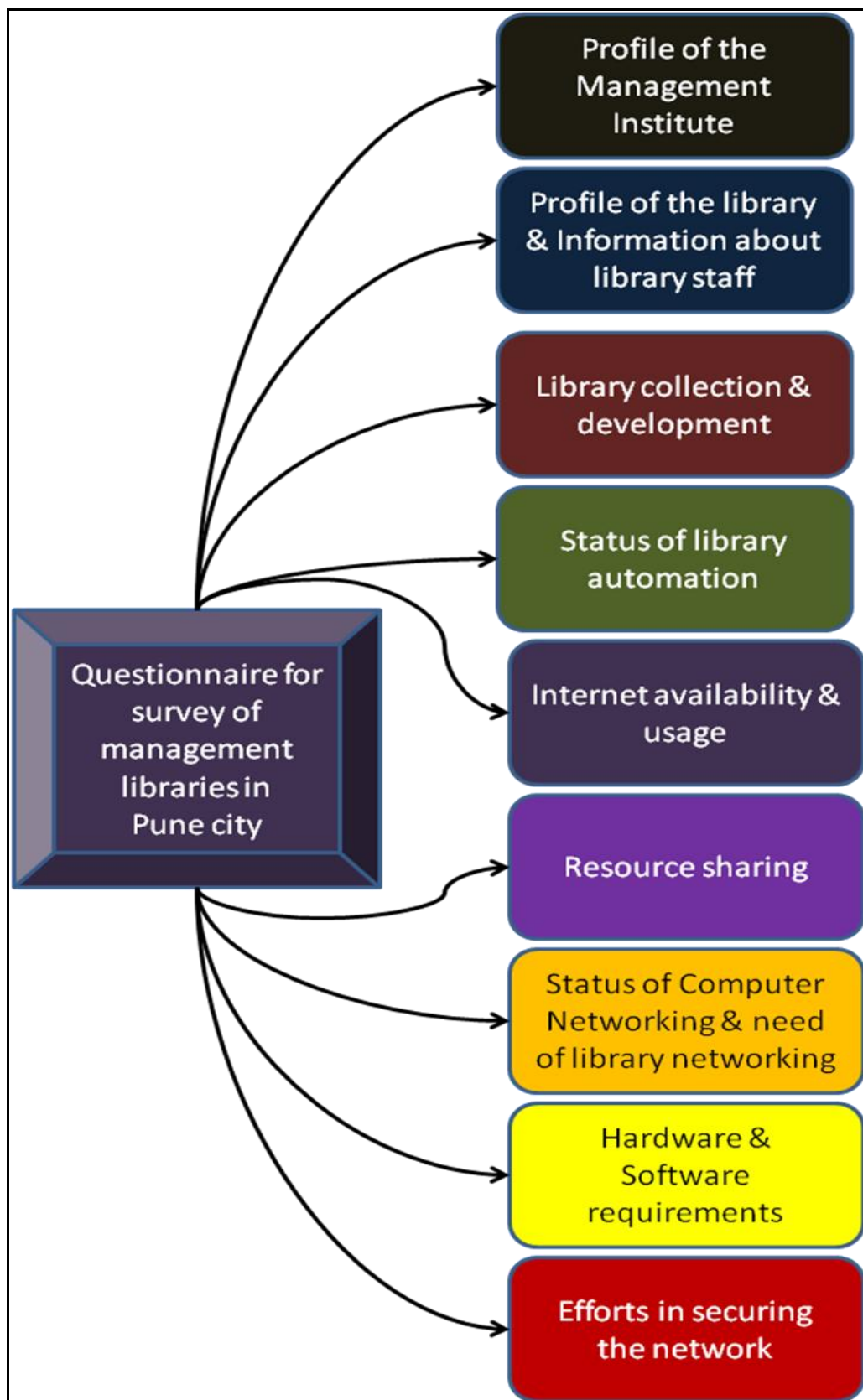
Figure 7.1: Prominent Sections of the Questionnaire

7.2.2 Response to Survey:

As discussed in research methodology researcher has considered only management libraries in Pune city and only MBA colleges are considered in Pune city, affiliated to UOP, DTE and AICTE (Annexure A). To get the data of the management institutes in Pune city standard sources were consulted like University Hand book and Official web pages of AICTE, DTE and Pune University for deriving population. There are 127 management institutes in Pune city covered under the preview of this study and these are selected as the population for the survey. All the institute libraries are considered for the survey purpose and hence sampling is not considered in this survey. But in addition to this population ranked management institutes conducting MBA courses in Pune are considered like Symbiosis Institute of Business Management, Bharti Vidyapeeth etc. The questionnaires were circulated among the management libraries (Librarians) using e-mail, and postal services. The researcher made utmost efforts in getting the questionnaire filled in from the librarians and also visited few prominent management institute libraries and personally gathered the data and discussed the issues with the library professionals and management education experts. Out of 127 respondents 127 (Response 100 %) librarians responded to the questionnaire with proper feedback. Responses received for the survey is thus 100%. The analysis is based on 127 responses of management institute librarians.

A. Management Institutes

7.2.3 Establishment of Management Institutes in Pune:

In Pune Management institutes are established since 1971 and since then growing steadily. Table 7.1 represents the growth of the management institutes in Pune.

Table 7.1: Chronological Development of Management Institutes in Pune

Establishment Year	Number of Institutes
1971-1980	4
1981-1990	7
1991-2000	20
2001-2010	84
2011-2013	12
Total	**127**
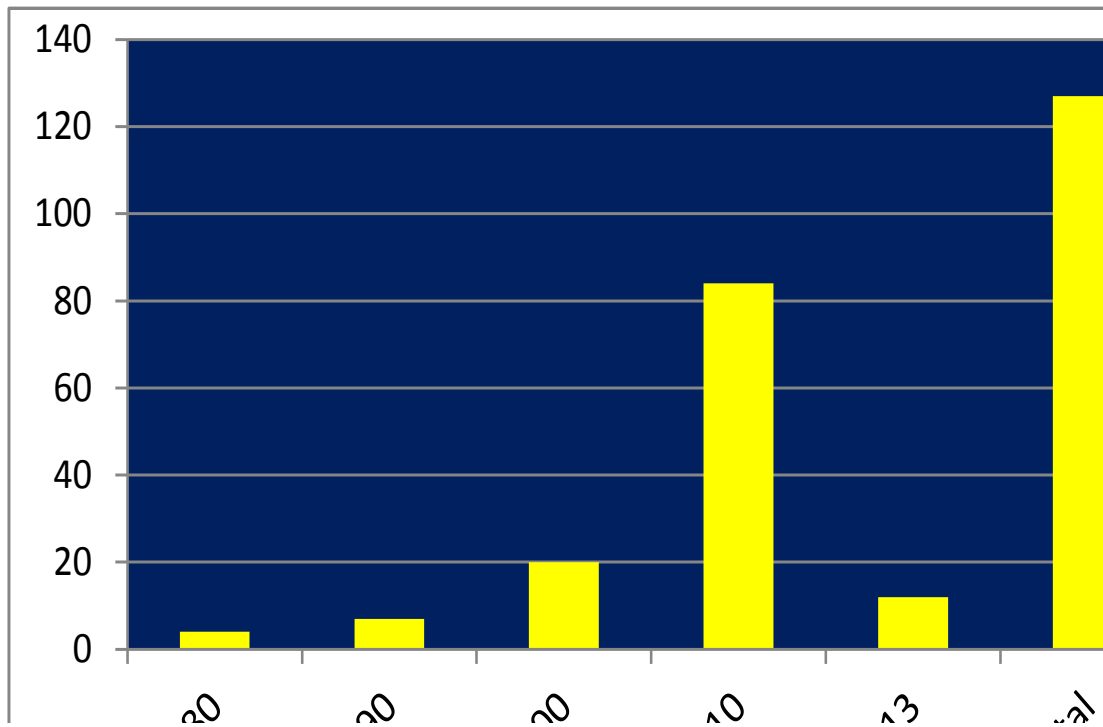
Figure 7.2: Chronological Development of Management Institutes in Pune

Observation:

From the Table 7.1 it is concluded that the management education progressed in Pune since 1971 and had constant growth but in 2001 to 2010 alarming rise and growth in management education and institutes are reported in this sector. Since 2011 in the past two years only 11 institutes have been established. The period 2001-2010 is therefore is a progressive period for the growth of these institutes. This is in consistent with the

countrywide scenario that entails declining growth for B-schools from 33% in 2008-09 to 3% 2012-13. In terms of absolute numbers, the number of new B-schools declined from 417 in 2009-10 to 82 in 2012-13. The same is attributed to the global (http://www.dreducation.com/2013/01/engineering-mba-india-statistics.html) slowdown.

7.2.4 Strength of Employees:

Table 7.2: Employee Strength

Staff	Number	Percentage (%)
Teaching Staff	2055	49.83
Technical Staff	344	8.34
Non Teaching Staff	1725	41.83
Total	**4124**	**100.00**
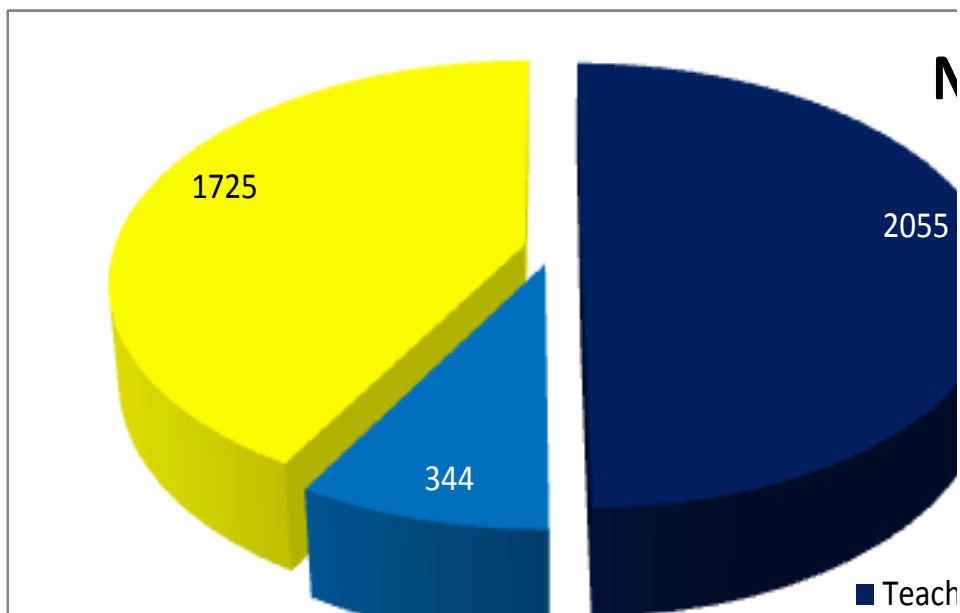
Figure 7.3: Employee Strength

Observation:

In management colleges in Pune city have maintained required human resource expertise in different areas of management disciplines. In the human resource teaching staff (Faculty) is in sufficient number (49.83%) as compared to other staff. Next to teaching

staff category is supporting or an administrative staff (41.83%). Technical staff is not available in all the institutes but only in few old management institutes this categories is available, but it is amalgamated in non-teaching staff elsewhere. On an average 15-20 faculty / teaching staff is available in the Pune city for management discipline. Though the management institutes intends to go hand-in-hand with the latest in Information and Communication Technology, yet the obligatory policy for the staffing pattern pertaining to technical cadre is yet to be formulated.

7.2.5 Strength of Students on the Campus:

Table 7.3: Students Intake Capacity

Intake Capacity of Students in all Branches	Number of Institutes	Total Number of Students
30	1	30
60	53	3180
70	1	70
90	4	360
120	47	5640
180	11	1980
240	2	480
300	3	900
360	3	1080
420	2	840
Total	**127**	**14560**
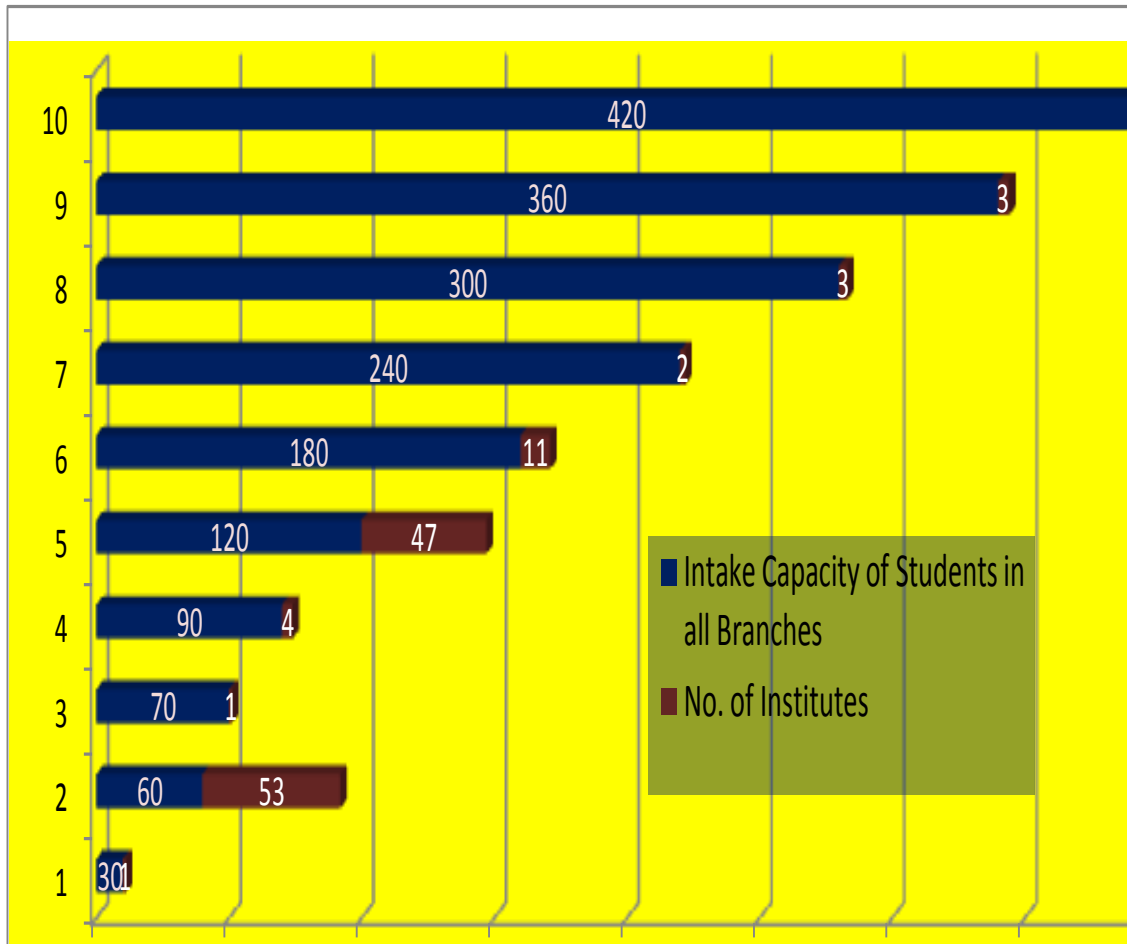
Figure 7.4: Student Intake Capacity

Observation:

The old management institute has more number of courses and hence the intake capacity of the students per year is more. Where as a new management institutes started with a single branch has minimum intake capacity of 30 students as incase of Symbiosis Institute for International Business. The maximum institutes (115) have intake capacity in between 60 to 180 students, where as 10 management institutes have intake capacity in between 240 to 420. The total number of MBA students enrolled in university of Pune jurisdiction management courses is approx 14560 per year. Thus institute's strength depends on number of courses conducted and intake capacity permissible to the institute by AICTE or UGC. On an average it is noticed that 180 – 300 students are entrants in each institute.

7.2.6 Nature of Management Institutes:

Table 7.4: Management Institutes

Status	Number of Institutes	Percentage (%)
Aided	01	0.79
Non-Aided	124	97.64
Autonomous	02	1.57
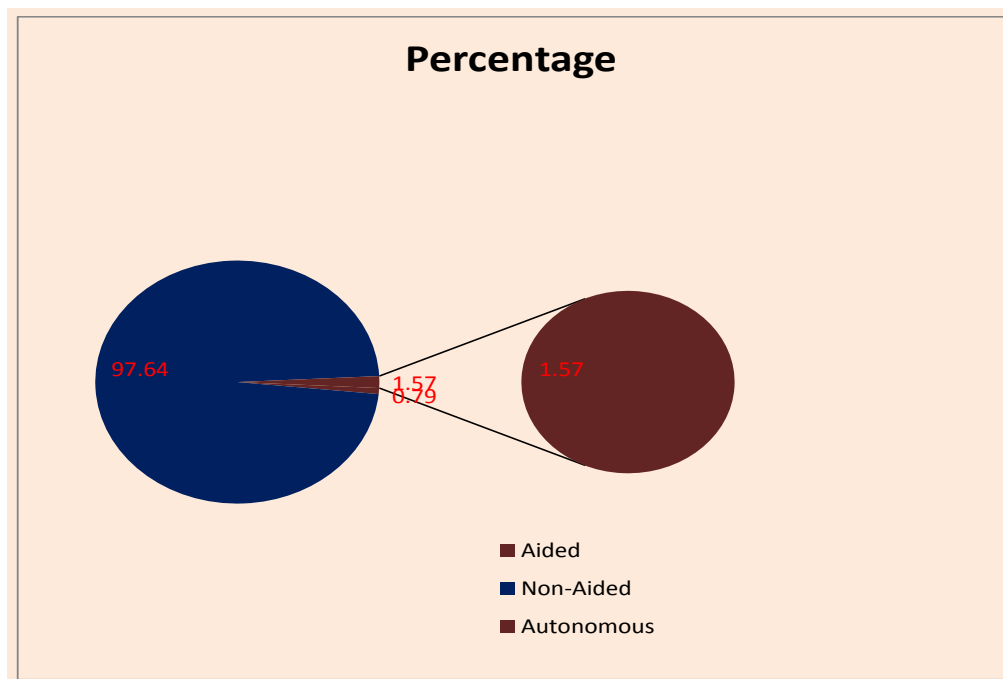
Figure 7.5: Status of Management Institutes

Observation:

Among 127 management institutes in Pune city, only 2 management institutes are autonomous in nature viz. Indian Institute of Cost & Management Studies & Research (INDSEARCH), and Shree Chanakya Education Society's Indira School of Business Studies, Tathwade. PUMBA has been supported under the 'University Funds' and therefore it is a self supporting department of the University. It comes under non-grant. There is only one management institute i.e. PUMBA which is aided, and rest are non-aided institutes (124) and they are affiliated to Pune University or AICTE, UGC or DTE.

Thus maximum 97.63 % institutes in management education sector are non-aided and they have to develop the system form their own earnings.

7.2.7 Categories of Management Courses in Pune City.

Table 7.5: Management Courses

Management Courses	Number of Institutes
Diploma	48
Under Graduate	42
Post Graduate	127
PG Diploma	45
M. Phil.	01
Ph.D.	13
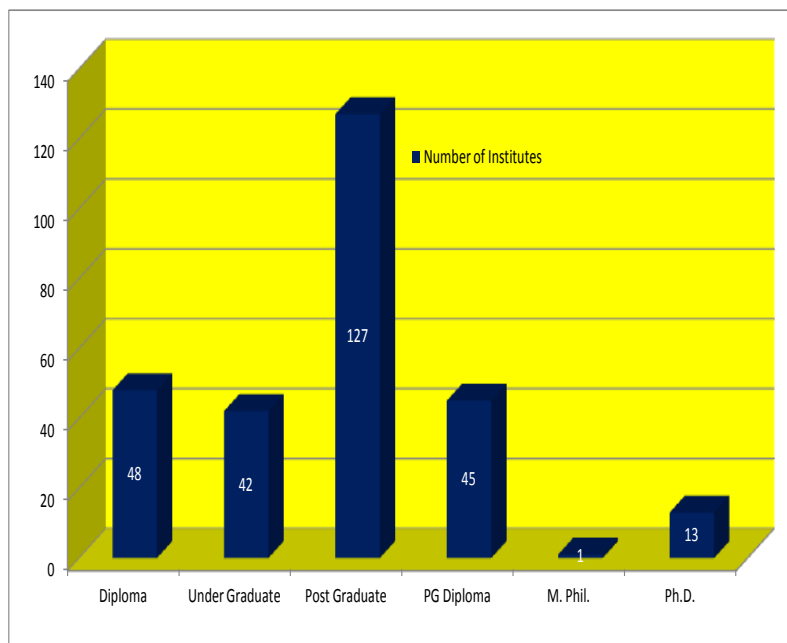
Figure 7.6: Categories of Management Courses

Observation:

In Pune city different categories of courses in management education are conducted, UG/PG and distance learning courses are being conducted, but in addition to these courses diploma, PG diploma courses are also being conducted. It is worth noting that earlier there was no facility for research programs in management but now 13 institutes are conducting research programs (M.Phil. and Ph.D.). The PG courses are more popular and all most all the 127 institutes have MBA courses in different specializations. However none of the institute seems to offer professional academic programmes equivalent to doctorate such as "Fellow Programme in Management" of Indian Schools of Business offered by IIM, Ahmadabad.

7.2.8 Specialized Courses in Management:

Regular MBA courses are being conducted in Pune city viz. Marketing, Finance, Human Resource Management and IT etc. But few organizations and institutes are specially developed for conducting management courses in different specialization like Banking (NIBM Pune), Insurance (NIA, Pune), Agricultural equipments (Agricultural University Pune), Cooperative management (Vaikunth Mehta National Institute of Co-operative Management, Pune). In Pune popular management courses are being conducted in regular areas as detailed in Table 7.6.

Table 7.6: Specialization in Management

Management Courses	Number of Institutes	Percentage (%)
Marketing	86	67.72
Finance	82	64.57
Human Resource Management	36	28.35
Information Technology	27	21.25
Productions and Operations Management	15	11.81
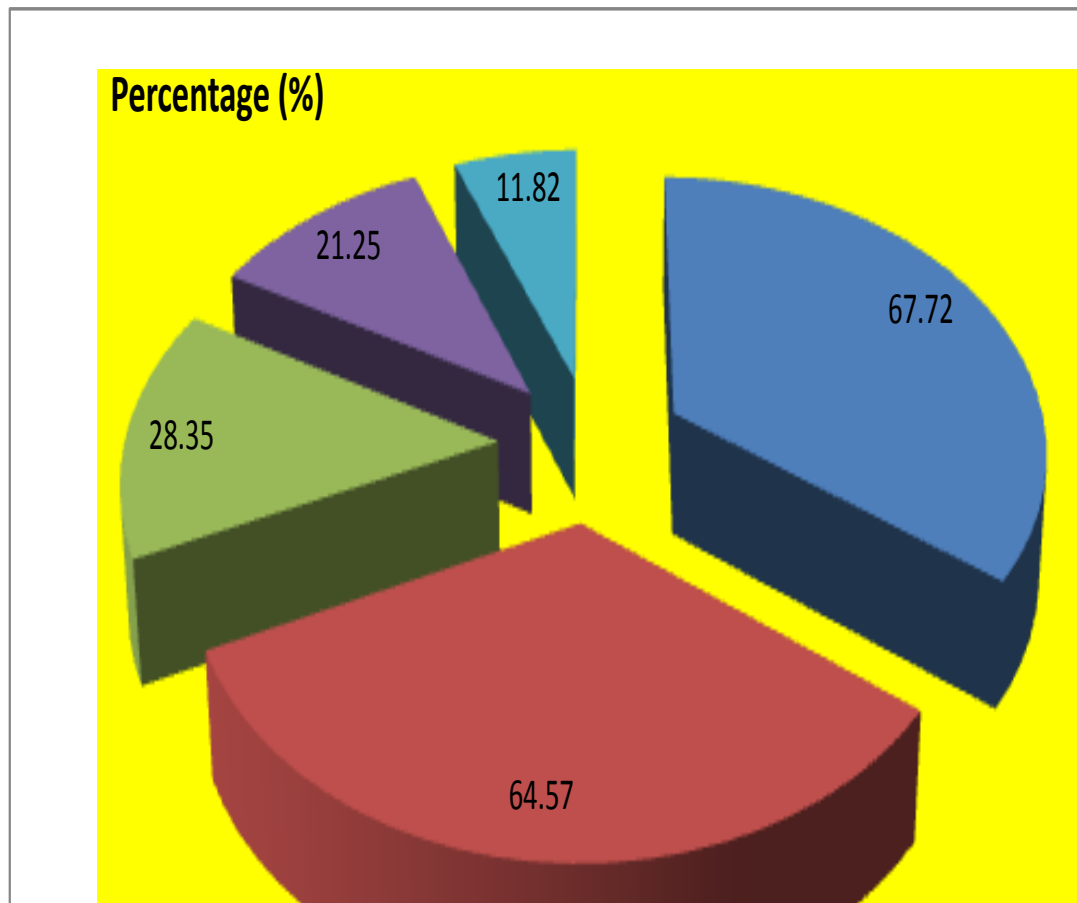
Figure 7.7: Specialization in Management

Observation:

In Pune city (127) institutes conducts regular courses. But for the employees in different industrial zones it is not possible for the employee to attend regular MBA courses and for this reason management institutes with proper approval initiated distance learning MBA courses in Pune city like other places. But distance, online courses in the same streams and specializations are provided by few institutes to employed staff. In general MBA in Marketing and Finance is on top of all the courses conducted in Pune city, next to these are HR and IT. Majority of the institutes 67% offer programmes in marketing specialization followed by the finance specialization (66%). However there is a need to initiate new specializations in MBA as detailed in (Annexure B).

7.2.9 Distance / Online / Correspondence Courses:

Table 7.7: MBA Courses: Online / Distance

Course	Number of Institutes	Percentage (%)
Regular MBA	127	100
Distance MBA	05	3.93
Online MBA	03	2.36
Executive MBA	05	3.93

Observation:

It is found that all the (127) management institutes have regular MBA courses in different disciplines and having the number of intake capacity 60 per stream. In addition to this few institutes among the 127 also conducts the distance and online MBA courses but their number is very small (10.22%) and the prominent institutes are Symbiosis International University, Bharti Vidyapeeth, and Tilak Maharashtra Vidyapeeth etc.

B Library and Information Center:

7.2.10 Qualified Librarians:

Table 7.8: Qualification of Librarian

Qualification	Library Staff	Percentage (%)
SET / NET	24	18.90
Ph.D.	6	4.72
M. Phil	11	8.67
B Lib and M. Lib I. Sc. (only)	86	67.71
Total	**127**	**100.00**
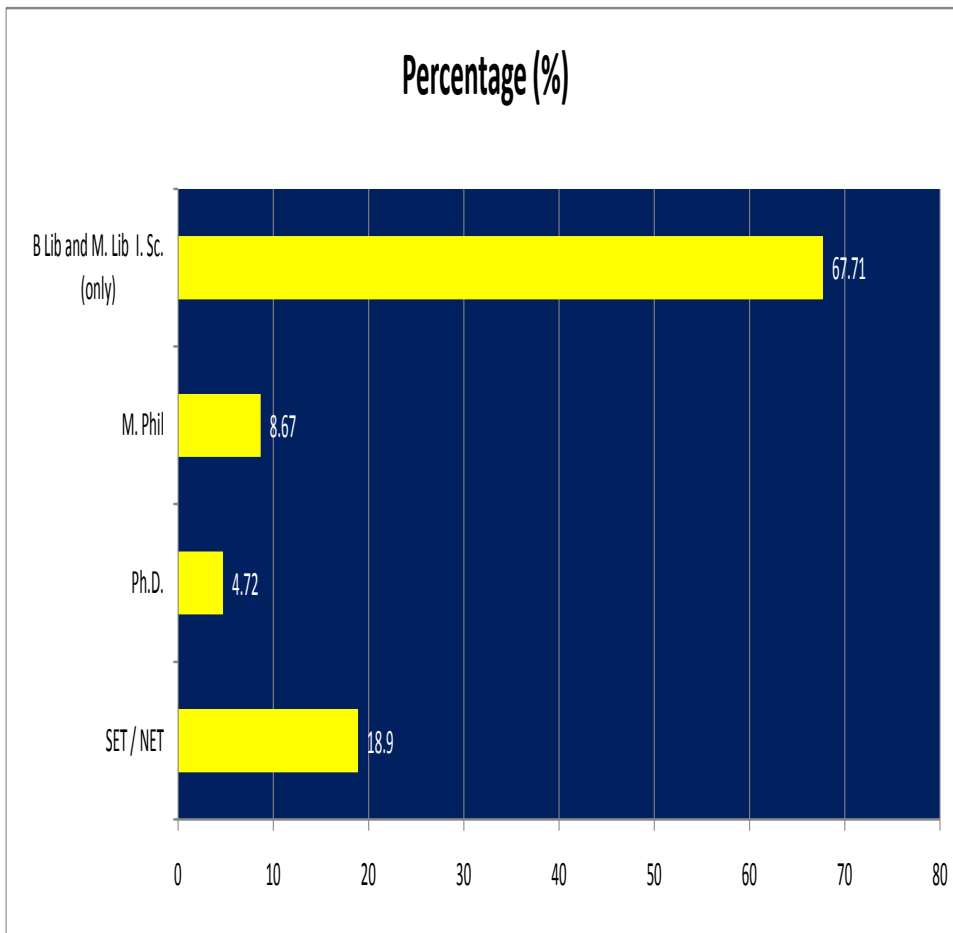
Figure 7.8: Library Staff Qualification

Observation:

It is observed that all institutes appointed qualified staff and possesses bare minimum qualifications required as per norms. i.e. B. Lib. and M. Lib. Since management colleges are under the preview of AICTE or DTE the minimum librarian's qualifications are master's degree in LIS with first class (as on to date). Eelier NET/SET criteria were not levied but now advanced qualifications are prepared like NET/SET. All librarians have acquired B Lib and M Lib qualifications but 19% have also cleared NET/SET. In addition 14% librarians have acquired research degrees (5% Ph D and 9% M Phil) in LIS.

7.2.11 Library Working Hours:

Table 7.9: Working Hours

Working Hours / Day	Number of Libraries	Percentage (%)
8 hours	21	16.54
10 hours	46	36.22
12 hours	60	47.24
Total	**127**	**100.00**
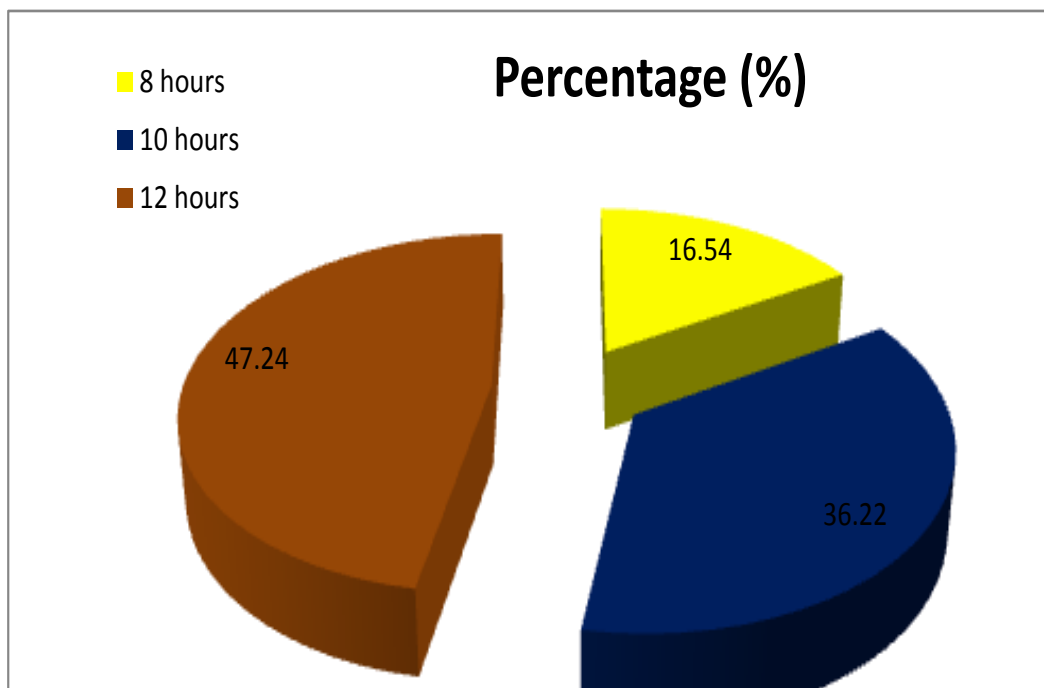
Figure 7.9: Working Hours

Observation:

Management libraries have fixed working hours and 47% libraries are kept open up to 12 hrs and remaining 8-10 hours depending on the nature and demand of users. The normal working hours of institutes are in between 8.00 am to 8.00 pm. 83% management libraries are kept open in between 10 to 12 hours per day. It is also observed that in the examination period the duration of the reading room facility is extended and kept open up

to 15hours a day on demand of the users. However, it is recommended that the management institutes should largely go for extended hours using the tools and techniques of Information and Communication Technology. Off-campus access to the information sources and services through the internet would suffice the missions and goals of the scholarly dissemination never than ever before in today's era of ICT.

7.2.12 Library Staff:

Table 7.10: Library Staff Strength

Library Staff	Strength	Percentage (%)
Professional	188	48.96
Technical	132	34.38
Non Technical	64	16.66
Total	**384**	**100**
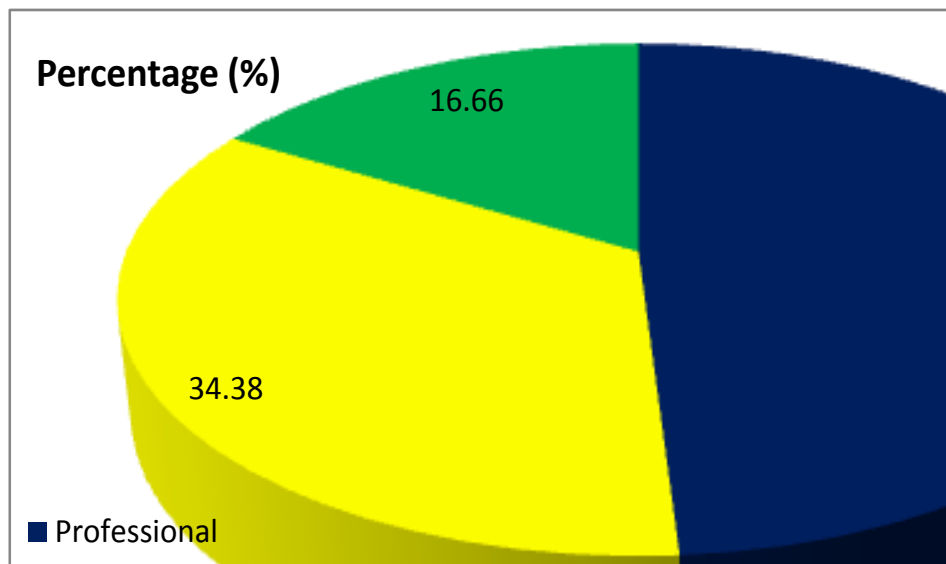
Figure 7.10: Library Staff Strength

Observation:

In management libraries of Pune, library staff is deployed at different levels professional, technical and non-technical staff. It is observed that 127 libraries have in total 384 staff covering different categories. 83.34% staff is professional and technical plays an

important role in developing institute libraries and 16.66% staff is non-technical staff which supports the activities and do not take part in skilled work, they are involved in shelving, administrative task and extending support in different tasks.

7.2.13 Total Collection in Library: Print Media

Observation:

Though Collection development in management libraries is shifting to e-resources yet the major collection is in print media. At present the hybrid type of collection is witnessed in management libraries. Libraries are also providing internet access and hence users are making use of digital information available over the net. In the collection of these libraries major share is of books consisting of text, reference and general reading books. In the survey it is revealed that approximate 11.71 lakh books are available among 127 libraries and this is a formidable resource for sharing locally. Apart from this national and internationals journals subscribed are nearly 3205, which is the core collection in Pune city management institutes. However the gray side is lack of initiatives from the concerned libraries to share the resources through inter-library loan. A common forum of librarians at least at local level should emerge to accomplish the same.

7.2.14 Annual Addition to Library:

As per AICTE norms, MBA libraries have to procure minimum 500 books per semester or 1000 books per year having 100 titles and 12 national and international journals per year. According to this norm libraries are purchasing 1000 books and 12 national and international journals per year minimum. Thus annual addition is 1,27,000 documents per annum with 1524 periodical subscriptions. Many librarian face the problem of adding the volumes and titles as specified by the AICTE. In fact the publishing rate of the resources is far less than the norms of procurement specified by AICTE.

7.2.15 Processing Systems:

Most of the surveyed libraries are resorting to the Most of the libraries are using the DDC classification method. OPAC and WEB OPAC are now being put to use for the benefit of library stakeholders.

7.2.16 Library Committee:

In many management libraries, I have observed that a library co-ordinator is appointed. This infect restrains the librarian from taking independent decisions. In case you have come across this practice in any of the libraries, do write against it for the benefit of LIS profession.

7.2.17 Access to Collection:

All libraries have open access system and permitted users to physically access the books and look through the collection for use. One of the down side of the open access is the potential damage to the collection. You might like to recommend these libraries to use CCTV systems to prevent the users from misdeeds with the collection. This will also support your research theme i.e. security.

7.2.18 Library Services:

Table 7.11: Library Services

Library Services	Yes (%)	No (%)
ILL	103 (81.10)	24 (18.90)
CAS	119 (93.70)	8 (6.30)
SDI	108 (85.04)	19 (14.96)
Clippings	89 (70.07)	38 (29.93)
Reading Room	127 (100)	0 (0)
Book Bank	51 (40.16)	76 (59.84)
Home Loans	127 (100)	0 (0)
Reprographic Services	112 (88.19)	15 (11.81)
Alert or Digest	Not specified	-
Library extension services	Not specified	-
Orientation	Not Specifies	
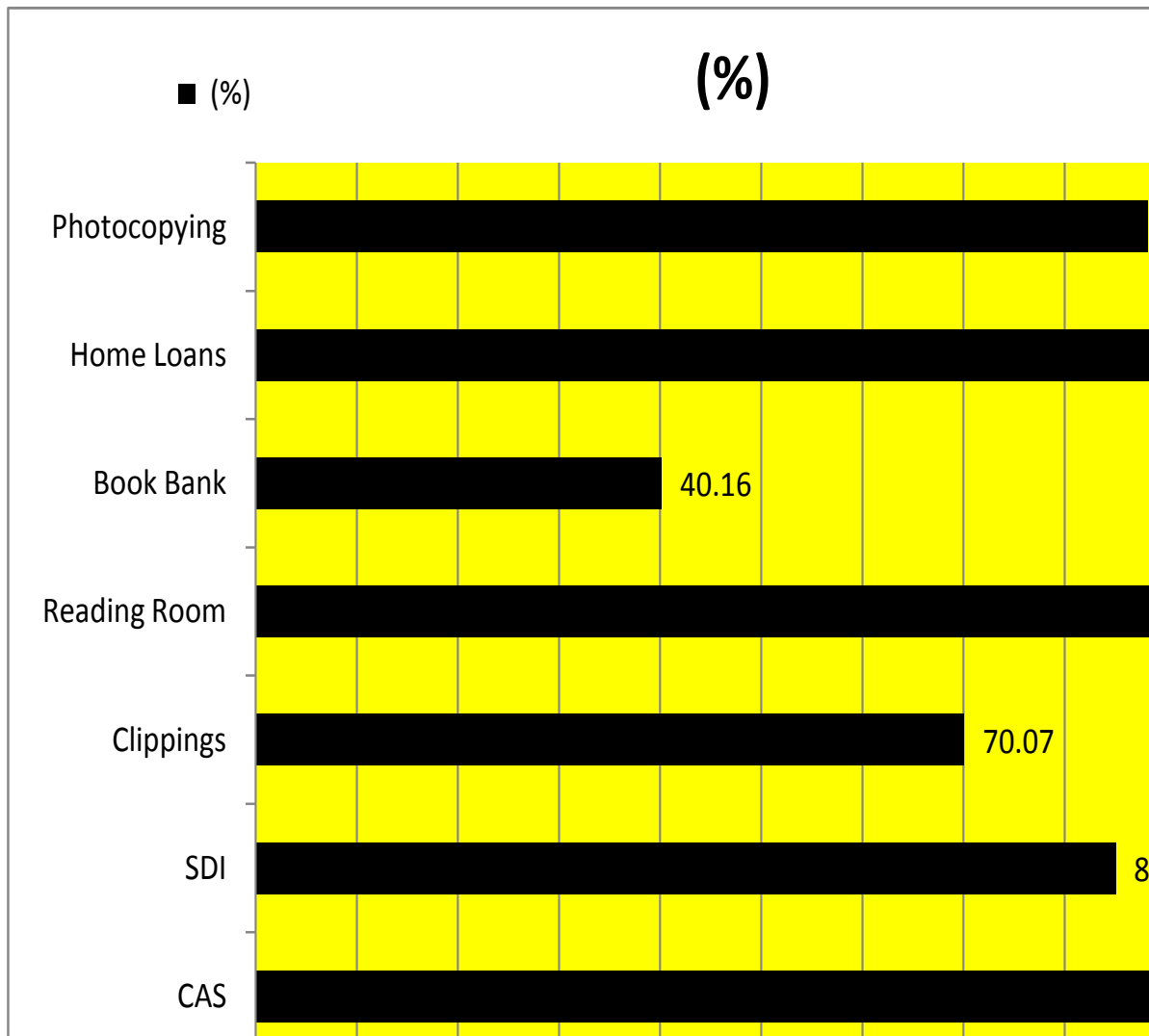
Figure 7.11Preferential Emphasis of Libraries on Services

Observation:

It is found that in all the management libraries, facilities / library services commonly provided are reading room and home lending (100%), this is followed by CAS (93%), newspaper clippings (89%), reprographic services (88%) SDI (85%), ILL (81%) provided to the users from the libraries. Book bank facility (40%) is provided in few management colleges. The advanced services like alert, extension services and orientation are not yet considered in these libraries.

C Library Collection Development:

7.2.19 Print Media

<p align="center">**Table 7.12: Library Collection: Print**</p>

Type of documents	Approx Volume in Holdings
Books	1171446
Journals	3205
Bound Volumes	7802
Technical Reports	284
Thesis or research dissertations	368
Proceedings	832
Manuscripts	28
News Papers (subscribed)	1046
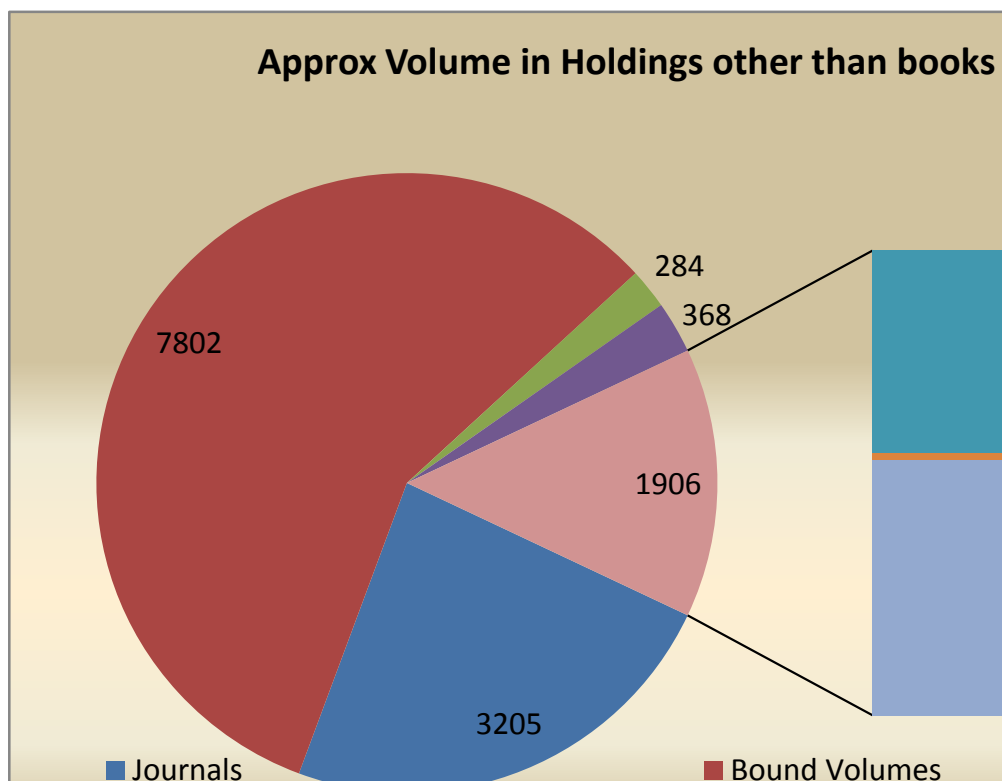
<p align="center">**Figure 7.12: Library Collection: Print (Other than books)**</p>

Observation:

It is observed that in management libraries books are procured more in number which covers text books, syllabus approved reference books and general reading books etc. The periodicals are not to the mark but subscribed in sufficient good number in which Indian periodical subscription is more than foreign. The magazines are also subscribed along with newspapers for the general purpose reading in libraries. The collection of technical reports, thesis, proceedings and manuscripts is bare minimum or negligible as compared to books and periodicals. The overall collection in the libraries is focused on management especially related to the streams the institutes are managing and it is based on syllabus or curriculum. The students and faculty also suggests books and other reading materials for the libraries. Apart from this students project reports are available in large number. Variety of print holdings quantified per number is visualized through fig. 7.12.

7.2.20 E-resources

Table 7.13: Library Collection: E-Documents

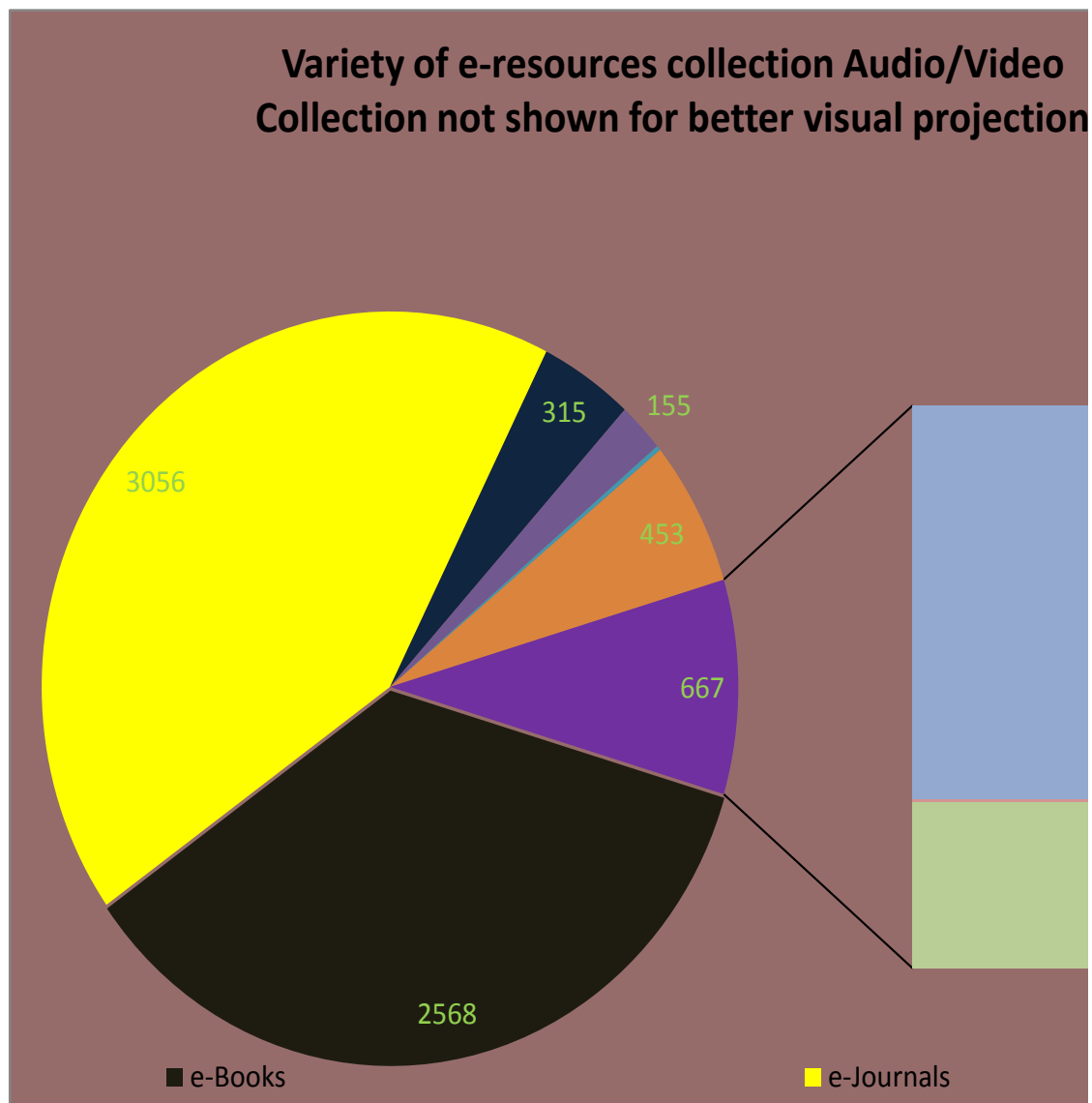| Type of E-resources	Approx Volume in Holdings
e-Books	2568
Audio and video material	12689
e-Journals (Subscribed)	3056
Databases	315
e- Technical Reports	155
e-Thesis or research dissertations	15
e-Proceedings	453
Use of internet resources	467
e- News Papers (subscribed)	3
Offline databases	197

Figure 7.13: Library Collection: E-documents

Observation:

It is observed that audio-video collection is more in management libraries which is stored in CDs / DVDs or tapes etc. According to AICTE, all management libraries have to purchase e- collection in libraries in the form of e-books, e-journals and databases. Due to this management libraries are purchasing now databases, e-books and e-journals. In spite of this the trend in collection development is more in print form than the e-form. It is also felt that the management institutes should form consortium atleast at the local level

which will facilitate exchange of resources. The librarians should also encourage domain specific consortium of e-resources such as ICICI Knowledge Park (http://www.iciciknowledgepark.com/) in tune with the finance specialization.

D Status of Automation:

7.2.21 Number of Libraries Automated:

<div align="center">

Table 7.14: Library Automation

</div>

Libraries Automated	Number of Libraries	Percentage (%)
Yes	125	98.43
No	2	1.57

<div align="center">
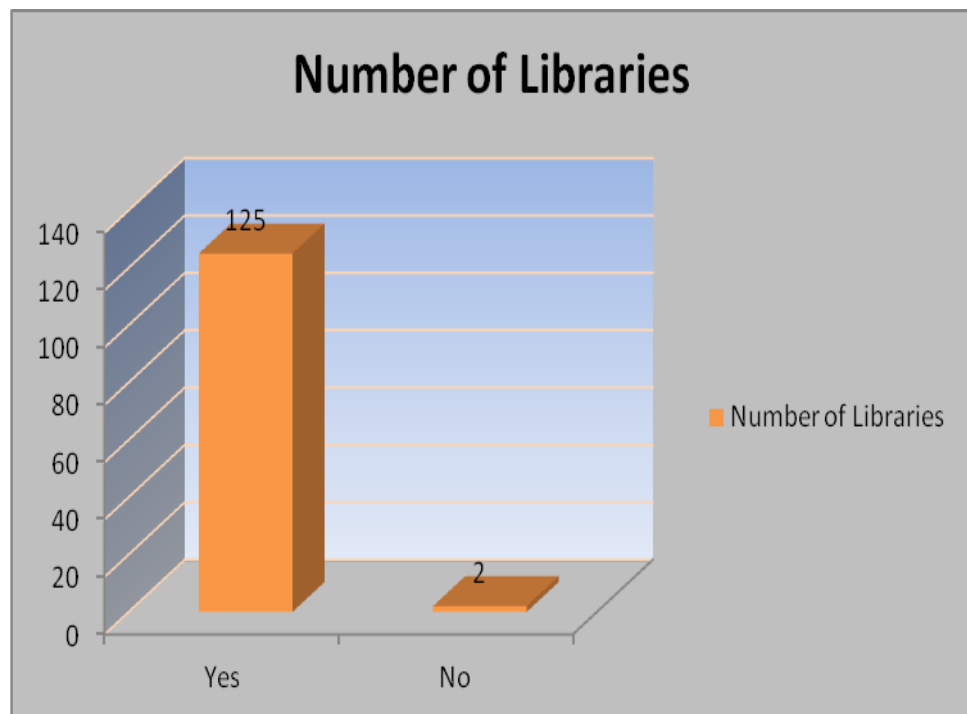
Figure 7.14: Library Automation

</div>

7.2.22 Status of Library Automation:

Table 7.15 : Status of Library Automation

Automation Status	Number of Libraries	Percentage (%)
Fully Automated	12	9.45
Partially Automated	99	77.95
In Process	14	11.02
Not Yet Automated	2	1.58
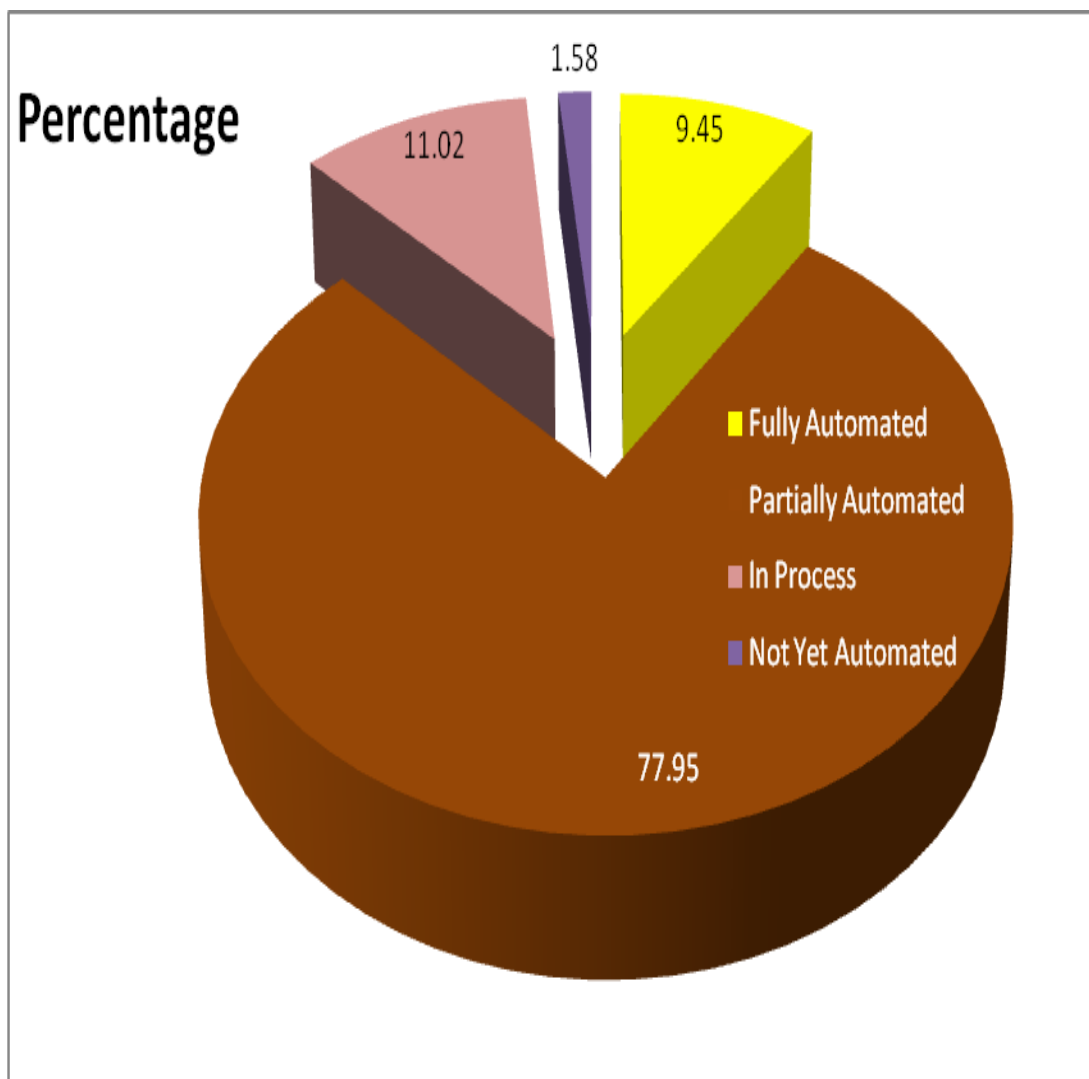
Figure 7.15: Library Automated Institutes in Pune

Observation:

It is observed that management libraries are 98% automated and this is very healthy sign to make development like creation of digital libraries and virtual libraries as well as developing networks. Out of 127 libraries only 10% libraries are fully automated and 88% are partially automated and 2% libraries have not yet automated. Though there is seemingly large number of partially automated libraries, they can be persuaded to undertake complete automation. However in order to accomplish the same, one need to review the underlying automation software used by these libraries. In order to gain an insight on this a question was put forth and the results are summarized in 7.2.23.

7.2.23 Library Management Software Used:

Table 7.16 : Library Management System Software used for Automation

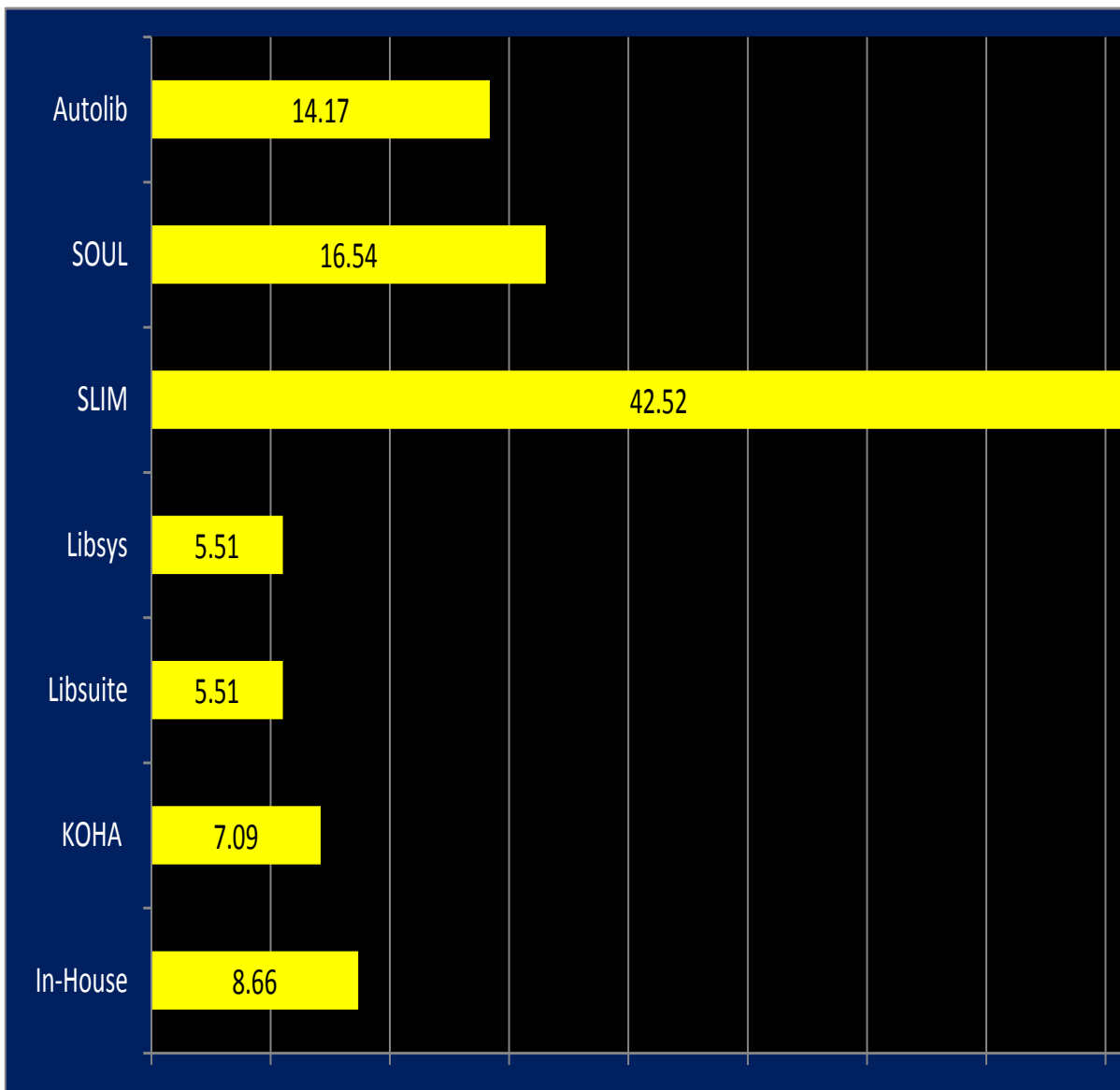| Library Management System (LMS)	Number of Libraries	Percentage (%)
In-House	11	8.66
KOHA	9	7.09
Libsuite	7	5.51
Libsys	7	5.51
SLIM	54	42.52
SOUL	21	16.54
Autolib	18	14.17
Total	**127**	**100**

Figure 7.16: Library Management System Software used for Automation

Observation:

It is observed that SLIM software is used in 42.52% in libraries. SOUL and AUTOLIB are used very prominently in management libraries. i.e. SLIM, SOUL and AUTOLIB (73%) are very popular library management software's used in management libraries to automate the libraries. Apart from these two software's used are Libsuite and Libsys (11%). But a remarkable point noted is that KOHA and other open source software's are also used by 7.09% management libraries for automating the libraries. The main concern is regarding the software suites developed in-house which is coming out to be 8.66%. It is a common observation that in general the IT professionals lack the perception of the

260

library automation software requirements. For the in-house software, incorporation of standard library protocols such as Z39.5 and standard formats such MARK 21 needs to be explored. In the absence of above these software suites are likely to create the compatibility issues with other professional library automation softwares.

7.2.24: Hardware available (PC):

In all the 127 libraries approximately 1262 personal computers are made available for the library staff and users. Approximately 9-10 PC's are available in libraries.

7.2.25 E-collection Development in Libraries:

Table 7.17: E-Collection Development

E-Collection	Number of Libraries	Percentage (%)
Yes	125	98.43
No	02	1.57

Observation:

It found that along with print media managemnet libraries are also developing to increase e-resources collection and nearly 98.4% libraries are having e-resources collection with them. This is a good move in devleoping advanced dgital libraries in management sector. There is also a growing need to develop e-collections in management education as necessitated by the global education system and develops managers to sustain in any environment. Hence not only printing but digital reasource acquisition is also necessary.

7.2.26 Interent Facility access from Library:

All respondent have indicated that libraries are providing interent to users. Special user terminals are made available in few libraries for the information searching over the net and intranet.

E Interent and Wi-Fi Connectivity:

7.2.27 Connectivity:

Table 7. 18: Internet Connectivity

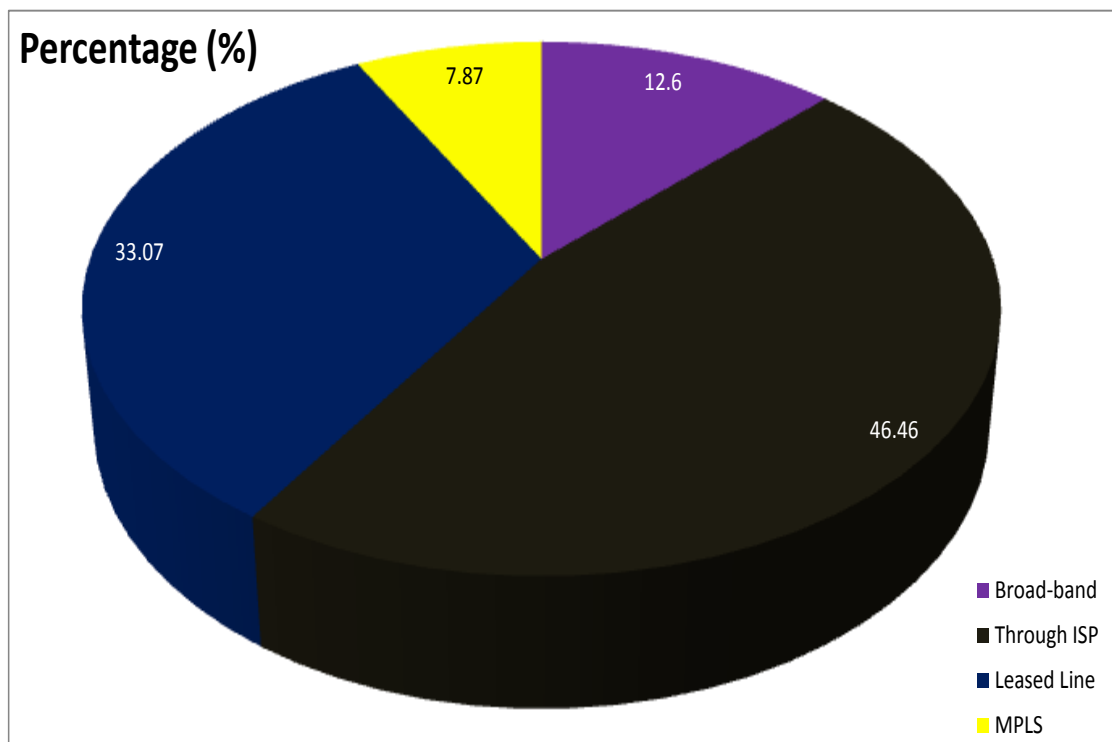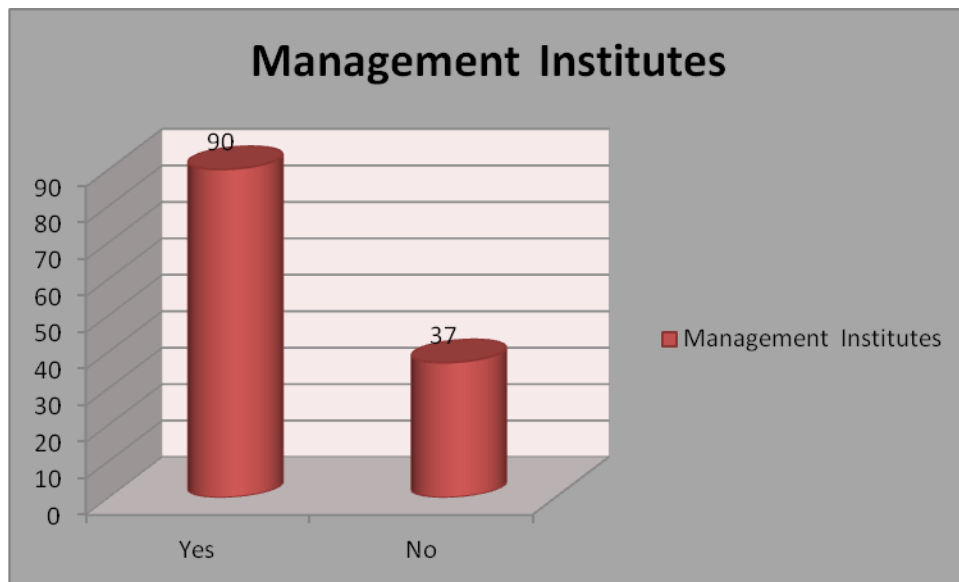| Internet Connectivity	Number of Libraries	Percentage (%)
Broad-band	16	12.60
Through ISP	59	46.46
Leased Line	42	33.07
MPLS	10	7.87

Figure No. 7.17: Internet Connectivity

Table 7.19: Wi-Fi Connectivity

Wi-Fi Connectivity	Management Institutes	Percentage (%)
Yes	90	70.87
No	37	29.13

Figure 7.18: Wi-Fi Connectivity

Observation:

Internet connectivity is provided (92%) libraries to search the data by the users in management libraries. It is found that in few prominent institutes Wi-Fi facility (70%) is also made available, to permit users to gather data from net as well as logging internally to access the e-resources available. It is also observed that only 45.67% libraries are using broad band and leased line facilities for getting data and better access to information from the remote location. 46.46% libraries are getting net connections from different ISP's. 70% libraries are supporting to Wi-Fi connectivity to users. The concern of the present research topic is felt at this juncture. With the increased Wireless Access Points (WAP) over the libraries, special security features needs to be adopted looking at the vulnerability of the wireless networks.

7.2.28: Internet Usage (by Users i.e. Students and Faculty):

Table 7.20: Internet Usage

Users	Numbers	Percentage (%)
Faculty and Staff	24	18.90
Students	94	74.01
Researchers	9	7.09
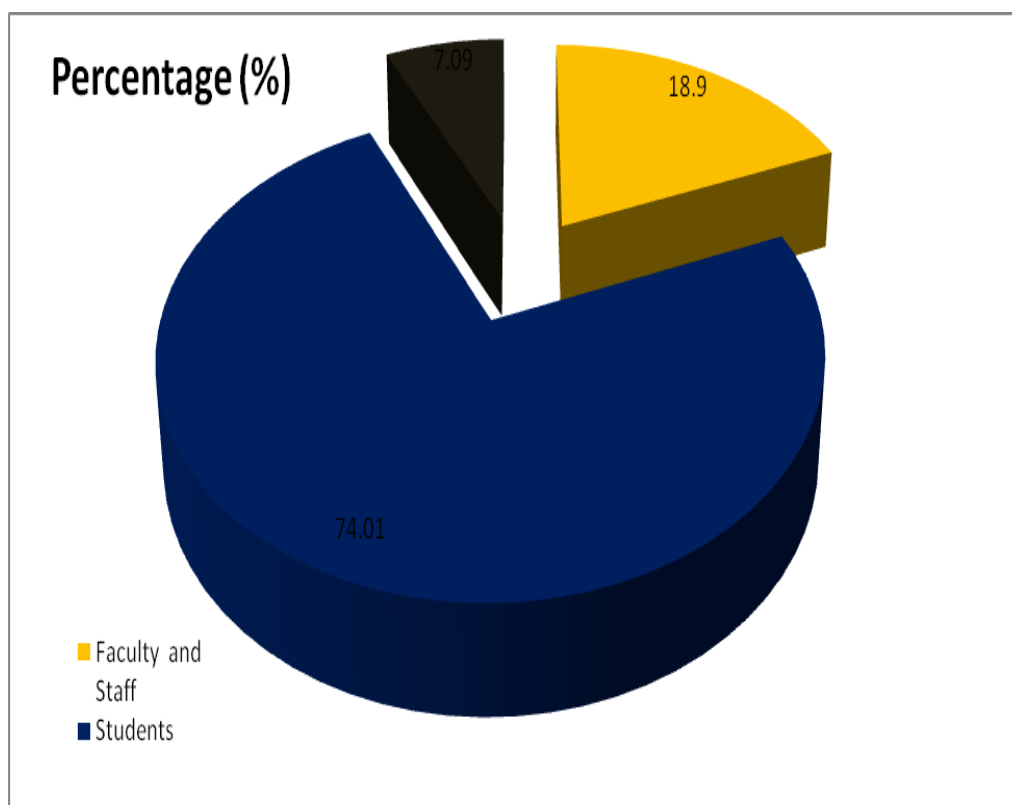
Figure 7.19: Internet Usage

Observation:

Internet is used in all the libraries during the working hours only. The more usage of net is reported by the PG final semester students, faculty and researchers etc. Users are generally using net for searching information or documents, for updating their knowledge and completing seminars, tutorials and extracurricular activities. It is observed that

264

students are using Internet more than faculty and on an average 74% students are making use of net for study purpose and case study analysis. Faculty (19%) and research scholars (7%) are also using library facilities for their research priorities or submission work.

7.2.29 User Satisfaction:

The survey has reported that the users are satisfied on using the net from the libraries. However they are of the opinion that they need more subscribed e-resources than the use of net for the information collection.

F Resource Sharing:

7.2.30 Sharing of Resources:

Table 7.21: Resource Sharing Facilities

Resource Sharing Facilities	Institute Libraries	Percentage (%)
Yes	103	81.10
No	24	18.90

Observation:

103 libraries (81.10%) are willing and joining the resource sharing programs. All the librarians are of the opinion that there is a need of developing resource sharing activity within the city or institutional branch libraries. They are also trying to use ICT for developing resource sharing programs. Intact libraries are sharing resources on request but there is no common program developed as such.

7.2.31 Membership of organizations:

It is observed that this culture (Membership practice) is yet to be developed in libraries but the librarians understand the value and some libraries have participated in the

DELNET membership or membership of some other institutes in similar zone. This culture need to be advanced.

7.2.32 Resources Likely to be shared:

<div align="center">

Table 7.22: Resource for Sharing

</div>

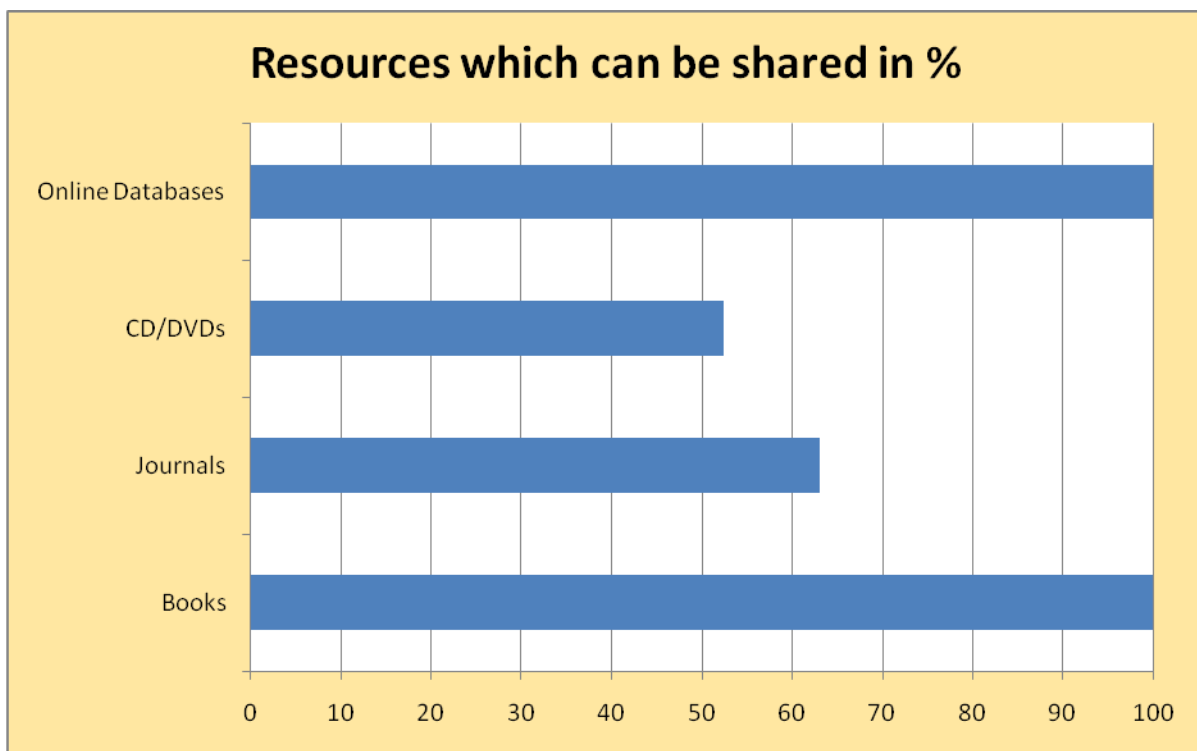| Library Resources for Sharing	Yes and (%)	No and (%)
Books	103 (100%)	0 (0%)
Journals	65 (63.11%)	38 (36.89%)
CD/DVDs	54 (52.43%)	49 (47.57%)
Online Databases	103 (100%)	0 (0%)

<div align="center">

Figure 7.20: Resource for Sharing

</div>

Observation:

The review indicated the opinions of the library professionals of management institutes. Most of them have opined that they are willing to share books and back volumes of

periodical issues. They are least interested in e-resource sharing. This might be due to the implicit restrictions and licensing issues with the consortia models through which the e-resources are being subscribed.

7.2.33 Resource Sharing Policy:

Table 7.23: Resource Sharing Policy

Availability of Policy	Number of Libraries	Percentage (%)
Yes	12	9.45
No	115	90.55

Observation:

An effort was taken to assess the availability of any structured policies developed by librarians of management institutes for sharing their resources. It is found in the survey that none of the library has developed resource sharing policy. But they are feeling the need of the policy for resource sharing. However 10% libraries have indicated the availability of the resource sharing policy but not framed properly and need to be revised.

7.2.34 Response Time:

Table 7.24: Response Time for Resource Sharing Services

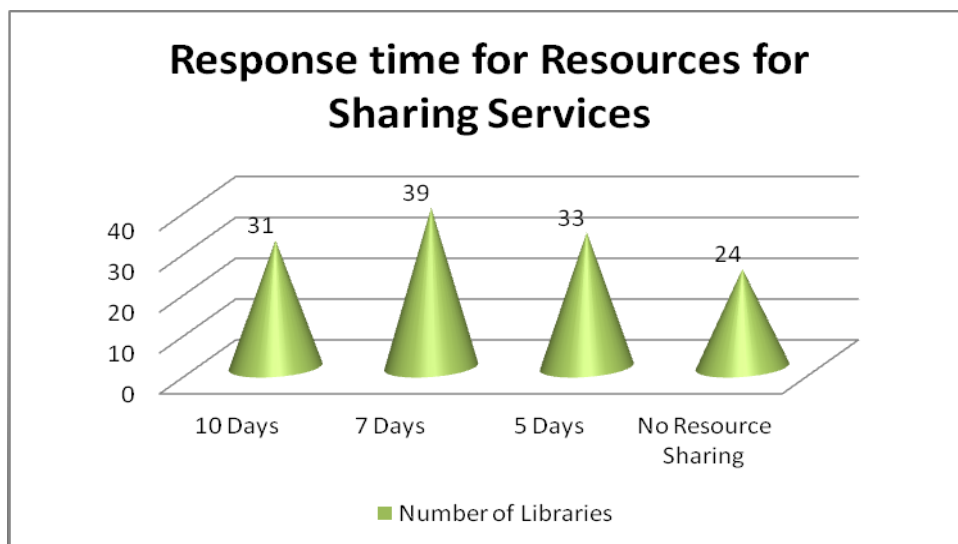| Response time for ILL/DDS Services	Number of Libraries	Percentage (%)
10 Days	31	24.41
7 Days	39	30.71
5 Days	33	25.98
No Resource Sharing	24	18.90

Figure 7.21: Response time for Resource Sharing Services

Observation:

All the librarians have opined that resource sharing is not effective and hence sharing of resources are very rarely done even at local level and at the most few pages of the photocopy are provided to the users. Users have to physically visit the library and only after which referring to the document is permitted. The response time is not clearly indicated but on telephonic enquiry if the document is available then the requestor is guided to visit the respective library for referring to the document. The data analysis indicated that nearly 10 days waiting period is required to satisfy the request. This is due to lack of tools for resource sharing.

G Networks:

7.2.35 Need of Library Networks:

Table 7.25: Computer Networks

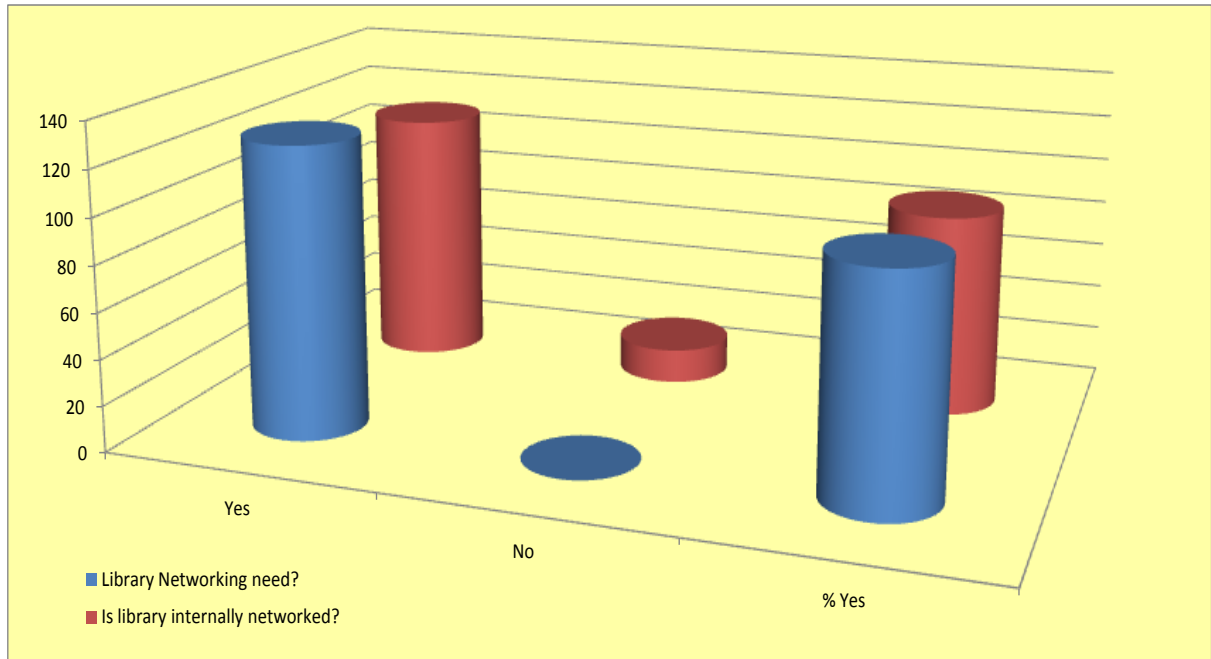| Questions	Yes	No	% Yes
Library Networking need?	127	00	100
Is library internally networked?	112	15	88.19

Figure 7.22: Computer Networks

Observation:

It is observed that all the librarians are interested in developing library networks and they may support the networking of managemnet institute libraries at local level. At present 112 libraries are initially networked i.e. intranet is available. But 15 management libraries (11.81%) have not yet connected interanlly also.

7.2.36 PC's in Librray Networks (Intranet):

Table 7.26: Number of PC's in Library Networks

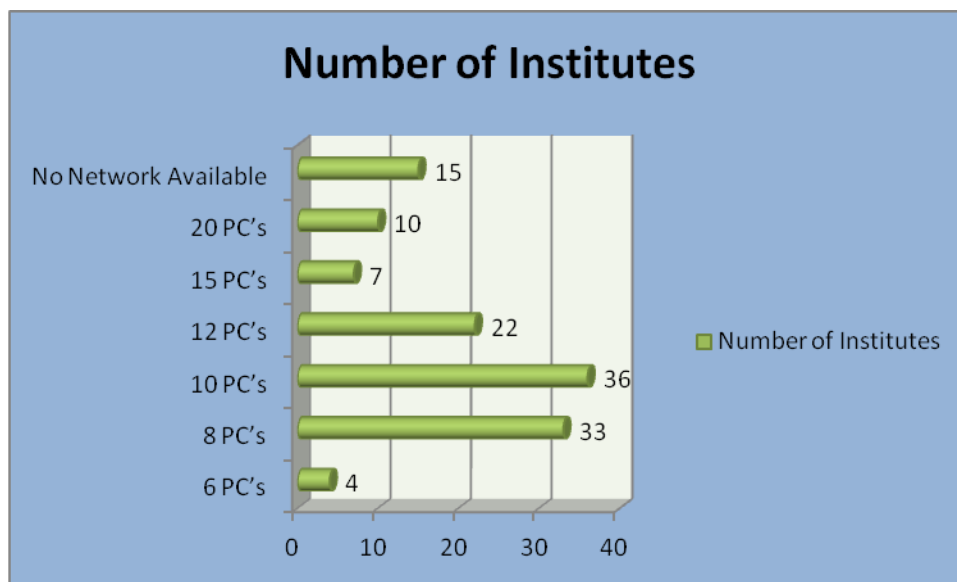| Number of PC's in Network	Number of Institutes
6 PC's	04
8 PC's	33
10 PC's	36
12 PC's	22
15 PC's	07
20 PC's	10
No Network Available	15
Total	**127**

269

Figure 7.23: PC's in Library Networks

Observation:

It is observed that 88.19% (112) management libraries are internally (Intranet) well connected and using the collection from central node. The PC's connected in network of library varies but in large institute it ranges in between 10 to 20 PC's in library. But 37 institutes have 6-8- PC's. The positive aspect is that libraries are internally connected and it is easy to connect with intra library system if efforts are made in library networking environment.

7.2.37 Operation Network Activities:

Table 7.27: Network Operation

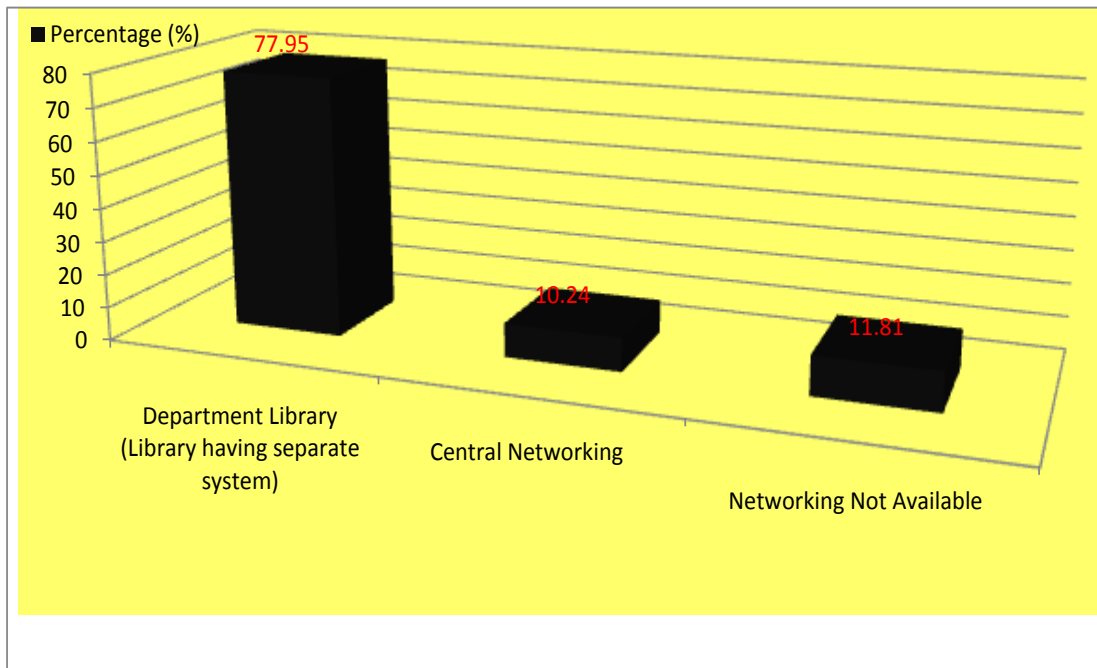| Types of Network Operation	Number of Institutes	Percentage (%)
Department Library (Library having separate system)	99	77.95
Central Networking	13	10.24
Networking Not Available	15	11.81

Figure 7.24: Network Operation

Observation:

It is observed that out of 112 institutes which have internal network are managed either central unit or departmental networking. In 78% libraries there is a separate library networking facilities managed by librarian with the help of IT staff of management institute. 10.24% libraries are connected through central pool and controlled by the IT experts.

7.2.38 Network Topology:

Table 7.28: Network Topology

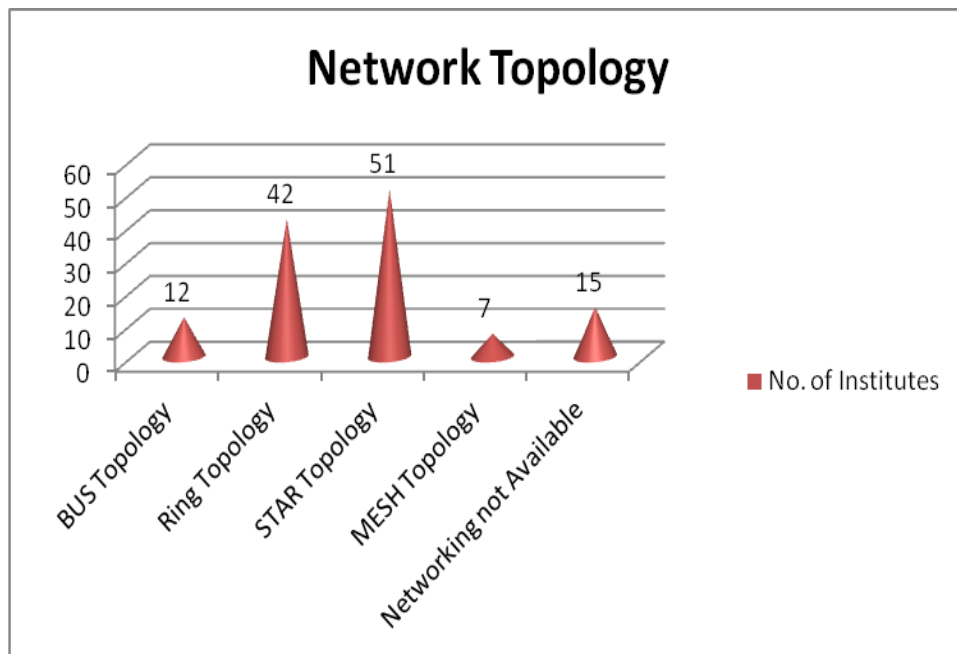| Network Topology	Number of Institutes	Percentage (%)
BUS Topology	12	09.45
RING Topology	42	33.07
STAR Topology	51	40.16
MESH Topology	7	05.51
Networking not Available	15	11.81

Figure 7.25: Network Topology

Observation:

In management institutes 40% network are star topology and 33% are ring topology, only 5% institute have mesh topology network. However the response pertaining to topology may not be considered as valid as the physical topology is completely different than the logical ones.

7.2.39 Applications of the Library Networking:

The response to this question is very poor hardly few librarians have mentioned the services to be availed through networks. The only positive aspect is that every one is willing to join the network if establsied and share the role posibility.

7.2.40 Membership of Library Network:

Table 7.29: Library Network Membership

Library Network Membership	Number of Institutes	Percentage (%)
Yes	16	12.60
No	111	87.40

Observation:

Only 12.6 % managemnet libaries in Pune are the members of few other library networks for getting information resources on loan or getting the photocopies from them on request or demand.

The majorities of the libraries (87%) are not members of any network. But more than 50% of them are interested to become a member or to take a membership of the subject oriented network. The libraries which are members of the network have indicated satisfaction due to getting resources.

H Resources for Establishing Networks:

7.2.41 Hardware :

Different requirements are necessary while developing networks in institute or libraries. Among these hardware is an essential part. It is found that the status of the automation in management institutes and libraries in particular is satisfactory. Libraries are providing OPACs and internet to users along with e-resources. Libraries have 10-12 PC's connected to institute's network and are in LAN. However the progress towards development of separate library network is very weak and progress is marginal as only 12 libraries are fully equipped and rests are in process. Hubs, switches, bridges, routers, gateways, modems, Network Interface Cards (NICs), Channel Service Unit / Data Service Unit (CSU/DSU), ISDN adapters, are the devices which are use in a networks, every components has their specific role in a network. These devices are used to connect devices with each other and translate data from one to another device. But the availability of such sophisticated hardware is lacking in most of the libraries.

7.2.42 Network Protocols:

Table 7.30: Protocols Used

Protocols	Number of Networks	Percentage (%)
TCP/IP	33	25.99
FTP	11	08.66
SMTP	21	16.53
HTTP	14	11.02
SFTP	09	07.09
Routing Protocol	24	18.90
Networking not available	15	11.81
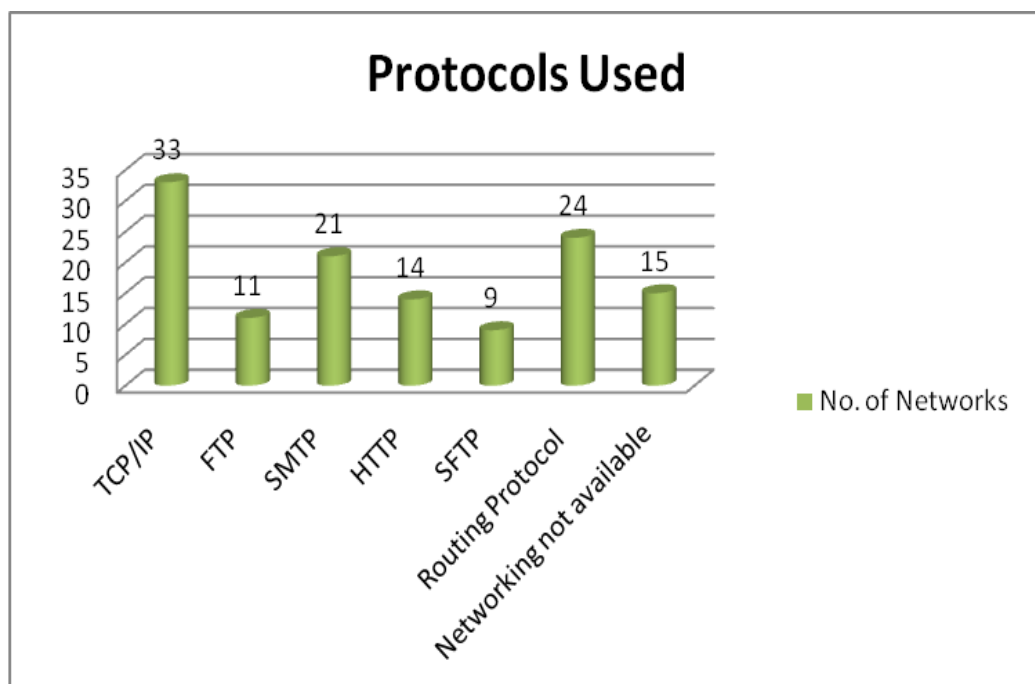
Figure 7.26: Protocols Used

Observaion:

Internet Service Protocols/ Internet Protocol (TCP/IP), File Transfer Protocol (FTP), Simple Mail Transfer Protocol (SMTP) Hyper Text Transfer Protocol (HTTP), Secure File Transfer Protocol (SFTP), and Routing Protocols are used very commonly in networking. It is observed that 33 management libraries (26%) have used Transmission Control Protocol / Internet Protocol (TCP/IP) protocols. 25% management libraries used

FTP and SMTP protocols. Other 37.1% management libraries used HTTP, SFT and Routing Protocols in networking. Though the librarians have tried to respond to this question based on their theoretical knowledge, the same may not be treated correctly. Most of the Ethernet (wired) networks follow TCP/IP protocol. Most of the wireless network follows 802.11b protocol, while the specialized services such as FTP are used for downloading the resources from the file servers.

7.2.43 Library Server:

Table 7.31: Separate Library Server used in Library Networks

Separate Library Server	Number of Networks	Percentage (%)
Yes	48	37.80
No	79	62.20

Observation:

In management libraries only 48 libraries (38% libraries) have their own library servers. Remaining 62% libraries don't have their own library servers and depend on institutional servers. Thus having independent network and server is a question in many management libraries.

7.2.44 Network Operating Systems (NOS):

Table 7.32: Network Operating Systems (NOS)

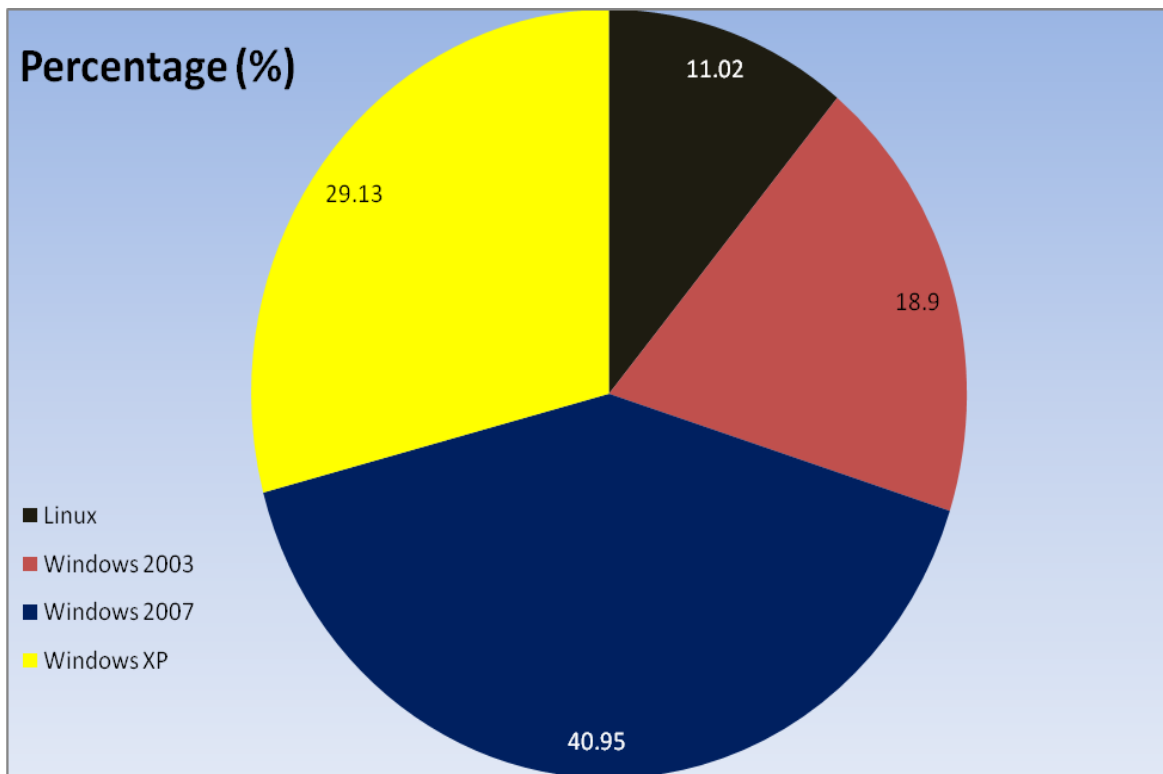| Operating Systems	Number of Networks	Percentage (%)
Linux	14	11.02
Windows 2003	24	18.90
Windows 2007	52	40.95
Windows XP	37	29.13

Figure 7.27: Network Operating Systems (NOS)

Observation:

Windows 2003, Windows 2007, Windows NT, Windows XP and LINUX are very popular network operating systems used in management institute networks. 52 management institutes (40.95%) uses Windows 2007 operating systems, 18.90% management institutes uses Windows 2003, 29.13% management institutes uses windows XP and 11.02% management institutes uses Linux operating system for networking purpose. The libraries need to be sensitized as regards to the use of the latest operating systems. In view of the theme of the present research topic i.e. security, it is reiterated that older the operating system, more is the vulnerability from the security point of view. Downloading the patches to make the system more secure also increases the burden on the bandwidth and valuable man-hours.

7.2.45 Internet Service Providers (ISP's):

Table 7.33: Internet Service Provider (ISP)

ISP	Number of Libraries	Percentage (%)
BSNL	28	22.04
Airtel	20	15.75
Reliance	23	18.11
Aircell	15	11.81
Vodaphone	9	07.08
Tata Indicom	13	10.24
Ticona	8	06.30
Idea	11	08.67
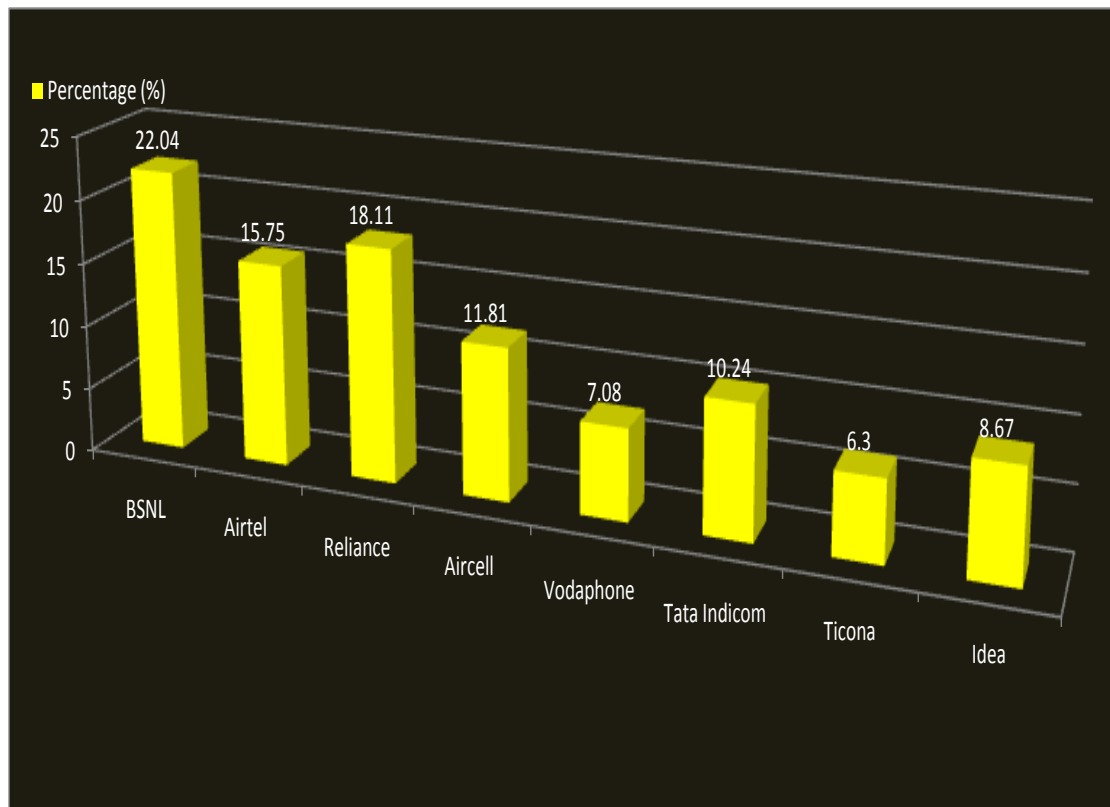
Figure 7.28: Internet Service Provider (ISP)

Observation:

It is observed that Bharat Sanchar Nigam Limited (BSNL) ISP is used by 22.04% management libraries, Reliance ISP is uses 18.11% management libraries, Airtel and Aircell ISP's uses 15.75% and 11.81% management libraries respectively. Remaining institutes uses the services provided by Vodaphone (07.08%), Tata Indicom (10.24%), Ticona (06.30), Idea (08.67%) etc.

7.2.46 Status of Domain Name Server (DNS):

Table 7.34: Domain Name Server (DNS)

DNS	Number of Networks	Percentage (%)
Yes	99	77.95
No	13	10.24
Networking Not Available	15	11.81
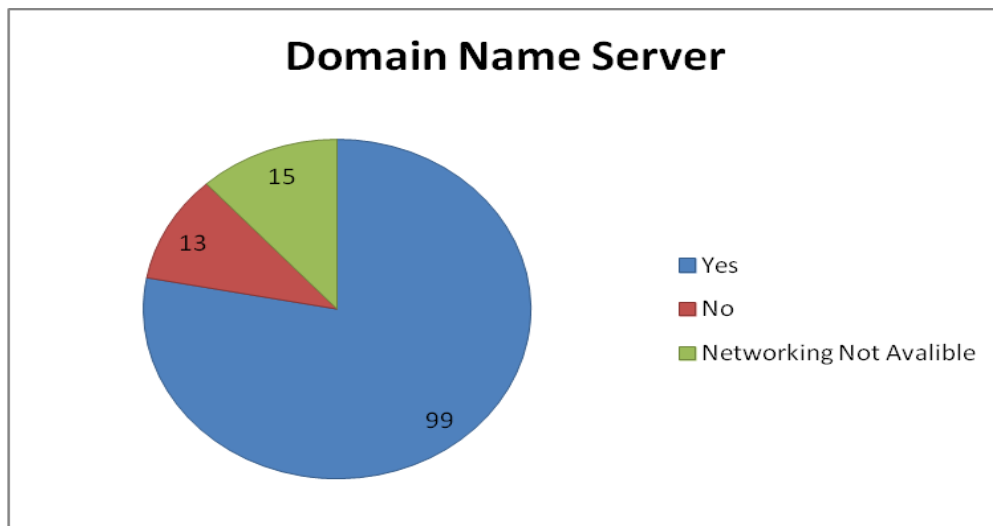
Figure 7.29: Domain Name Server (DNS)

Observation:

It is observed that 77.95% management institutes have Domain Name Servers (DNS). From 77.95% management instiuttes 80% instituutes have subscribed to Domain Name

Server and, 10.24% management institutes have not yet used DNS of its own. Domain is an important issue for the library networks. Older the domain names, more is the searchability of the library website through internet search engines such as Google.

7.2.47 Multiprotocol Label Switching (MPLS):

Table 7.35: Multiprotocol Label Switching (MPLS)

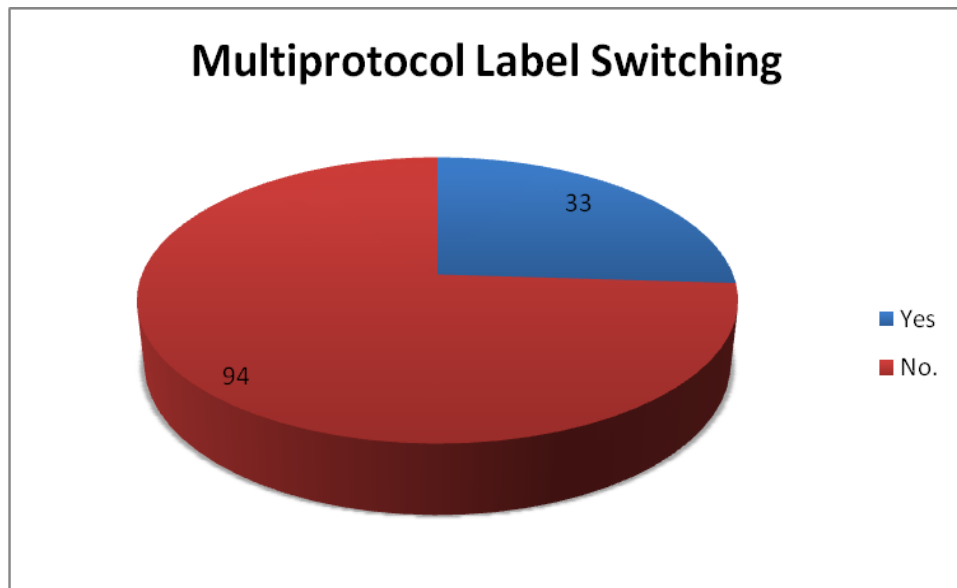| MPLS Use	Number of Networks	Percentage (%)
Yes	33	25.99
No	94	74.01
Total	**127**	**100**

Figure 7.30: Multiprotocol Label Switching (MPLS)

Observation:

It is observed that 33 management institutes (26%) have Multiprotocol Label Switching (MPLS). Remaining 74% management libraries don't have Multiprotocol Label Switching.

I Network Security:

7.2.48 Network Security:

Among 127 management libraries 112 libraries have networks in their libraries and tried to secure their networks. Different tools like firewalls, mirror servers, proxy servers etc. are used for this purpose. All management libraries used User-Id and Password facility for security purpose also. Antivirus software's are also used for the security purpose.

7.2.49 Firewall:

Table 7.36: Firewall for Network Security

MPLS Use	Number of Networks	Percentage (%)
Yes	88	69.29
No	24	18.90
Networks not Available	15	11.81

Observation:

It is observed that only 88 manageemnt libraries (69.29%) out of 112 libraries uses firewall for network security, the remaining 24 management librareis (18.90) have not uses firewall but they uses different tools.

7.2.50 Proxy Server:

Table 7.37: Use of Proxy Server

Proxy Server	Number of Networks	Percentage (%)
Yes	94	74.02
No	18	14.17
Networks not Available	15	11.81

Observation:

It is observed that only 94 manageemnt libraries (74%) out of 112 libraries uses proxy servers for network security, the remaing 18 management librareis (14%) have not used proxy servers yet.

7.2.51 User-ID and Password:

Almost all 127 management libraries provide unique User-ID login and Password faciltiy for maintaining the security of network.

7.2.52 Antivirus Software:

Table 7.38: Antivirus Software Used for Security

Antivirus Software	Number of Networks	Percentage (%)
Norton	24	18.90
Quick-Heal	31	24.40
Kaspersky	12	09.45
Symantec	21	16.54
Trend Micro	18	14.17
NOD	12	9.45
Microsoft essential security	9	7.09
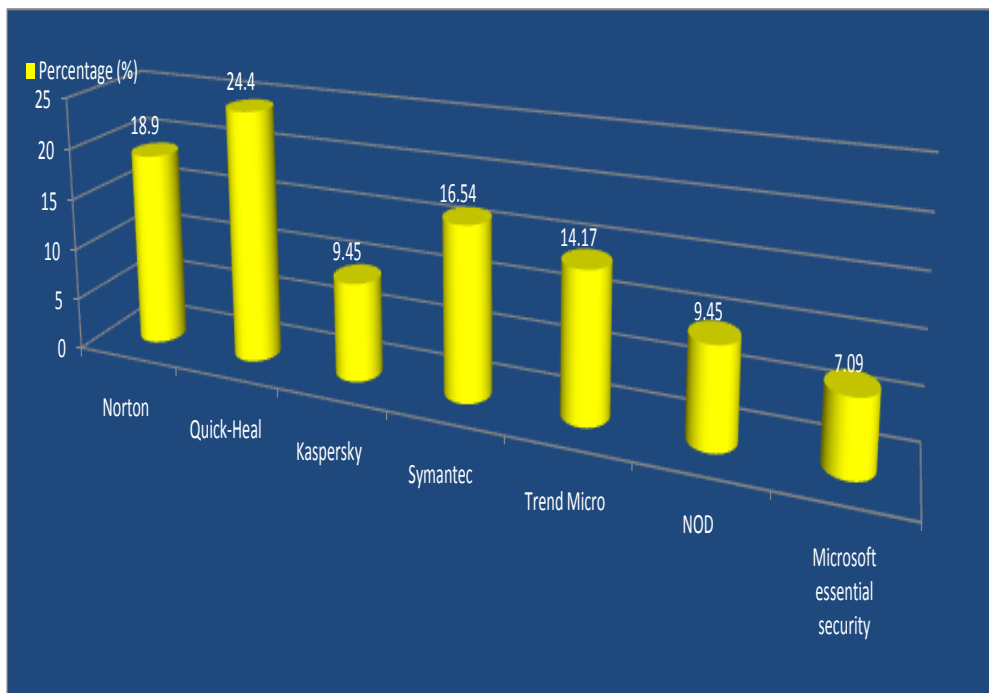
Figure 7.31: Antivirus Software's used

Observation:

All the 127 management libraries are using different antivirus softwares for network security. 24 management libraries (18.90%) uses Norton antivirus software, 31 management libraries (24.40%) uses Qucik-Heal antivirus software. Kaspersky and Symantec antivirus software is used by 12 (9.45%) and 21 (16.54%) management libraries respectively. Trend Micro antivirus software is used in 18 management libraries (14.17%). NOD and Microsoft Essential Security antivirus software is uses by 12 (9.45%) and 09 (07.09%) management libraries respectively. It is found that 92 % management libraries subscribed the antivirus software and remaining 8% libraries used antivirus software which is available free over the Internet.

7.2.53 Problems faced in Developing Library Networks:

A general open ended theme was kept open for the discussions among the librarians that highlights the problems faced during the network development in libraries. Response to

this question gave insight for the development of networks and the problems faced are identified like, budget, qualified manpower, tools and technologies, space etc. Some librarians have stated that support from the management is not available to modernize the libraries as well as for maintaining the proper collection in libraries, due to lack of sufficient technology networks are not yet developed in many libraries.

7.2.54 Safety Equipments Used:

Table 7.39: Safety Equipments

Safety Equipments	Libraries Respond	Percentage (%)
CCTV Camera	86	67.72
Bio-metrics	75	59.05
RFID	06	4.72
Smart Card Facility	NA	NA
Automatic Door Control	NA	NA
Fire Alaram System	24	18.90
Fire Extinguisher	68	53.54
Visitors Entry Register	127	100
Humidity Control	111	87.40
Smoke Detectors	127	100
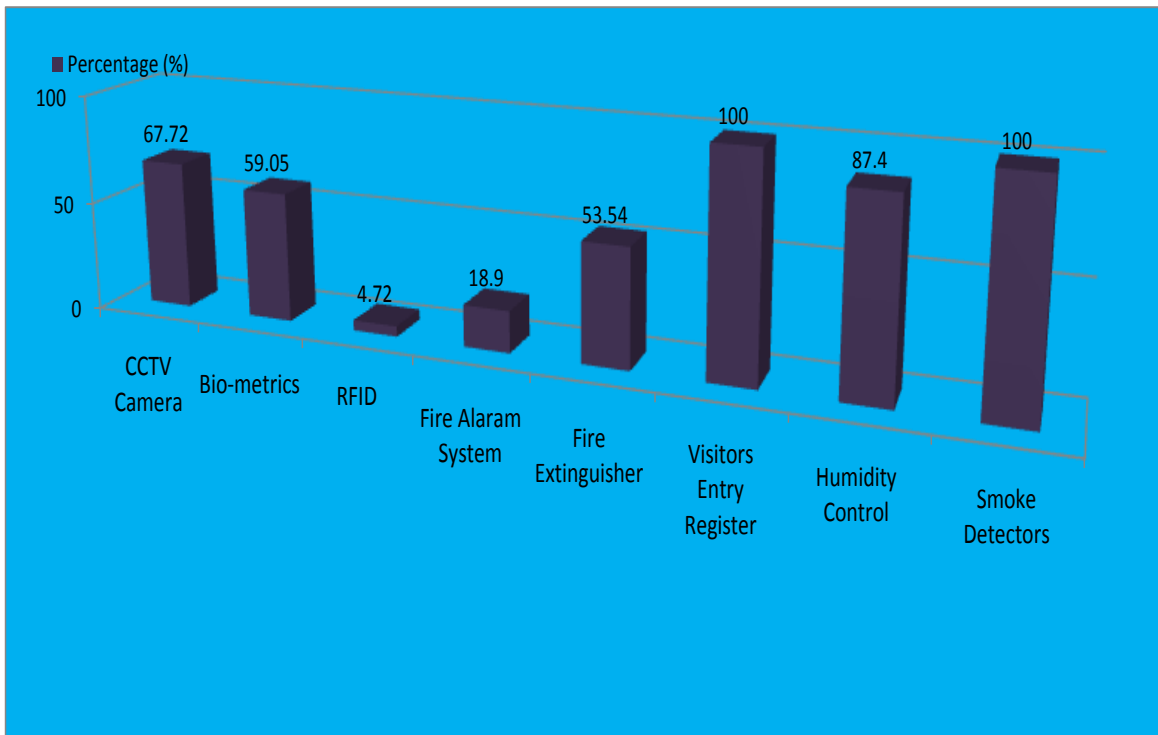
Figure 7.32: Safety Equipments used in Libraries

Observation:

It is observed that in the recent period libraries are taking more care and avoiding hazards happening in libraries like carrying books without entries, vandalism by librarians by applying moden tools and technologies like use of safety equimemts, CCTV, Biometric scanned entries to users, RFID and barcode systems, auto control gates, fire and somke detectors, humidity control by dehumidifiers, in addtion to traditional practices like visitors records, manual gate check, pesticiding, etc.

It is observed that 87.40% management libraries used humidity control equipments. 19% management libaries have fire alaram system and 53.54% management libraries used fire extinguisher. Only 5% libraries uses RFID and 59% libraries used Bio-metrics, 67.72% libraries used CCTV camera's in management libraries. Smart Card and Automatic Door Control facility is not yet used in any library. In spite of shortage of budget management libraries are being provided additional funding for modernising and saftey of data collection.

7.2.55 Measures for Network Security:

Many management Institutes have intranet and internet facilities with them and also provided to libraries. There are many network security measures available to control the networks and used very commonly in practices, which are as follows:

- Use of firewalls, proxy servers, mirror servers etc.
- Use Anti-software's for different purposes either free or subscribed
- Unique user identifying facility to all users with unique Username login ID and Password
- Updates all hardware and software in network systems.
- Disable or remove USB ports, floppy drives, CD/ DVD drives and other external connecting devices to servers
- Un-accessed server rooms with password or biometric door controlling.
- Use CCTV camera and fire extinguisher / alarms
- Backup of important data in different formats print as well as e-format. Backup data on CDs / DVDs are kept in different locations.

This indicates the use of tools and techniques for the safety of network and libraries.

7.2.56 Spam Mail Protecting System:

Table 7.40: Spam Mail Protecting System

Spam Mail Protecting System	Number of Libraries	Percentage (%)
Yes	51	40.16
No	76	59.84
Total	**127**	**100**

Observation:

It is observed that only 40.16% libraries are using Spam/Mail security systems and remaining 76 libraries (59.84%) are not used to this system for security.

7.2.57 Security Measures:

Table 7.41: Security Measures

Security Measures used in Libraries	Yes	(%)	No	(%)
Data Backup	72	56.70	55	43.30
Lock System	98	77.17	29	22.83
Disable / Remove Devices	66	51.97	61	48.03
Update Hardware and Software	80	62.99	47	37.01
Hardware Components (Firewall and Proxy Server)	112	88.19	15	11.81

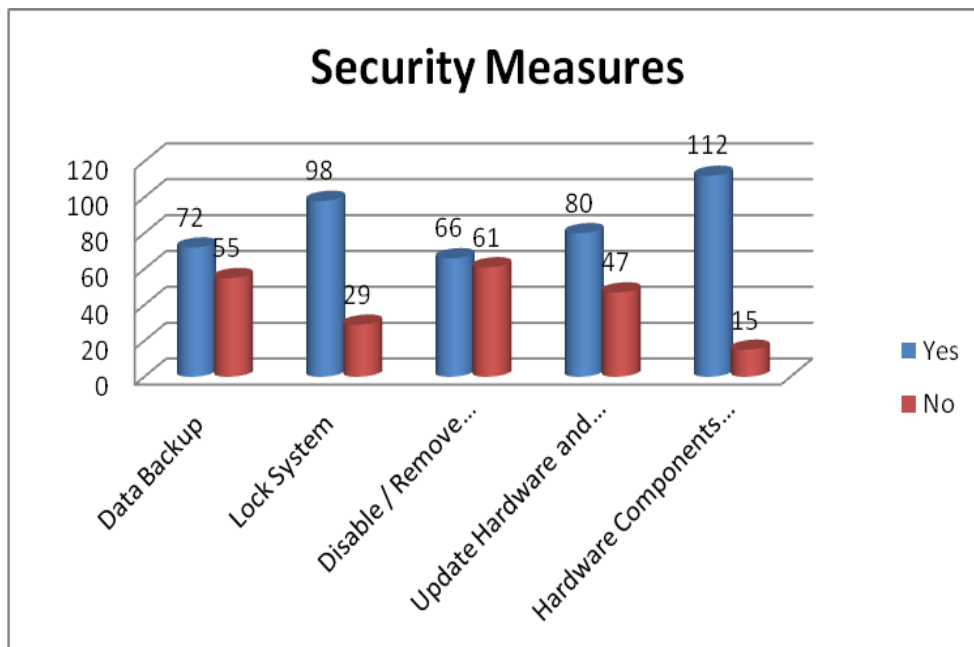**Figure 7.33: Security Measures**

Observation:

It is find that 56.70% management libraries maintain data backup regularly and 43.30% management libraries are not using backup facilities. 77.17% management libraries are kept their records, data, information and important devices in closed access system. More than 50% management libraries used disable / remove facility to their libraries. 63%

management libraries update software and hardware time to time. Hardware equipments like firewall and proxy servers are used by 81% management libraries.

Summary:

The survey identifies the following:

- Management libraries are growing along with the growth of management institutes and libraries are used by maximum students and faculty for learning and teaching.

- Management libraries are using more ICT and other technologies.

- Moderization of management libraries is necesssary which is useful for implementing qualitative collection development and services.

- Very few library staff have higher qualification and they need to upgrade their qualification and knowledge in respct of ICT and use of managemnet techniques etc.

- The advanced services like alert, extension services and orientation are not yet considered in these libraries yet.

- Usage of e-resources has increased but e-collections are limited.

- It is found that library have to develop resource sharing policy and implement it properly.

- Librarians are interested in establishing library networks for local management libraries and implementing initially at local or city level.

- Network security is also a point in consideration.

Conclusion:

As depicted from the survey, the management institutes in Pune seems to have libraries with varying dimensions with respect to their collection, human resource, automation, internet bandwidth and expertise. One of the intended objectives of the survey was to perceive their readiness towards networking, sharing the resources and dissemination of the knowledge which is in the true sense philosophy of the LIS. The outcomes of this survey are taken forward in the next chapter to project the model of consortia of all these libraries.

CHAPTER 8

FINDINGS, SUGGESTIONS AND CONCLUSION

8.1 Introduction

The present study is the result of analyzing 127 management college libraries in Pune city affiliated to University of Pune, and some well known management colleges, Symbiosis Institute of Management, Bharathi Vidyapeeth, MIT etc. In this research study the researcher has analyzed the status of management libraries taking into consideration information resources, library services, status of automation, efforts made towards resource sharing etc. and examined these in detail to understand the efforts made towards library resource sharing and networking among management college libraries and opinions of library professionals in monitoring these activities.

This analysis prompted researcher to suggest solutions for the easy management of resource sharing by networking among the management libraries in Pune. On the basis of analysis and interpretation of data, the findings, are reported in this chapter which highlights the status of management libraries and willingness towards sharing resources. Based on these facts researcher has made efforts in suggesting plans and best practices to be followed while undertaking resource sharing project in management libraries using technology and new media and developing a network of management libraries in Pune city. The model suggested is conceptual but might be useful for developing library networks and also maintaining its security for protecting data.

From the survey of management libraries, observations noted as well as discussions with library professionals regarding their experiences in the profession, based on these, researcher identified prominent findings and suggestions which are placed below.

8.2 Findings:

The major findings deduced from the study are grouped in to different aspects and presented briefly as:

A. Management Education and Institutes:

1. The growth of management education initiated since 1971 in Pune city and since then constantly increasing by number of institutes as well as by specialization in courses as per the need and demand. During the period 2001-2010 the growth in institute is very high (83). This indicated the need and importance related to management education. Most of the management institutes established are non-aided (97%) but these are approved by AICTE or DTE or Affiliated to universities. The trend in the period 2010-2013 in developing new establishments of management institutes is reported to be normal as compared to previous period.

2. The staff / employee in management institutes in Pune are categorized in three groups faculty, administrative and technical / professional. The faculty strength is nearly 50% and non-teaching staff is 42% where as technical staff is 8%. Technical staff category is not available in all institutes and merged with administrative category includes library professionals also.

3. The students enrollment (intake) in 127 colleges is 14,360 Per Annum and on an average 113 students are admitted in each branch in each college. Old and ranking management institutes have more number of students as more courses are being conducted and where as in new colleges the strength of students is less in number (minimum 60) due to initial stage of development.

4. In all the management institutes Post Graduate (PG) courses in MBA are conducted, but in few institutes Diploma, Under Graduates (UG), distance learning courses are conducted. It is a positive sign in development of management education that research element is now introduced including Ph.D. Distance / Online MBA and these courses are conducted in 18% institutes.

5. All the management institutes conduct common old MBA programs in HR, Marketing, Finance etc. but specialized courses are also now implemented and conducted in many institutes like NIBM, NIA, Vaikunth Mehta etc.

6. Management education is spreading its wings and enhancing the courses in management and nearly 80 new programs are being added since its inception. The

courses in banking, insurance, information technology, operations, rural management, health care management, hospitality management, agricultural business, sports, are the new avenues developed in to this system.

In short it is observed that the progress in management education is improving and enhancing year by year and launching new MBA programs in the courses as per requirement of industry, society and culture. To manage the specialization many new management institutes are upcoming and its growth is also exorbitant. This clearly indicated the need of management education at every discipline. The globalization, industrialization, and commercialization are the factors in developing management education. To support the management education system libraries and information centers are acting as backbone and supporting to the development of education. The resources available are ample but its management and economical collection development is an issue to be considered.

B. Libraries and Information Centers:

1. All the libraries of management institutes have qualified librarians and all the librarians have acquired minimum B.Lib, M.Lib qualifications. However now apart from basic qualifications, professionals have acquired NET/SET and appointed in management library sector. 14% staffs have also completed research in LIS either M. Phil (9%) or Ph.D. (5%).

2. The working hours of libraries are generally 8.00 AM to 6.00 PM. But reading room facilities are extended for users between 10-12 hours / day and during exam period the time is extended as per demand of users.

3. Total library staff strength in management libraries is 384 in 127 institutes. Out of these 83% staff is professional and technical with library qualifications. This strength is managing the libraries and supporting to management education system.

4. The total collection of documents in management libraries (Pune city) alone is nearly 12 lacks and annual addition is about 1, 27,000 documents. This is a very good information resource for sharing among libraries. Journals back files are more than 3000 titles and subscribed annually to 1500 titles in the city. This subscription may have duplication in subscription and found similar titles more

than few libraries. There is a very good scope to reduce the duplication and add new titles in libraries by way of resource sharing.

5. Processing of information and documents procured in the libraries are managed using DDC and AACR-2 in all libraries. This is very good for the development of union catalogues of holdings using computers in addition to OPAC.

6. All management libraries have appointed library committee consisting of 5 to 6 members to take decisions related to libraries and managing library collection development and solving management issues. The committee helps librarian in taking proper decisions related to library development including modernization. This committee can also look after the resource sharing project.

7. The library services commonly provided by the management libraries are: reading room, home-lending, CAS, newspaper clipping, Photocopying, SDI and ILL. The services like alert, digest, extension services, library orientation are not reflected in the survey, which is the need of present time.

8. The library collection mainly consists of books, textbooks, reference books and periodicals (85-90%). The remaining collection covers technical reports, thesis, newspapers, proceedings and project reports of students. E-collection is also growing in which e-books are subscribed more with audio / video materials, e-journals, database, internet resources, technical reports are increasing in collection. In audio-video literature management essays, notes, lectures are procured, which are brought out by standard universities like oxford, Stanford, IIMs etc.

C. Automation:

1. About 98% management libraries have automated in management education sector. This is a very healthy sign for growing further and developing a network of libraries as data is available in digital form.

2. It is observed that all the management libraries are using different software's for automation depending on their feasibility. The software's used are good viz. SLIM, SOUL, and LIBSYS in which integration for import and export of data is possible and helps in sharing the information.

3. For automation nearly 73.23% libraries (93 libraries) have used SLIM (42.5%), SOUL (16.5%) and Autolib (14%). Libsys is also used but only 5.5% libraries. The trend of using open source software for automation is adapted recently (7%) and in house developed software by (8.5%) libraries.

4. OPAC is also developed by many management libraries, but available mainly for the internal users of the institute and not shared among other libraries.

5. The standardization in data management is weak, and has to be standardized with the help of expert professionals.

D. Internet:

1. Maximum management libraries are providing Internet access from libraries or from the central facility. Users can get access to global information routing using internet. Wi-Fi facilities are also provided to connect users laptops to net and enhance the access points to users in a limited space in few management libraries. Internet access is used for learning and teaching activities for both students and faculty.

2. 92% libraries provide internet services using broadband, ISP and leased lines for powerful communication in institutes and libraries. 70% Wi-Fi connectivity is also available. This development is very prominent as compared to other academic libraries.

3. The main users of internet in management institutes are students (74%) and faculty (19%), since research element is added in management discipline. 7% users are researchers.

4. Users generally use Google search engine for data collection. There are many search engines useful for data gathering but users are not aware of it. There is a need of training to the management students for searching information over the net.

E. Resource Sharing and Library Networking:

1. Among 81% management libraries, resource sharing concept is operative at primary level i.e. Inter Library Loan (ILL) only, and shown interest in joining to resource sharing programs. All management libraries are of the opinion to share resources and provide advanced services to users using networked collection.

2. In resource sharing programs only few libraries are members of DELNET. But librarians are of the opinion that, they need resource sharing at local level with common program. Liberians have agreed to share books, journals, and back volumes including databases.

3. For resource sharing purpose, there is no proper policy available or prepared by librarians. The librarians are willing to develop a policy which may be more effective to implement.

4. At present there is no formal activity of resource sharing among local libraries. But on specific demand users can visit library and consult documents and even take Photocopy. No DDS is organized systematically. The response time is 10 days to meet the queries due to lack of tools and technologies in LIS at presently.

5. There is no network available but all the librarians are of the opinion to develop a local management library network in city to share resources. The analysis indicated that 88% libraries in Pune are having intranet facilities with them to access and transfer data. This is healthy symptom in developing networks of management institute libraries. The availability of PCs and network infrastructure is suitably available in 88% of institutes.

6. The network operation is merged through libraries in 78% institutes where as 10% is managed by central facility. This environment is good for networking of libraries in Pune city.

7. In management institutes 40% networks are Star in nature and 33% are using Ring topology. 77% institutes have developed proper topology.

8. Management libraries do not have membership with other library networks. e.g. DELNET to achieve resource sharing. More than 50% librarians opinioned that they are ready to join local city network of management libraries if established and agree to perform active role in it.

F. Pre-requisites for Network:

1. For developing sustainable network for information transfer it is necessary to acquire different hardware equipments as well as software and trained manpower. But the hardware required for advanced networking is lacking in management institutes.

2. In networks TCP/IP protocol is popularly used followed by FTP and SMTP. For data storage there is no separate server for library, centrally located servers are being used. Thus having independent library network and server is in question in many management libraries.

3. Windows NT Operating System is used in maximum institutes. BSNL is the major ISP used for intra networking in management institutes.

4. For initiating networking in libraries situation demands for additional budget and management of these institutes have to consider this point.

G. Network Security:

1. Many management institute libraries have their own network which is Local Area Network (LAN). The network may be bus topology or ring topology. The management college libraries provide services over the LAN like CAS, SDI, OPAC Services. etc. but using intranet

2. User authentication process is used to identifying and verifying users authenticity and allowed to access the network data. Generally two types of authentication is observed, user's and administrator's.

3. For user authentication used users login-id and password, CAPTCHA methods for login and one time password etc.

4. Firewall and proxy servers tools are used for network security. 69% firewalls, 74% Proxy servers are visualized in the survey.

5. Different antivirus software like Norton, Quick-Heal, Symantec and Trend Micro are also used for maintaining the security.

6. In libraries different safety equipments are used like CCTV, biometrics, automatic door, controller, fire / smoke detectors, humidity controller etc. Apart from this different utilities are available at primary level to apply in general.

8.3 Suggestions:

On the basis of analysis and interpretation of data and findings of the study, suggestions have been made to improve the use of information communication technology for

advance and modern functioning of management libraries. It helps to develop e-libraries and sharing resources among the management libraries using networking.

1. Management education programs, courses and institutes are continuously increasing and the growth is linear. The syllabus of the management programs is supporting global components and the education system is using digital class, internet and discuss the cases online in the classroom. The trend in management education is shifting from traditional to advanced online system. This change need to be accepted universally to support globalization.

2. The staffs employed have to develop research element among the students and research element is to be added in the education system to bring sustainable quality in the management education, which helps in solving the problems.

3. Coordination between management institutes and industries to be enhanced so as to get expertise faculty for teaching and also strengthen the education system in real environment.

4. Few older courses still conducted in the management education system need to be amalgamated, modified and brought to the standards. The facilities for the working employees desiring to join management courses for them online tutorial based courses are to be implemented.

5. Management institutes have to be ranked frequently based on the performance, teaching, deployment of students for employment, collaborations, faculty employed, courses management, infrastructure available and fees pattern etc.

6. Along with the growth of institutes and management education programs, libraries in this area are also increasing to support education system, but have to be metamorphed and reshaped using ICT. Management institute authorities need to allocate maximum budget at the initial stage for modernization and developing service based libraries. Libraries in management area have to support management education system and provide different services based on ICT and Digital era.

7. Though management libraries categorized in academic libraries, they are also now treated as special libraries as they serve to management education users in which specialized needs of users are to be satisfied from the collection and by means of services. Management libraries use ICT more as compared to other social science libraries. To maintain the status library professionals have to apply more technology and projects like resource sharing.

8. The status of automation in these libraries is good but need advanced ICT support to enhance the services which is weak at the present moment. The advanced hardware need to be replaced to use ICT more effectively.

9. Uniform library management software having standard facilities is to be used and also support to import and export of data to any database for resource sharing purpose.

10. The collection of management libraries comprises of specialized subject based and it is not possible to collect all the literature in any single library and hence resource sharing is essential among the group of management libraries to develop economical collection as well as provide services from large information base.

11. Books, journals, magazines, thesis, and student's research reports, are mainly available in the libraries. Most of the collection is in print from but now there is a need to collect information resources in digital form. In some libraries it is observed that quantity of e-resources like e-journals, e-books, database, CD-DVDs are being procured but less than printed materials. To achieve economical collection development and free exchange of information libraries have to enhance the e-collection in libraries.

12. User expectations from management libraries are different and they need advanced services. Thus librarians of this facility have to find user needs and ISB regularly to support the needs and provide better services required by users.

13. In addition to regular services provided presently, the management libraries have to use ICT and management techniques to provide advanced and enhanced services like alert and digest services, library extension services and digital collection based services.

14. Use of web tools to be practiced more like RSS feed to collect the global data and provide to students and faculty to enhance the learning and teaching and developing specialized courses.

15. The libraries in this zone if would like to metamorphed then facilities like digital class, chat rooms, discussion rooms, internet lab, Global online demonstrations, Tele conferencing room, Audio video rooms, etc are to be introduced for better development.

16. Use of twitter, face book for gaining qualitative information is to be developed. Internet links need to be faster and advanced to get the universal data quickly.

17. The libraries have to be developed specialized databases of their collection and posted on the Web for general purpose information. IR can also be developed and links to web.

18. Every library provides internet facilities but have insufficient bandwidth, high speed bandwidth is required to get the fast connectivity to internet. Internet connection with maximum speed more than 1MBPS is required. All users, students, faculties, researchers, and other members can access the resources using Wi-Fi facilities available on institute campus and library area also which helps to all library users to access information 24/7.

19. It is suggested that every management library have its own library server for storing library databases and data. Latest specifications for hardware, software and operating systems are to be used for developing management college library networks.

20. Every management librarian have to take interest in developing library web page which provides information about library and library services, functions, facilities, library collections, new arrivals etc. It also helps in sharing resources by providing connectivity.

21. Management college libraries are facing the problem of scattered information and observed that there is lack of proper infrastructure in libraries, and hence advanced facilities cannot be availed.

22. To maintain safety there is a need to use safety equimemts like CCTV cameras, biometric system, automatic door control, RFID and barcode systems, smart card facility, fire and somke detectors, humiditity controler using dehumidifies, in addtion to traditional practices like visitors records, manual gate check, pesticiding, etc.

23. Managing library network security efforts are needed like multilayer password facility, security password CAPTCHA code, use of good wireless encryption for encoding messages or information etc. Worms and viruses are major security issue of networks. Threats blending Internet worms, viruses, and Trojan horses spread around the world in minutes, resulting in widespread intrusions and costly damage. To overcome from this problem use antivirus softwares. Use antivirus software like Norton, Quick-Heal, Kaspersky, Symantec, Trend Micro, NOD and Microsoft essential security etc. Use firewall for the network security for both software as well as hardware for controls the incoming and outgoing network

traffic. Use CISCO software for network security, proxy server, mirror server, spam and Mail protecting system. Take data backup for security, data can be stored in another place for security purpose and updates all hardware and software in network systems simultaneously. For security disable or remove USB ports, floppy drives, CD/ DVD drives and other external connecting devices to servers. Restricted entry in server room.

24. Librarians commonly suggested that for the development of networks additional budget, qualified manpower, advanced tools and techonologies, support from managment autorities etc. are required. Due to lack of these factors networks are not yet developed in many librraies.

25. The total collection in maangement education is strong in Pune city and it is mainly focusing to textbook and syllabi orientation. There is a very good reference collection in some mamangement education libraries. The resource sharing is possible and also beneficial looking into the collection of all libraries in this sector.

26. The consortium practice at local level for the subscription to journals and databases might be very useful and for this purpose administrative heads and librarians have to formulate policies for enetering into resource sharing projects.

27. There is a need for the central agency to be established based on NISSAT principles for organising and initial funding of librray networks in different subject disciplines.

28. Network security is not to the mark and if resource sharing is to be initiated there is a need to develop security at higher level using firewall and proxy servers.

29. In the research study, researcher observed problems faced by libraries and librarians and these are less usage of advanced ICT technology, e-resources, and e-collections and are limited and need to improve these drawbacks. It is commonly suggested that avoid duplication in collection at local level by means of developing resource sharing library networks. Librarians have shown their interest in developing library networks and implementing initially at local or city level. Librarians should take interest for designing and creating bibliographical databases of their resources.

30. For performing better resource sharing or library and information network model is suggested which can be considered by the library professionals.

8.4 Conclusion:

In brief the status of management education and management institutes in Pune city is studied in and noticed that: Management education is progressing and had constant growth. The different level courses and programs are added in to system. Demand for management education is increasing and more non aided management institutes are established under the control of AICTE or UGC. Along with general MBA programs organizations and institutes are specially established for conducting specialized management courses like Banking (NIBM Pune), Insurance (NIA, Pune), Agricultural equipments (Agricultural University Pune), Cooperative management (Vaikunth Mehta National Institute of Co-operative Management, Pune) etc. The trend in management education is shifting from traditional to online. The libraries are also supporting to the bets by providing facilities to users and trying to modify in to ICT based librraies to support education system.

In the present era of information technology and information explosion, the libraries are to be developed in different strategy and the traditional libraries are converting slowly into digital libraries and wall less libraries. Libraries are using modern technologies and techniques and have progressively replaced the old method of information collection, storage, retrieval, library functions and services. Today libraries have no limits for collecting reading materials, information resources, distributed in different geographical areas, but the budget constraint do not permit to collect maximum. Therefore modern technologies are now used in the libraries and accepting electronic documents in the digital environments. Links are established with different information sources and virtual libraries and achieving resource sharing and networking benefits. Every individual library is acting as a place for storage and services to the users while the trend is to provide shared information to the users. There is possibility to create their own institutional digital repositories by transforming their institutional publications which are in print and digital. All this needs support and cooperation from the management authorities of the colleges and active participate of library professionals.

In electronic age, library users are demanding for instant searching for information from a single point to any geographical location, and retrieve information from the library catalogue, abstracting and indexing journals, databases and full text information electronic resources. Management college libraries are facing increasing pressures from

multiple sources, information explosion, increase in cost of library materials and insufficient library budgets etc. and due to these libraries can no longer be expected to support research and development from their own resources unless they device some new activities like sharing the resources by means of services.

Considering the facts it is definitely a beneficial project to enter in to resource sharing using development of library networks and consortium etc. It is also observed that resource sharing and networking is a great boon which needs to be implemented progressively and professionally in management college libraries in Pune. This helps to generate optimum satisfaction among users and also save huge expenses on collecting resources.

The present study described the status of management college libraries in Pune. It is observed that information resources are available in traditional as well as electronic formats. Management college libraries are not acquiring sufficient electronic information resources and rests on print media only. Internet and related services of management college libraries are not up to the expected level. In few colleges users are satisfied with the internet access and technical services and facilities like online databases, e-journals etc. provided by libraries. But in many management colleges users are not satisfied with the provision of web based services. The main reasons to unsuccessfully development of library networks in management college libraries were lack of sufficient budget allocations, lack of availability or usage of information technology, modern infrastructure and lack of trained library professionals. In this context, the researcher has designed a model for library networks for management colleges in Pune, and also suggested for the development of a library network for management college libraries in Pune. Researcher tried to present many problems for developing the management college libraries and also discussed the issues and challenges of the management college libraries in Pune. Researcher tried to solve the problems through this proposed library network.

In the present study the objectives fixed were studied in detailed and discussed in different chapters viz. studying status of management education and management libraries, information resources available, user expectations from management libraries, services provided currently, ICT usage and status of automation, status of resource sharing and consortium, networking, requirements for the development of city networks and interest of the library professionals in resource sharing etc and based on the results a

suitable management library network model is presented. The hypotheses formulated in the beginning of the study **"Design and Development of Network Based Model for Management College Libraries in Pune City with Special Reference to Network Security"** is tested and found true.

The purpose of this research study is to check the status of management college libraries and assess efforts towards sharing resources, designing of the library network among management college libraries, find out the problems faced in resource sharing and networking of management college libraries and to provide the feasible and cost effective solution to solve these problems and allow libraries to provide the standard and quality services and updated information to the users.

The research study has covered all the objectives and discussed in different chapters. Objective 1 is discussed in detail in chapter 3 and presented the status of management education and institutes in India as well as Pune city in particular. Objectives 2, and 4 i.e. assessment of resources available in management institute in Pune and user expectations from libraries as well as assessment of availability of e-resources is discussed and analysed form the survey and presented in chapter 7. Objective 3 is focused well in chapter 4 discussing ICT use in management institutes for supporting education. Objective 5 is represented in chapter 6 in which the development of library networks due to ICT is achieved for resource sharing globally and in India. Objective 6 is elaborated in chapter 5 and the requirements for developing networks and security issues of networks are discussed to the fullest possible. The objective 7 is satisfied providing a concept based model for the networking of management libraries in Pune city based on NKN. This is broadly discussed and presented in chapter 9. Similarly the hypothesis considered in the beginning of the study is proved positive and elaborated in chapter 7 and 9. Thus the study has satisfied all the objectives considered and hypothesis formulated.

8.5 Possible future Extension:

Any research study is not complete in its all aspects and there is always a scope to have further continued or similar concept based study but used in different environment is also possible. The present study is very well accepted for the management libraries for its development but similar studies can be undertaken in different subject libraries as there is

a need of resource sharing for all most all the libraries serving to specialized subjects. But the nature and demand is different and hence few more research topics which can be thought for are:

1. The present study can be extendable to Pune District or for Maharashtra State or even more than two states.

2. Similar studies can be initiated in other areas of education fields like Engineering colleges, Medical colleges, Agricultural colleges and Law colleges etc.

3. The comparative study of library networks (Developed and developing countries) can also be undertaken.

4. MAN or WAN can also be considered instead LAN or MAN

Information is essential for developing knowledge base. The revolution in the information handling due to ICT, information explosion in both print and digital has resulted many challenges to the library and information professionals. Along with these factors scatter of information, use of internet resources, rising cost of publications, technological revolution to preserve the knowledge, growing demands of user and increase in expectation of users from libraries, need of pinpointed information to carry out different studies, insufficient budget have made inability to librarians in managing ocean of information properly and information explosion forced librarians to undertake resource sharing projects at any level. The consortium development even at special group of libraries and initiating development of library networking of specified libraries even at city level is a good concept to follow like it was initiated before in 80's.

Based on the detailed study of different library networks established in India, there topology and function researcher have deduced a model for "Pune Management Library Network (PMLN)" and presented in chapter 9. This model is based on comparative study of suggested models by other researchers and considering their views researcher tried to develop a suitable model for management libraries in Pune including National Knowledge Network (NKN).

CHAPTER 9

CONCEPTION OF PUNE MANAGEMENT LIBRARY NETWORK (PMLN)

9.1 Prologue:

Opening part of the thesis presented the very need of the library network which was substantiated in the later chapters. The sole objective of the research work was to seek the readiness of the management institutes in Pune towards formation of a library network wherein the individual libraries now serving a rich hub of information and knowledge based services can gain collective advantages and which in turn would be attained by their stakeholders. Based on the findings as regards to the technical capabilities of the libraries of management institutes in Pune a model of Pune Management Library Network referred hereafter as PMLN has been conceived and presented in this chapter.

Figure 9.1 shows the geographical spread of the PMLN. It consists of three districts viz. Pune, Nashik and Ahmedenagar. The PMLN will reach to the management institutes through three sub-networks connecting 204 institutes from Pune, 27 institutes from Ahmednagar and 34 institutes from Nashik. List of these institutes along with their addresses is available at

http://www.unipune.ac.in/affiliated_colleges_and_institutions/Update_Management_List _2-11-12.pdf.

The main vision of PMLN is to unite the above mentioned libraries, to facilitate them to accomplish what cannot be done by the standalone library. Networking will support them to exploit their inadequate resources and will make out their cooperative strong points so as to tie together in a win-win fashion. The integrated functionality of PMLN goes on the following lines:

- Assisting combined acquisition of print resources
- Judicious allocation of e-resources
- Lend an expert hand in dispensation of information resources

303

- One time downloading of the freeware, shareware and Open Education Resources available on web for all the users of the member institutes.

- Developing a uniform acquisition policy to avoid redundant and extravagant duplication in procuring the resources.

- Developing information robots through browser utilities for metadata harvesting

- Developing a user friendly interface for information retrieval.

- Narrowing the demand-supply resource gap by characterizing the information seeking behavior of the users from the member institutes.

- Archiving the e-resources for their sustained use.

- Efficiently implement the inter-library loan modalities amongst the member institutes.

Before proceeding to the details of the PMLN model, however it would be worthwhile to review the nitty-gritty's of the modeling notion.

9.2 Basics of modeling

Model is a small object used to build scale, representation and primary work is of developing a plan for the development of network. Model is useful for plan, construction and creates a basic idea of work (Business dictionary). The basic objectives of models are:

i. To facilitate understanding by eliminating unnecessary components
ii. To aid in decision making by simulating 'what if' scenarios
iii. To explain, control, and predict events on the basis of past observations and future needs

A model contains only those features that are of primary importance to and ranges from simple sketches to computer programs with millions of lines of code, but all of them have one thing in common: some elements of the actual 'thing' are abstracted or mapped into the model.

Models are divided into three classes on the basis of their degree of abstraction:

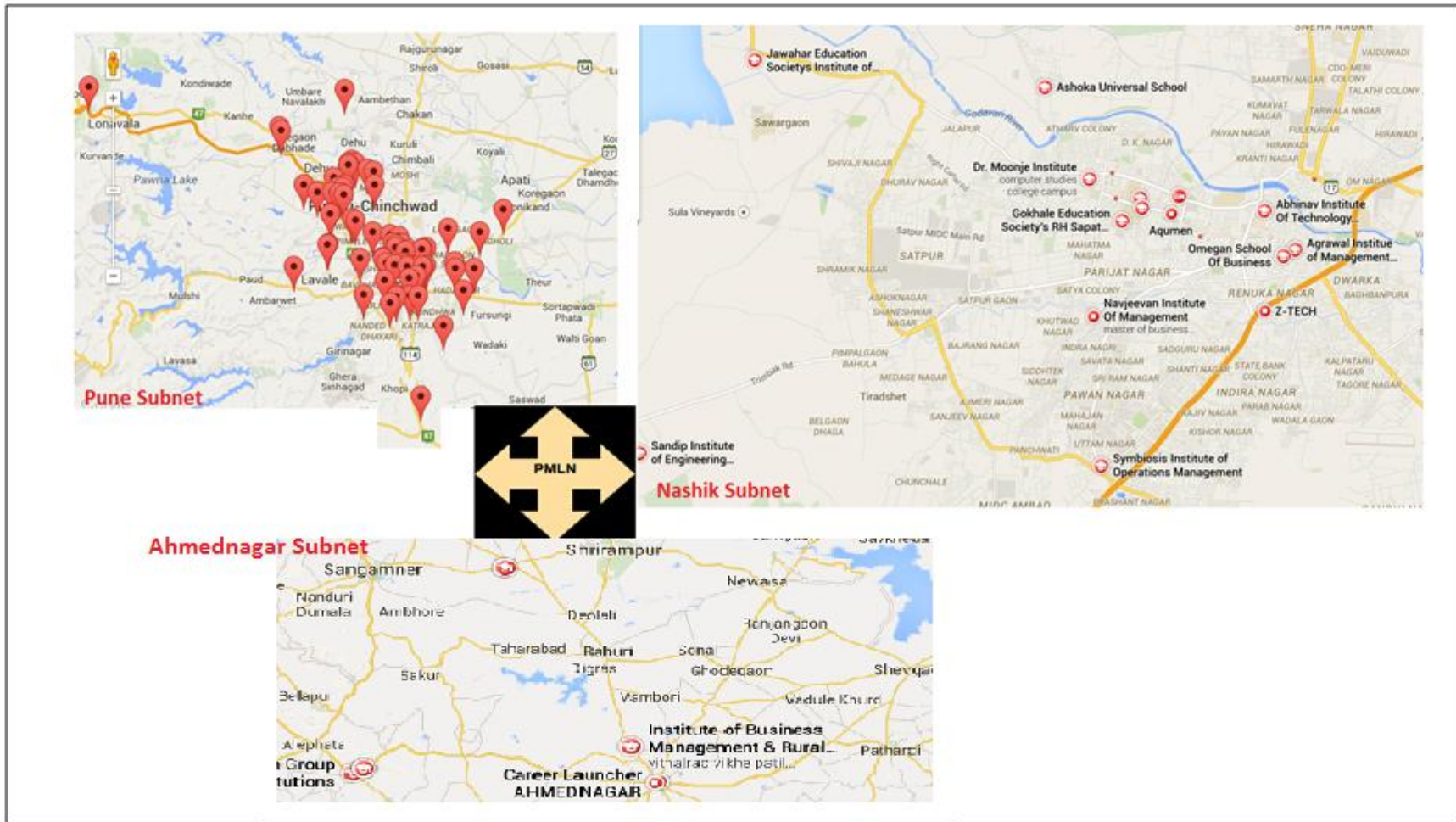i. Iconic Model: least abstract, physical, 'look-alike' model, such as a model airplane or train.

Figure 9.1 Geographical spread of the PMLN showing three subnets viz. Pune, Nashik and Ahmedenagar

ii.   Analogous Model: more abstract but having some resemblance to what it represents, such as a chart, graph, map and network diagram

iii.   Symbolic Model: most-abstract model with no resemblance but only an approximation to what it represents, such as a mathematical equation or formula, financial statement, language, and set of accounts.

The scholarly literature if full of different concepts related to model. However according to Oxford Dictionary, the necessary model of suits to a present study is model is a three-dimensional representation of a thing, typically on a smaller scale. Model is (in sculpture) a figure made in clay or wax which is then reproduced in a more durable material. Model is something used as an example. Model is a simplified mathematical description of a system or process, used to assist calculations and predictions. Model is an excellent example of a quality.

"A representation of a system that allows for investigation of the properties of the system and, in some cases, prediction of future outcomes. Models are often used in quantitative analysis and technical analysis and sometimes also used in fundamental analysis" (investor-words). "Model is graphical, mathematical (symbolic), physical, or verbal representation or simplified version of a concept, phenomenon, relationship, structure, system, or an aspect of the real world" (Business dictionary). "A model can represent in many shapes, sizes, and styles. It is important to emphasize that a model is not the real world but merely a human construct to help us better understand real world systems. In general all models have an information input, an information processor, and an output of expected results" (Carleton)

9.3 Architecture of PMLN

The very notion of the PMLN has been originated in view of the recent initiatives adopted by the management institutes affiliated to the Savitribai Phule Pune University. The same has been perceived by the researcher through the questionnaire addressed to the librarians of these institutes. Factors in support of formation of the PMLN are as follows:

- Library Automation Drive by almost all the institutes
- Presence of the library on the respective institute's website
- Digital Library Initiatives
- Resource Mobilization through Turnkey Projects
- Library Networking

The PMLN will have three subnets viz. Pune, Ahmednagar and Nashik. One of the possible topology for the Pune subnet is as shown in figure 9.2. The other subnets will be worked out on the similar lines as shown in figure 9.2. The server technically stringent enough for catering the needs of the number of management institutes falling under the respective district will be chosen.

The central server of the PMLN will be configured as a Data Center with a standard blade server solution from reputed companies such as IBM, HP, SAN with storage capacity of approximately 32TB and the visualization software VM Ware. Other civil amenities for such a data center include precision air conditioners, uninterrupted power supply, diesel generator, and fire alarm and IP cameras for surveillance.

The main advantage of such a sophisticated data center would be to converge all the servers on a single platform which will also save significantly on the maintenance account. The entire scattered infrastructure could be thus unified on a single platform. The above mentioned infrastructure will have   the following typical specifications which will be scale as the more management institutes are added to the PMLN.

Features of the Data Centre:

- IBM H Blade Chassis with 14 blade slots, populated with 10 No. of IBM HS22 Blade Servers, Intel Xeon Hex-Core CPU, RAM 4GB, onboard 146 GB SAS HDD
- Storage: IBM SAN Storage 9 TB Fiber Channel HDDs with 2TB free space
- Level III data centre having 99.99 % up time

The above specifications are chosen from IBM. However they are simply to give an insight regarding the specifications. Similar other companies such as IBM, CISCO can be opted to accomplish the network.

Other essential part of the network is the equipments required for the networking purpose. A set of typical specifications goes on the following lines:

Network Equipment

➢ HP Make Multiservice Router, Watch Guard Make UTMs and HP Make Core Switch

➢ Virtualization software: VM Ware 5.1 virtualization Solution for hosting virtualized servers with platforms like Windows 2003, 2008, Linux

In addition to above few peripheral equipments re required in order to safe guard the central data center. Following list details additional equipments for this purpose:

Peripheral Equipments

➢ Precision Air Conditioners

➢ On line UPS

➢ DG set

➢ Raised flooring and false ceiling

➢ IP Camera for Surveillance

➢ Fire proof glass doors with Biometric Access Control
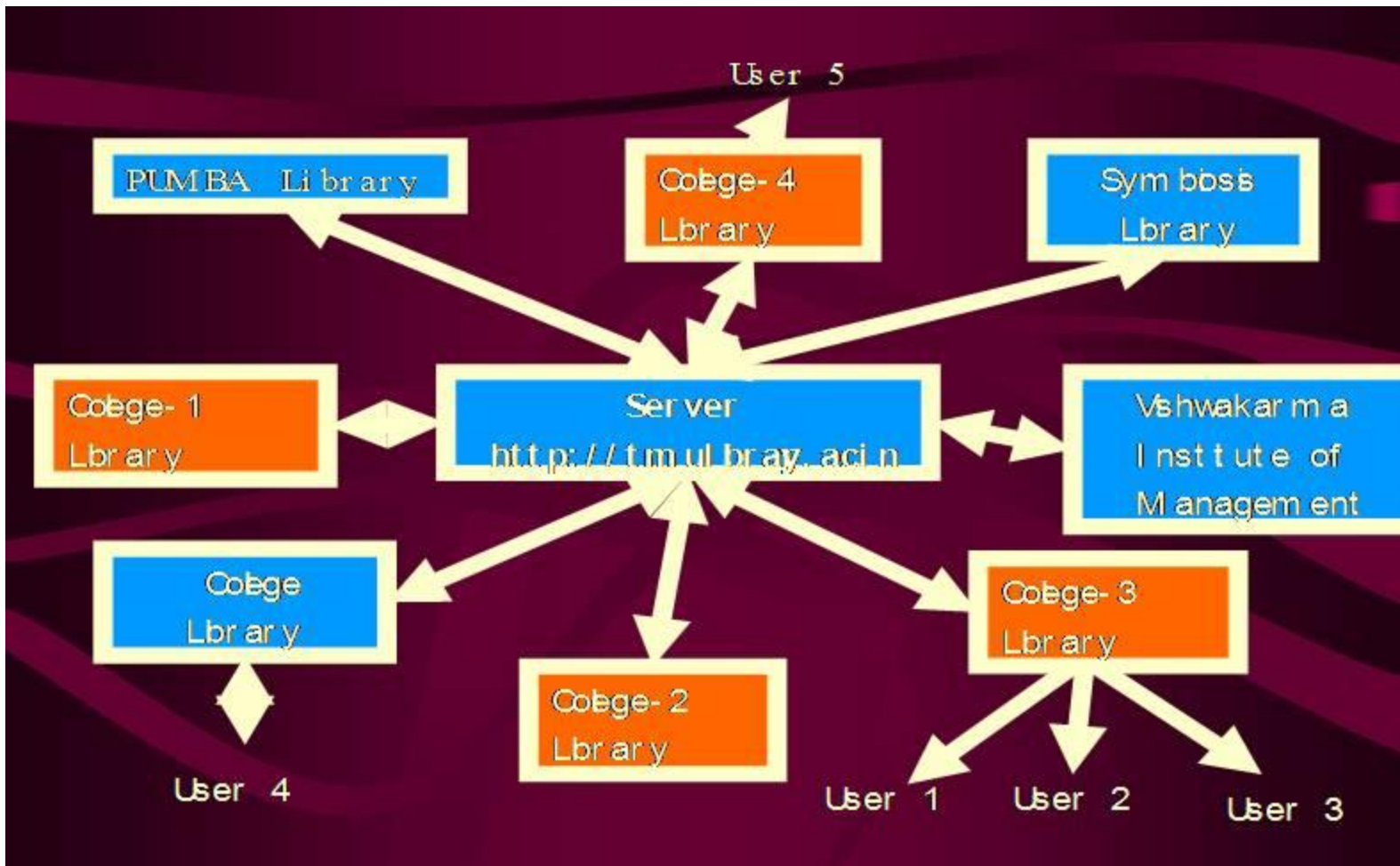
➢ Fire Alarm System

➢ Rodent Repellant System

Figure 9.2 Topology for the Pune Subnet

Essentially the PMLN will be distributed network with shared functionalities as shown in figure 9.3.
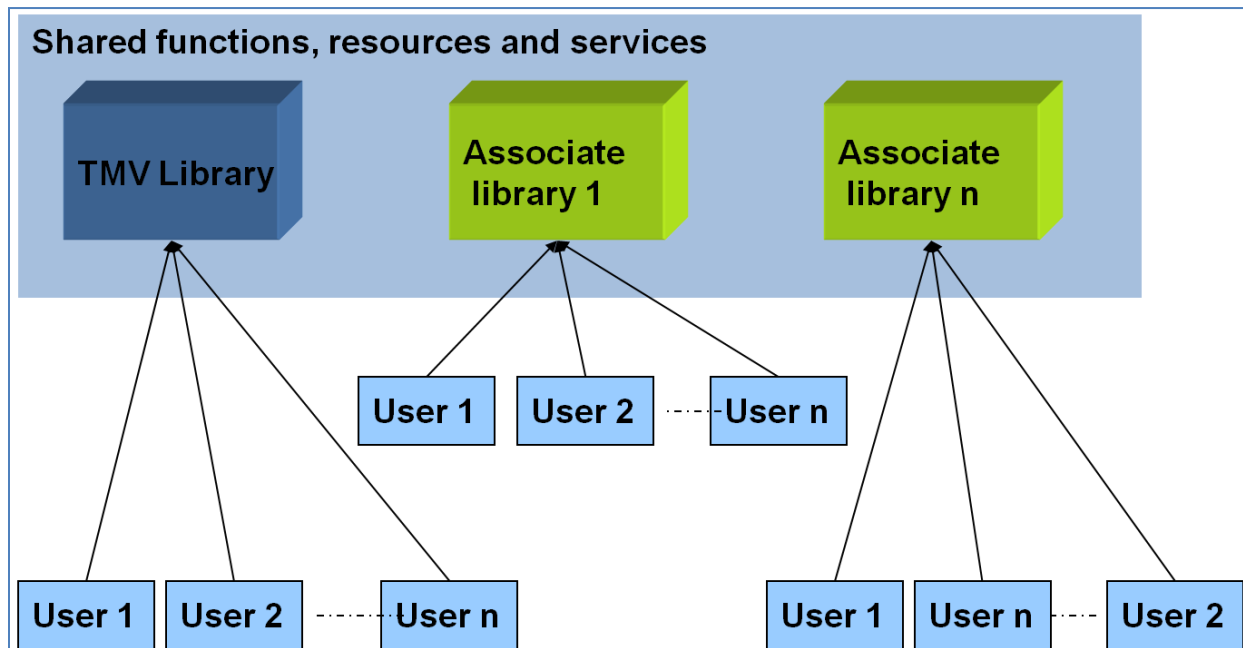

Figure 9.3 Distributed Nature of the PMLN

As shown in figure 9.3, the central data center will suffice all the infrastructural requirements of the network. The member libraries will have to invest very little in terms of the computing resources. Even the vast amount of storage modalities will be taken care by the Central Storage Area Network (SAN).

9.4. Designing PMLN: A Layered Approach

The design and deployment of the PMLN has been carried out in a layered manner as shown in figure 9.4. There are three basic layers through which this network will manage its functioning namely:

- ➢ Access Layer
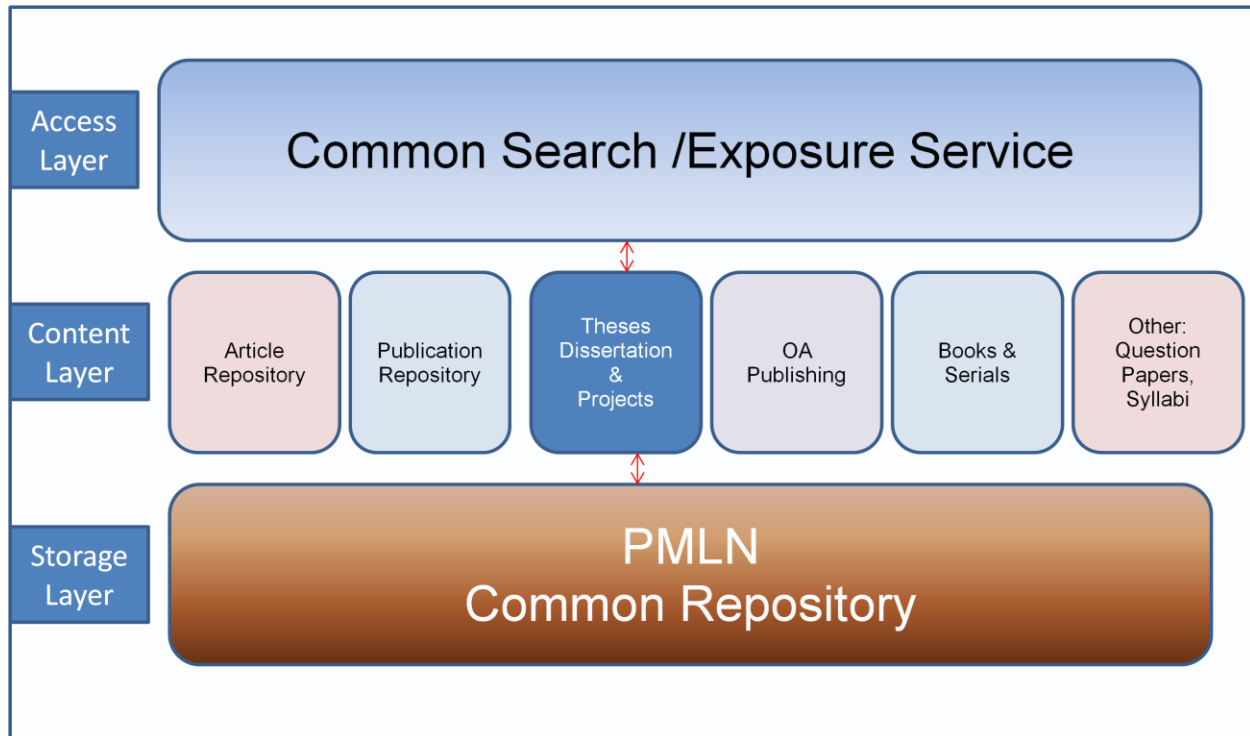- ➢ Content Layer
- ➢ Storage Layer

Figure 9.4 PMLN Adopting a Layered Approach

Details of these layers are as follows:

9.4.1 Access Layer

The access layer will manage the common search / exposure services. The search window will facilitate the search in an intuitive manner. There will be provision to fire the search query in the natural language manner. In addition to this the Boolean combinations will be allowed to mine the proper information from the repository. The individual management institute libraries will have their library union catalogs which will be shared through the access layer. The access layer will present the information through the digital library portal which will be sort of integrated library system facilitating the system integration through software services. The system will also facilitate digital object catalog system for approving / denying the access to the resources. In addition to this the access layer will have personalization options in order to remember the search preferences of the respective library/ users.

Following means will be provided to facilitate the access to the resources:

- **Joint OPAC**

OPAC (Online Public Access Catalogue) will be made available to get the bibliographical details of the collection. Searching tools such as simple search, advanced search, search by database, ISBN will be deployed under OPAC facility. The search results will be presented with tags of the respective management institute library along with additional information as regards to the exact location of the resource in the respective library. Information regarding the resource availability at the time of searching will also help the users to know well in advance as regards to its presence in the library.

- **Electronic Resource Management package for e-journals**

The portal of PMLN will host several e-resource packages to access peer-reviewed e-journals, e-books, e-database (bibliographical and full text...etc) and portal. Some of them will be: Cambridge University Press, Sage, Science Direct, Springer Link, JCCC, ASME, ASCE, LISA, Scopus and Web of Science. These e-resources are either accessible from INFLIBNET Centre (an IUC centre of UGC) or subscribed to the library and link to all such e-resources/portal made from the library website. In addition to that, link to scholarly open access journals/database will also be provided through the library website.

- **Federated searching tools to search articles in multiple databases**

The library portal will feature access to e-database/portals like JCCC, Scopus, SciFinder Scholar, Knimbus and LISA having federated searching facility from multiple databases. The search strategy includes Boolean Logic searching options/logical searching options and advanced searching techniques to access the particular document.

9.4.2 Content Layer

The content layer will feature many standard types of content categories as detailed below:

- Article repository: This will host the collection of the articles freely available on the internet. Since the management students, faculty and researchers require case studies

which are available freely on the internet, the same will be collected at a common place and disseminated through this repository.

- Publication repository: The publication repository will host the publications of the faculty of the member management institutes. In order to avoid the copyright violation, the preprints will be hosted. This will serve the purpose of formation of close groups of likeminded faculty members aligning them to work on common themes. Simultaneously it will also increase the citations of the faculty members.

- Thesis/ Dissertation and Projects: Management schools are very rich in terms of the student projects. The main intent of this sub layer would be to collect such projects and showcase the potentials of the individual students and faculty members to the corporate sector. This will help in matching the interests of the students with the employees and help in improving the placement of the students. The faculty members are likely to get good consultancy project as their thesis and dissertations will be seen by the industry experts.

- OA Publishing: The scholarly publishing movement at no cost for readers mostly through online mode is picking up rapidly all over the globe and in most of the disciplines and management sciences is not an exception to this. The tools, media and journals for open access publishing will be showcased through this layer.

- Books and Serials: Free e-books, subscribed e-books would be made available to the member libraries.

- Question papers and syllabi: Student find great deal of difficulties when it comes to finding out the old question papers. With the rapid obsolescence of the concepts, the management science curriculum also goes on revising. The latest updated as well as old versions of the syllabi will be maintained through this layer.

9.4.3 PMLN Common Repository:

This repository will consist of the common tools, codes and software required by the users of the library. Useful tools for writing the reports, common templates for the dissertations and automated bibliography will find their place in this layer.

9.5 Connectivity of PMLN with other Library Networks:

In order to have value addition, the PMLN will be connected to other library networks as shown in figure 9.5.

Following library networks will be contacted for their possible connectivity with the PMLN:

1. Bombay Library Network BONET (BOSALA)
2. Information and Library Network (INFLIBNET)
3. Pune Library Network (PUNENET)
4. Calcutta Library Network (CALIBNET)
5. Madras Library Network (MALIBNET)
6. Ahmadabad Library Network (ADINET)
7. Mysore Library Network (MYLBNET)
8. Bangalore University Academic Library Network (BALNET)
9. Delhi Library Network (DELNET)
10. Management Library Network (MANLIBNET)
11. National Open and Distance Learner's Library and Information Network (NODLIBNET)
12. Indore Library Network (INDOLIBNET)

9.6 Channel Partner for PMLN:

Choosing the right channel partner or in other words the Internet Service Provider (ISP) for the PMLN is very important for it success. An online tool hosted at opensignal.com helps in comparing the coverage of the various telecom service providers. This tool has been used with respect to the three districts proposed to be covered by the PMLN. The results are shown in figure 9.6.
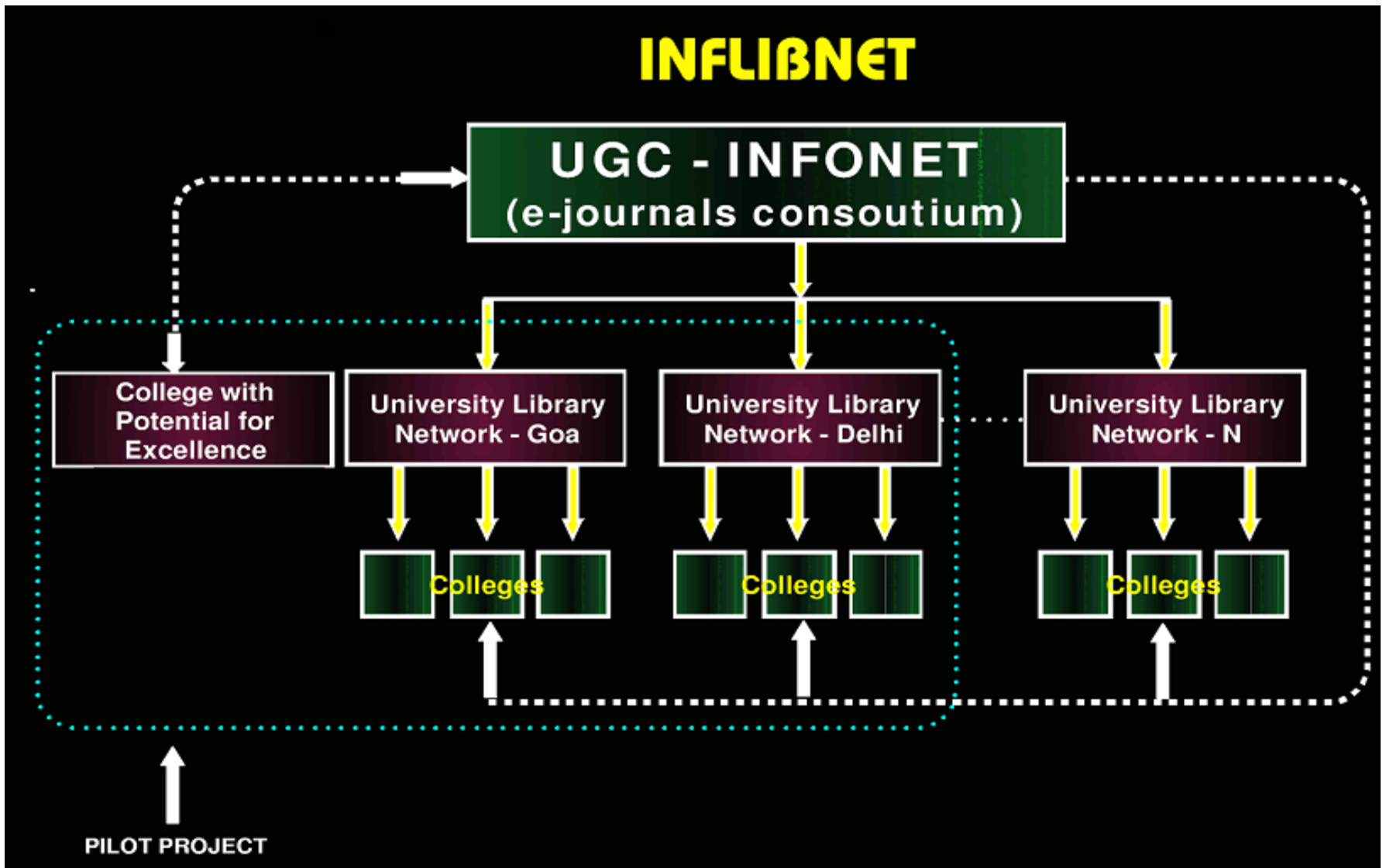
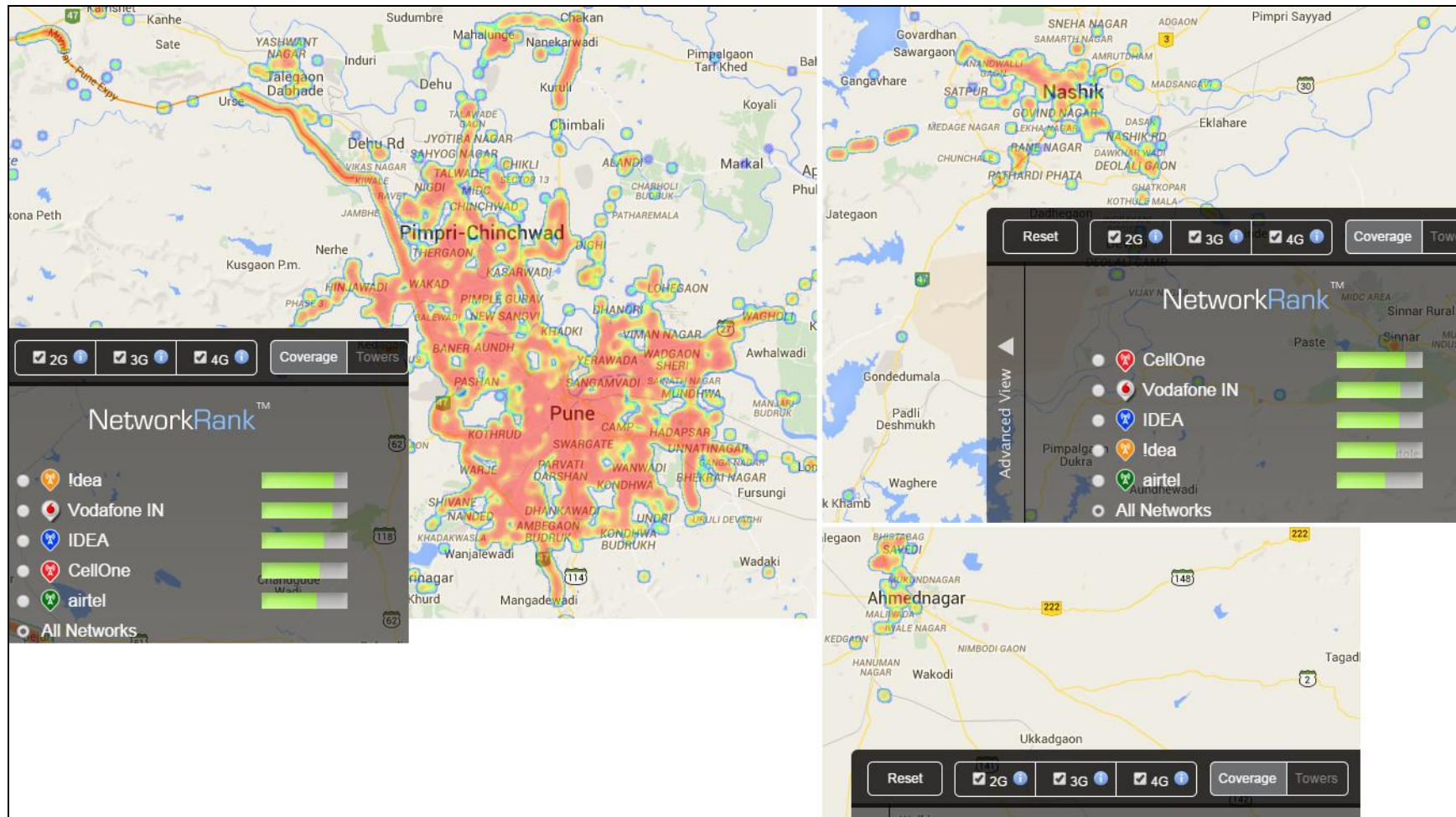**Figure 9.5 Connectivity of PMLN to other Library Networks**

Figure 9.6 Coverage Scenarios of the Various Telecom Operators in the PMLN

In view of the coverage depth and breadth of the BSNL the same is the natural choice for the PMLN. Besides the BSNL is also serving as the nodal implementation agency for the National Knowledge Connectivity (NKN) and owns most of the fiber spread over the region of coverage of the PMLN. Network prototyping after adapting to the BSNL facilities is as shown in figure 9.7.
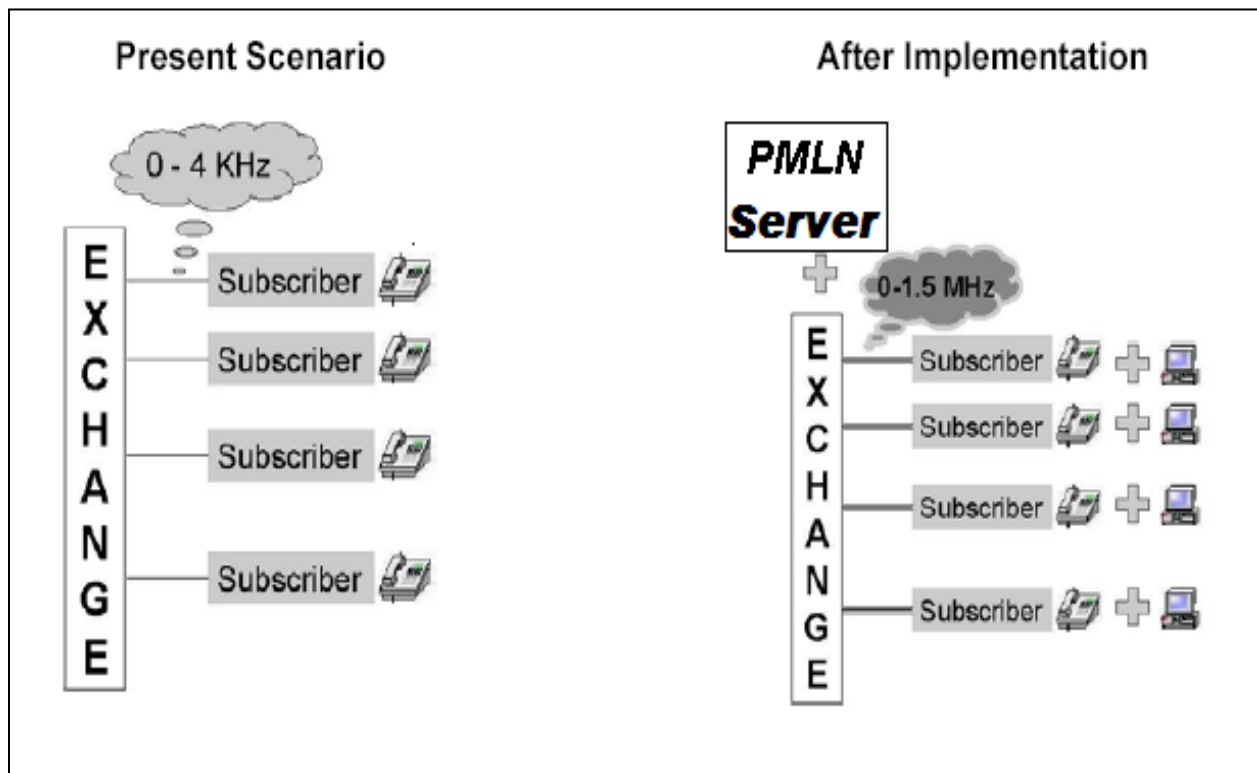

Figure 9.7 Network Prototyping

The wide bandwidth indicated in figure 9.7 will facilitate multimedia type content to the library users. The convergence of the PMLN with BSNL can be best described by means of figures 9.8 and 9.9.
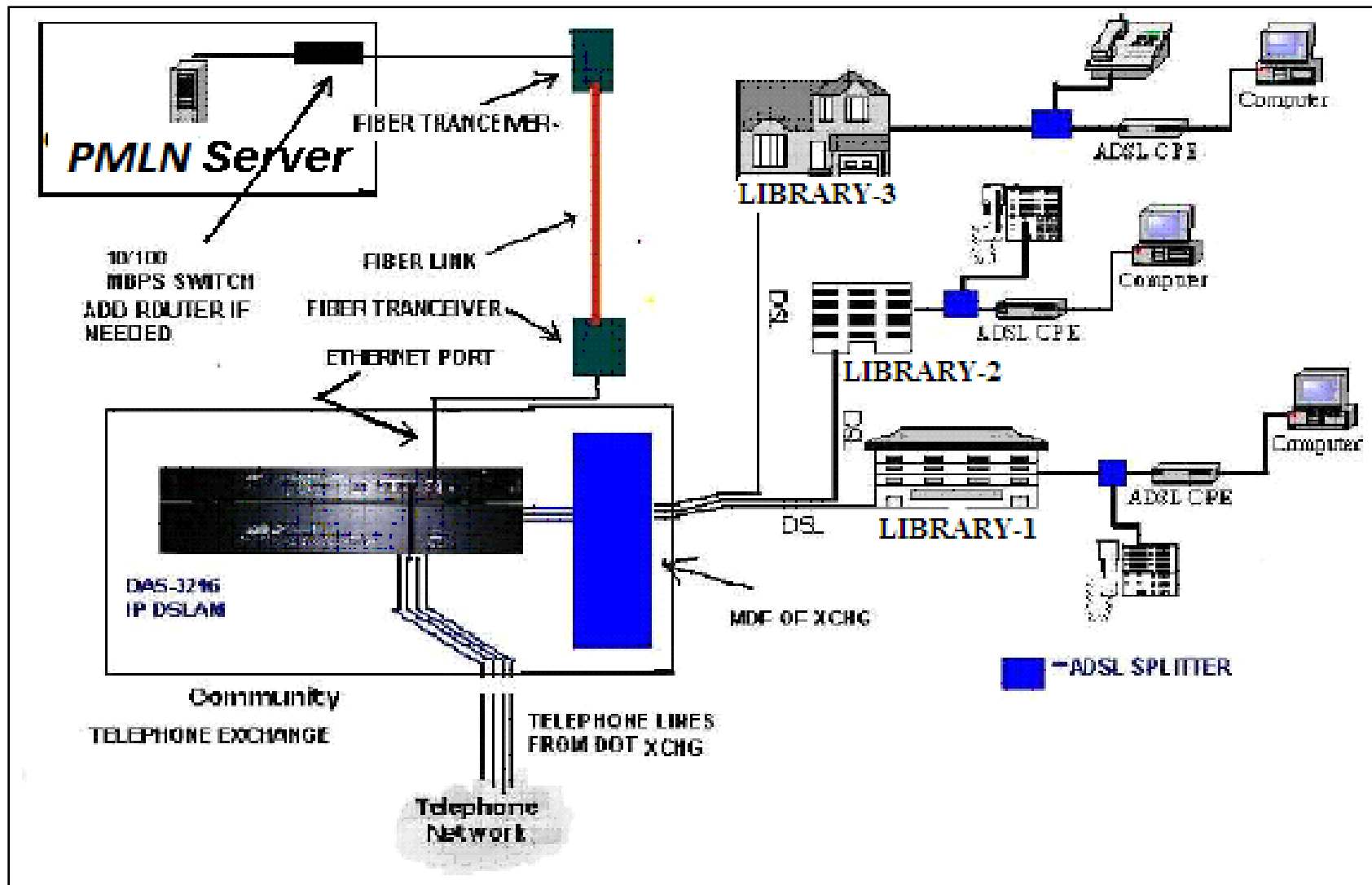
Figure 9.8 Proposed PMLN-BSNL Convergence Covering Pune University Management Institute Libraries
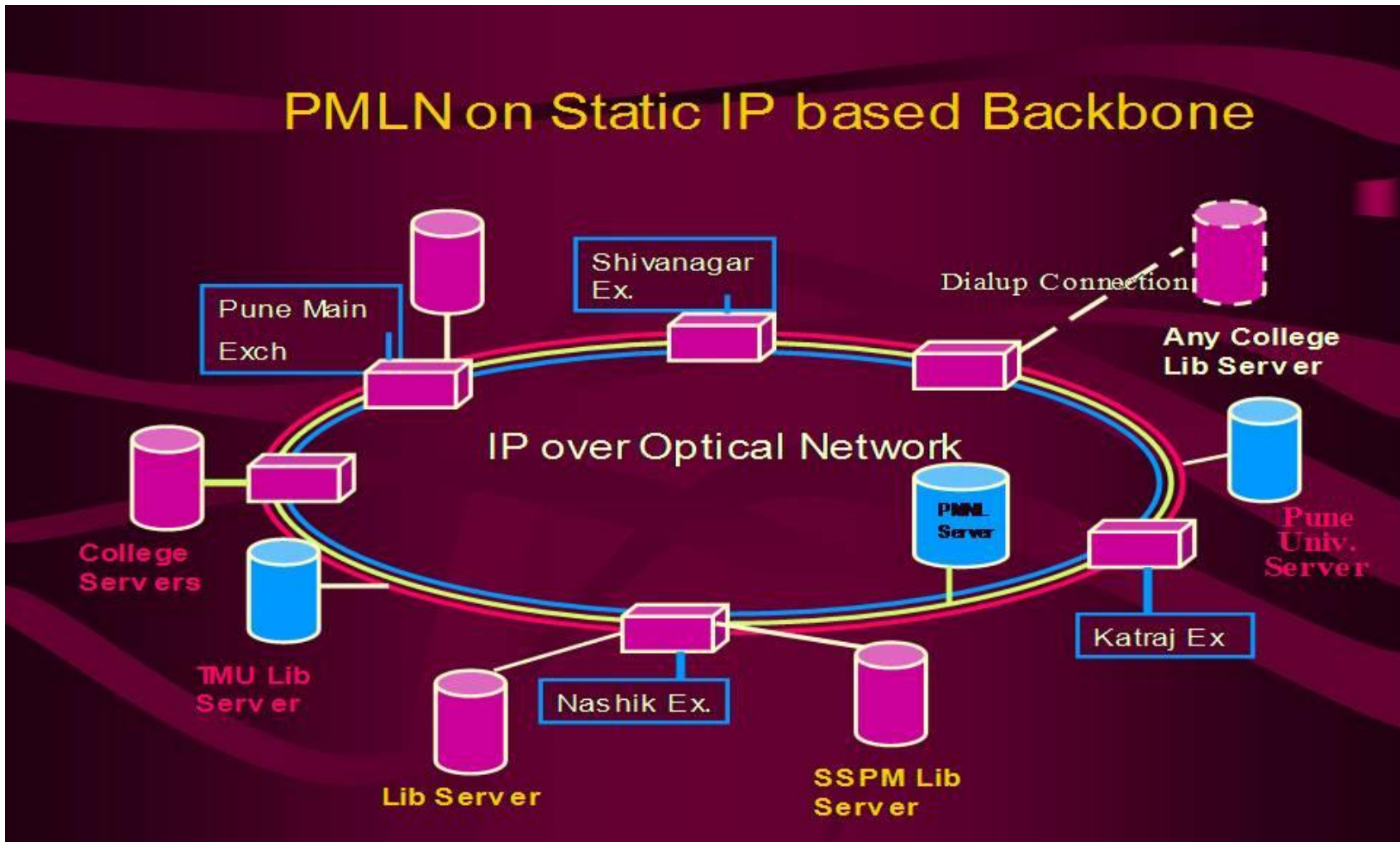
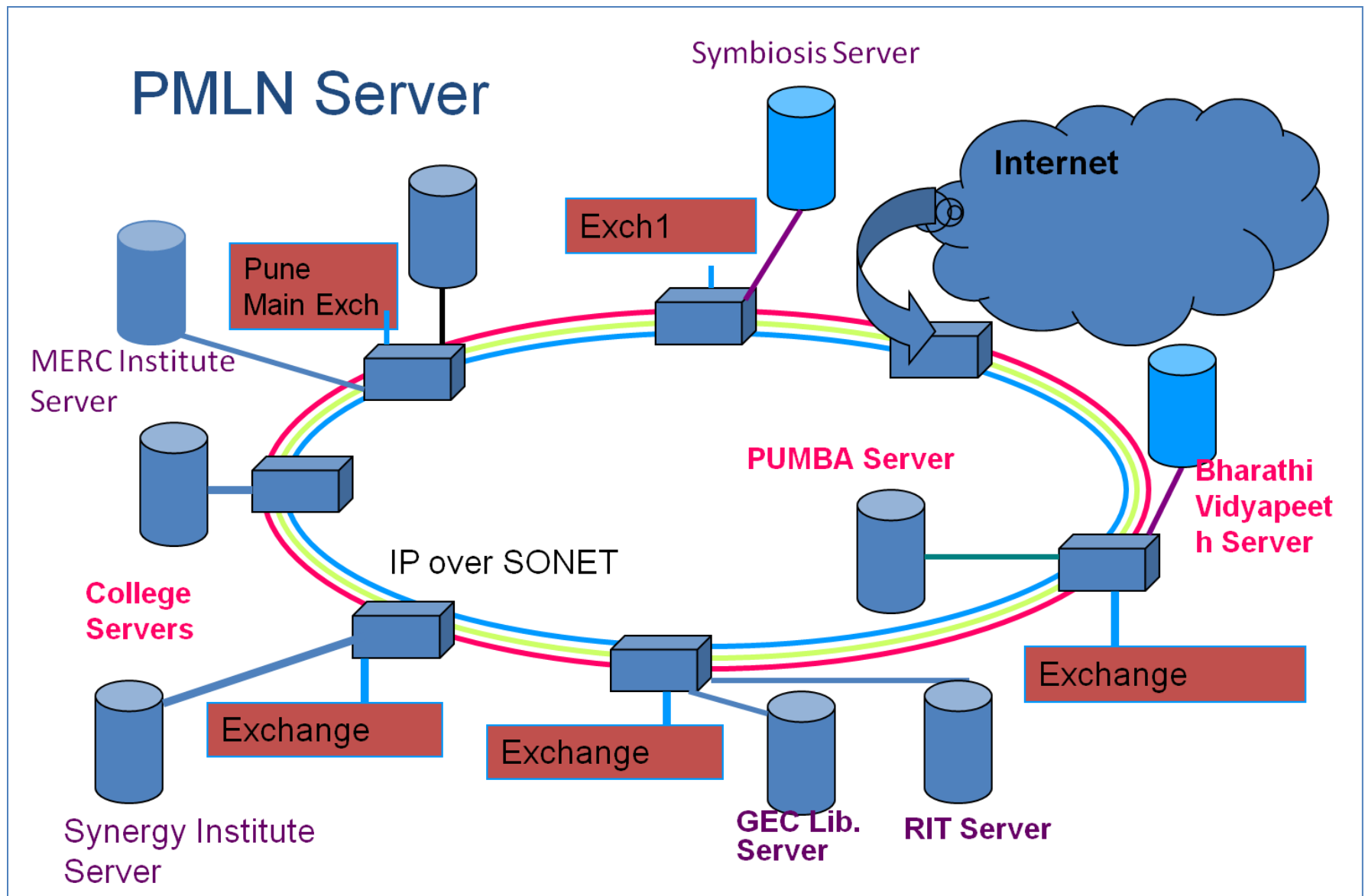**Figure 9.9 PMLN Connectivity through Static IP Backbone**

Figure 9.10 PMLN Connectivity using IP over SONET

9.7 Closing View of the PMLN

The concluding view of the PMLN is shown in figure 9.11. The symbols used for this drawing are taken from CISCO documentation for ensuring standardization. The notable features of this network are as detailed below:

9.7.1 Network with core fiber connectivity:

The PMLN has a central fiber link running through the three districts which ensures no bandwidth limitation. In fact this serves as a sort of intranet amongst the institutes and thus facilitates the information exchange practically at no cost involvement.

9.7.2 Diversified End User Appliances:

The network exemplifies diversified end user appliances for information seeking. It ranges from the simple PC to LAN and even thin clients for cost effectiveness. It also takes care of the new computing devices such as tabs, iPods and mobiles.

9.7.3 Network with heterogeneous interfaces:

PMLN ultimately emerges with the network with heterogeneous networking interfaces. This includes simple modem to router, gateway, and Layer 3 switch.

9.7.4 Security:

As seen from the figure 9.11, PMLN ensures utmost safety from the attacks and thus exhibits minimal vulnerability. It has all sorts of firewalls, antispam appliances and the central antivirus solutions.

9.7.5 Protocols:

At the network level PMLN follows the standard TCP/IP protocols and the wireless protocol suite such as 802.11. However at the local level it also ensure the common standard data formats such as MARK 21 and metadata harvesting protocols such as Z39.5 used in the library realms.

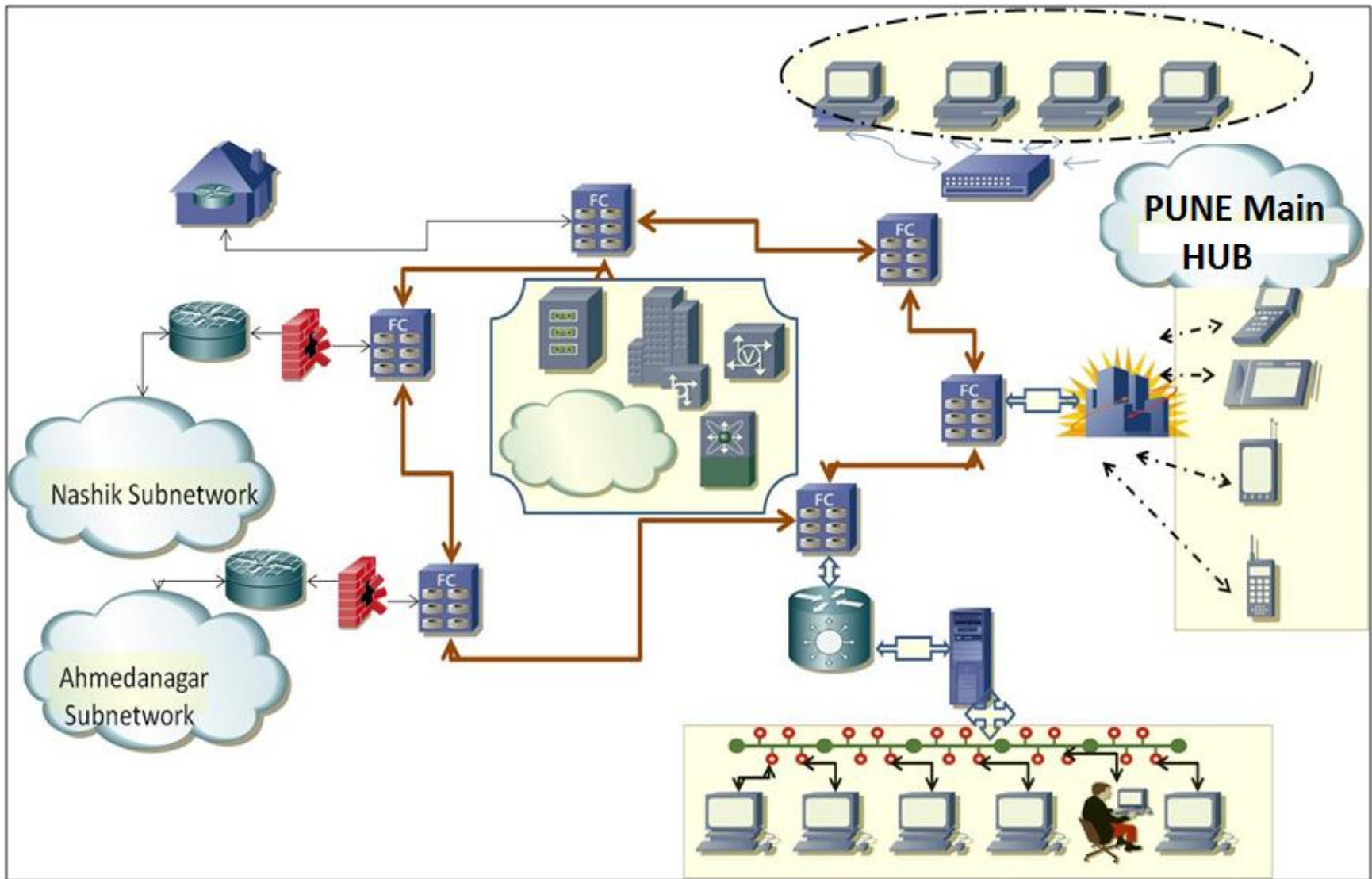User benefits of PMLN are listed out in the summary section.

Figure 9.11 Concluding View of PMLN

9.8 Costing of the PMLN:

As far as the possible realization of the PMLN is concerned, there are two approaches towards its implementation. Approach 1 could be procuring all the networking equipments and hosting them in the form of data center. This however could be the costly affair in the beginning. Instead of going for the same, it is possible to hire the third party services from various domains and then building the corpus fund for the sustenance of the PMLN. The second approach thus requires hiring various services from the third party service providers. The same is detailed below:

1. **Opting for co-location services of the Internet Service Providers:**

   Internet service providers such as BSNL provide Internet services to the customers located in about 450 locations. Web Co-location is an easy and cost effective solution to house the powerful infrastructure without losing the administrative control on the equipments. Web Co-location eliminates much of the Infrastructure costs as well as the maintenance cost of such equipments apart from avoiding the last mile problems. Web Co-location enables customer's equipment/ Servers to be treated as a part and parcel of the ISP network enjoying all the facilities as the ISP servers. Web Co-location provides the infrastructure at a nominal value keeping the customer comfortable and focused in maintaining the Applications /Services of the company.

   A Co-location is a data center facility in which an organization, can rent space for servers and other computing hardware. Co-location provides the building, cooling, power, bandwidth and physical security while the customer provides servers and storage. It manages services which supports the customer's initiatives.

   Co-locate libraries can find themselves locked into long-term contracts, which may prevent them from re-negotiating rates when prices falls. It is important for an organization to closely examine their co-location's service level agreements (SLAs) so as not to be surprised by hidden charges.

   All terms and conditions are to be mention in agreement.

   Benefits of co-locator are:
   - Offer the libraries secure place for hardware, software and other equipments in their offices and warehouse.
   - Provide security from fire, theft or damage.

- Provide higher security like cameras, fire detection and extinguishing devices.

- Provide higher facilities backup power generators, filtered power, multiple connections feeds etc.

- Co-location sites are being operate at various points around the world

- Provide services to the rapidly expanding Web hosting and e-commerce marketplace.

- One of the biggest benefits of co-location is it save the money.

- Implementing our own redundancy plan can be very costly and hard to manage. Co-location provides power redundancy.

- Co-location sites offer a variety of security services to ensure data is always safe and sound.

- From key card entry and 24/7 staffing to cabinet locks and surveillance cameras, your resources are protected in many ways at a co-location facility.

- This type of security and protection is difficult to manage with an in-house data center because of costs and staffing shortages.

- For security Co-location sites provides firewalls and intrusion detection services.

- Information is safe from intruders and data breaches in co-location sites.

- Co-location facility offers much more reliable network and connection than a typical in-house data center.

- Co-location sites have redundant internet services which helps network to switch over seamlessly if an issue or connection problem arises.

- These sites are supported by 24/7.

- Provide fast connection, download speed, fast connectivity and better performance.

- Data is always change and updated, but in in-house data center it is possible but it takes a lot of time. Data care center take care of that.

- Experts are available in co-location data centers, helps to solve the customer's query, handle their problems. Because experts are monitor data center for 24/7.

In starting it takes money for all database creation and setup. But after that every management institute pay only small amount according to plan shows in table 9.1.

Apart from enjoying the bandwidth and facilities, the customer retains control over his equipment, software and operating system. The customer simply leases the physical space and high-grade, tier one network access from BSNL the hosting provider.

Software Technology Parks of India (STPI) is a government agency in India, established in 1991 under the Ministry of Communications and Information Technology. SPTI manages the Software Technology Park scheme. It is an export oriented scheme for the development and export of computer software, including export of professional services. The STP Scheme provides various benefits to the registered units, which include 100% foreign equity, tax incentives, duty-free import, duty-free indigenous procurement, CST reimbursement, DTA entitlement, deemed export etc. Headquarter of STPI is in New Delhi.

In cities like Pune in addition to BSNL, Software Technology Parks of India (STPI) is yet another service provider to offer such services. The main advantage of the connectivity is its manageable features based on load. The exact tariff depends on the data exchange rate and this goes as per the following table in case of BSNL:

Table 9.1 Costing for PMLN

Component Name	Plan I	Plan II	Plan III	Plan IV	Plan V
Monthly Tariff (in Rs)	4000.00	5000.00	7000.00	12000.00	20000.00
Free Data transfer per month	50 GB	100 GB	200 GB	500 GB	1000 GB
Email IDs of BSNL domain	1	1	2	2	5
Additionall data transfer charges per GB(Rs.)	100.00	80.00	50.00	40.00	30.00

2. **Opting for services of National Knowledge Network**

   National Knowledge Network is yet another opportunity to avail the connectivity benefits. Just recently they have announced a major upgradation of their connectivity to educational institutes in the range of 1 to 100 GBPS. However the main limitation is the service could be availed only if the institute is permanently affiliated i.e. comes under 2F, 12B clause of the UGC. However a special case can be submitted for knowledge sharing.

The costing indicates that if the individual institute bears a fixed cost of the order of Rs. 50,000/- the entire PMLN would start rolling its operation. However this requires a critical mass and many institutes should be sensitized to become its members.

The intention of furnishing cost analysis is just to imply that the PMLN can sustain in a long run and there won't be any burden on the individual institutes. Secondly there is no need to have physical space or sort of office/data center for the said implementation.

This is very much significant as now a day's any IT based project can be operationalised virtually without the constraint of space, time and so on.

Summary:

The main benefits of the PMLN are as listed below:

   ❖ Access to the union catalogue
   ❖ Access to one or more external databases
   ❖ Downloading metadata or the full text of the records.
   ❖ Requesting acquisition of new publications from their library itself on interlibrary loan.
   ❖ Access to their circulation records through the internet
   ❖ Accessing electronic journals across all the libraries in the network.

The said network is portrayed as the outcome of the present research work and will serve as the pilot project to connect management institutes in Pune. This will also enable concession in tariff for the academic purpose. The funding possibility for the said network can be explored through MHRD, Department of Information Technology and National Knowledge Commission.

BIBLIOGRAPHY

1. Advantages of Networks. Retrieved from http://www.brighthub.com/computing/hardware/articles dated 21 Nov 2013.

2. Advantages of Networks. Retrieved from http://www.buzzle.com/articles/advantages-and-disadvantages-of-computer-networks.html dated 21 Nov 2013.

3. Agarwal, Vibhuti. (2000). *Library networking : Challenges and opportunities*.

4. Agarwal, Vibhuti. (2002). *Information Networking Concepts in Library*. New Delhi: Daya Publishing House.

5. Ahmadabad Library Network (ADINET). Retrieved from http://www.alibnet.org on dated 22 Feb 2012.

6. AICTE: Handbook 2013. Retrieved from http://www.aicte.com/ on dated 25 Jan 2014.

7. ALA's Interlibrary Loan Fact Sheet. (2013). RUSA STARS' 5 Things Every New Resource Sharing Librarian Should Know. Retrieved from website http://www.ala.org/rusa/sections/stars/5-things-every-new-resource-sharing-librarian-should-know on dated 25 Sep 2013.

8. Ali, Amjad. (2007). *Digital Libraries and Information Networks*. New Delhi: ESS Publications.

9. Ali, Hussaini, Owoeye, J. E., & Anasi, Stella N. I. (2010). Resource sharing among law libraries: an imperative for legal research and the administration of justice in Nigeria. *Library Philosophy and Practice (e-Journal). Paper404*.

10. All India Council for Technical Education (AICTE). Retrieved from website http://en.wikipedia.org/wiki/All_India_Council_for_Technical_Education on dated 21 Jan 2012.

11. Allen Robert. What Is Networking Software? eHow Contributor. Retrieved from http://www.ehow.com/about_5507248_networking-software.html on dated 25 Mar 2012.

12. Allen, Neal. (2009). *Network Maintenance and Troubleshooting Guide: Field Tested Solutions for Everyday Problems*. New Delhi: Pearson Education.

13. Alzaza, N. S., & Yaakub, A. R. (2011). Students Awareness and requirements of

mobile learning services in the higher Education Environment. *American Journal of Economics and Business Administration*, *3*(1), 95–100.

14. American Library Association (ALA). Retrieved from http://www.ala.org/aboutala/on dated 15 Oct 2013 on dated 12 Oct 2013.

15. American Library Association (ALA). Retrieved from http://en.wikipedia.org/wiki/American_Library_Association on dated 12 Oct 2013.

16. American Psychological Association (APA). Retrieved from website http://www.apa.org/support/education/accrediation/description.aspx#answer on dated 28 June 2012.

17. American Society for Information Science and Technology (ASIST). Retrieved from

    http://en.wikipedia.org/wiki/American_Society_for_Information_Science_and_Te chnology on dated 25th Oct 2013.

18. American Society for Information Science Technology (ASIS). Retrieved from https://www.asis.org/about.html on dated 18 Oct 2013.

19. Anderson, D. A., & Duggan, M T. (1987). A gateway approach to library system networking, *6*(4), 1–6.

20. Ashaj (2009). The Importance of Management Studies for a Successful Corporate Career. Retrieved from website http://ashaj.hubpages.com/hub/The-Importance-of-Management-Studies-for-a-Successful-Corporate-Career on dated 12 May 2013.

21. Asproth, V. (2012). Information technology challenges for long term preservation of electronic information. *International Journal of Public Information Systems*, *1*(1).

22. Association for Information Management (ASLIB). Retrieved from http://www.aslib.com/about/about_us.htm on dated 16 Oct 2013.

23. Association for Information Management (ASLIB). Retrieved from http://www.aslib.co.uk on dated 20 Oct 2013.

24. Association for Library and Information Science Education (ALISE). Retrieved from http://www.alise.org/index.php?option=com_content&view=article&id=437 on dated 16 Oct 2013.

25. Association of Learned and Professional Society Publishers (ALPSP). Retrieved from website http://www.alpsp.org/ dated 16 Oct 2013.

26. Association of Learned and Professional Society Publishers (ALPSP). Retrieved from

    https://en.wikipedia.org/wiki/Association_of_Learned_and_Professional_Society_ Publishers on dated 14th Nov 2013.

27. Association of Learned and Professional Society Publishers (ALPSP). Retrieved from http://www.alpsp.org/Ebusiness/Home.aspx on dated 15 May 2013.

28. Aswal, R.S. (2003). *Information Networks in Inida*. New Delhi: Ess Ess Publication.

29. Australian Library and Information Association (ALIA). Retrieved from http://www.alia.org.au/ on dated 15 Oct 2013.

30. Australian Library and Information Association (ALIA). Retrieved from http://en.wikipedia.org/wiki/Australian_Library_and_Information_Association on dated 12 Oct 2013.

31. Avram, H. D. (1980). Directions in Library Networking. UK: Wiley Publications.

32. Azeez Abdul T A. (2007). *Development of a library consortium for engineering colleges in Kerala.* University of Calicut., Kolkatta.

33. Bachalapur, M. M., Kumbha, B. D., & Gururaj, S. Hadagali. (2009). Network Model for Engineering College Libraries Affiliated to Visvesvaraya Technological University (VTU): A Proposed Plan. *Library Progress (International)*, *29*(1).

34. Bakardjieva, Teodora. Introduction to Computer Networking. Varna Free University "Chernorizec Hrabar" p. 1- 23. Retrieved from http://vfu.bg/en/e-Learning/Computer-Networks--Introduction_Computer_Networking.pdf dated 21 Nov 2013.

35. Balakrishnan, S. (2007). *Networking and the future of libraries*. New Delhi: Ess Ess Publications.

36. Bangalore University Academic Library Network (BALNET). Retrieved from www.bangaloreuniversity.ac.in on dated 15 May 2012.

37. Bansode, Sadanad, & Perirea, Shamin. (2000). Use of Internet for Reference Service in Malaysin Academic Libraries, *24*(5), 381–388.

38. Baruah, Arunima. (2002). *Computer Networking in Libraries*. New Delhi: Kalpaz

Publications/Gyan Books Pvt Ltd.

39. Beasley, Jeffrey S. (2010). *Networking* (2nd ed.). New Delhi: Pearson Education.

40. Ben Rotchke (2004). Access Control Systems & Methodology. New York: SecurityDocs.com. Retrieved from http://www.securitydocs.com/go/69; Internet on dated 28 Aug 2012.

41. Benjamin Tomhave (2004) Research Paper: Inforamtion Security Technologies. (Washington University) Retrieved from http://www.secureconsulting.net/Papers/218-Research-Paper-FINAL.pdf on dated 24 Apr 2013.

42. Benjamin, P.N. (2006). Google : its impact on the library. *Library Hi Tech News*, *23*(9), 9–11.

43. Bhatti, Rubina, & Chohan, Tariq Mohmod. (2012). Assessing the role of library associations in promoting research culture in LIS. *Library Philosophy and Practice (e-Journal). Paper 839*, 1–11.

44. Bhavya, Daya. (2005). Network Security : History, Importance, and Future. Retrieved from http://web.mit.edu/~bdaya/www/Network%20Security.pdf

45. Biradar, G. S. (2012). *Resource Sharing and Networking of College Libraries Affiliated to Gulbarga University: A Study*. Karnataka University, Dharwad.

46. Blogs. Retrieved from http://library.sdsu.edu/guides/sub2.php?id=52&pg=266 on dated 25 Apr2013.

47. Bombay Library Network (BOSLA). Retrieved from http://www.bosla.org.in on dated 28 March 2011.

48. Boritz, J. E. (2005). CICA Research Report on Secure it Infrastructure for E-commerce. Retrieved from http://accounting.uwaterloo.ca/uwcisa/symposiums/symposium_2005/Boritz.pdf on dated 24 Dec 2013.

49. Boss. R. W. (2004). RFID Technology for Libraries. PLA Tech Notes. Retrieved from www.ala.org/ala/pla/plapubs/technotes/rfidtechnology.htm

50. Bourke, C. (2005). Public Libraries : Building Social Capital through Networking, *18*(2), 71–75.

51. Bowonder and Rao, S. L. (2005). Management Education in India its Evolution & Some Contemporary Issues. *AIMA/CME*.

52. Braden, R. (1989). Requirements for Internet Hosts – Communication Layers (Wikipedia of Internet Layer) Retrieved from http://en.wikipedia.org/wiki/Internet_layer on 30 Sep 2011.

53. Bragg, R., Ousley, M. R., & Strassberg, K. (2004). *Network security : the complete reference*. New Delhi: McGraw-Hill.

54. Bridges and Switches. Retrieved from http://www.omnisecu.com/basic-networking/network-infrastructure-devices-what-are-bridges-and-switches.php on dated 25 Apr 2012.

55. Brown, R C W. (1989). Achievement, potentialities and limitations for library networking in Europe and North America, *39*(3), 192–200.

56. Bruntjen, S. (1983). The political, economic, and technological roots of some legal issues in library networking, *3*(2), 15–28.

57. Buckeley, Barbara. (1999). Library Cooperation and Partnerships, in the United Kingdom: How joined up government is leading to joined up Libraries. Retrieved from http://www.cus.edu.au/special/raiss99/papers/bbuckley.html on 10 Dec 2013

58. Bus Topology diagram. Retrieved from http://cedtinet.blogspot.in/2013/06/bus-topology.html on dated 25 Jan 2011.

59. Calcutta Library Network (CALIBNET). Retrieved from http://www.calibnet.org on dated 21 Aug 2011.

60. Campbell, J. D. (2006). Changing a Cultural Icon: The Academic Library as a Virtual Destination. *EDUCAUSE Review*, *Jan/Feb*, 16–30.

61. Campbell, Jim. Network Software Requirements. eHow Contributor. Retrieved from http://www.ehow.com/list_6729465_network-software-requirements.html on dated 25 Mar 2012.

62. Campus Area Network (CAN). Retrieved from http://www.eis.ernet.in/services/cwnetwrok.html on 25 Apr 2013.

63. Campus Networks. Retrieved from http://www.cisco.com/cpress/cc/td/cpress/ccie/ndcs798/nd2001.htm on dated 25 May 2012.

64. CCNA. Retrieved from http://www.thebryantadvantage.com/CCNACCENTCertificationTrainingHubsCollisionDomains.htm on dated 12 Apr 2013.

65. Cedefop   Glossary.   (2001).   Retrieved   January   21,   2011,   from http://www.cedefop.europa.eu/EN/about-cedefop/projects/validation-of-non-formal-and-informal-learning/european-inventory-glossary.aspx

66. Chartered Institute of Library and Information Professionals (CILIP). Retrieved from http://www.cilip.org.uk/about-us/business-areas/pages/default.aspx dated 16 Oct 2013.

67. Chartered Institute of Library and Information Professionals (CILIP). Retrieved from

http://en.wikipedia.org/wiki/Chartered_Institute_of_Library_and_Information_Pro fessionals on dated 12 Oct 2013

68. Chavan, John E. (2000). *Fundamentals of Network Security*. Boston: Artech House, Inc.

69. Cholin, V. S., & Karsiddappa, C. R. (2002). Consortia Approach for Academic Libraries: Emerging solution for optimum utilization of Resource. 27–29. Presented at the Consortia Approach for Content Sharing among Libraries, Mangalagangothri.

70. Choudaha, Rahul (2013). Growth of engineering and management institutions in India. *DrEducation: International Higher Education Blog*. Retrieved from *http://www.dreducation.com/2013/01/engineering-mba-india-statistics.html*   on dated 15 Jan 2013.

71. *Cisco Unified CallManager Express Solution Reference Network Design Guide*. (2001).

72. Coalition   for   Networked   Information   (CNI).   Retrieved   from http://en.wikipedia.org/wiki/Coalition_for_Networked_Information on dated 25 Oct 2013.

73. Coalition for Networked Information (CNI). Retrieved from www.cni.org on dated 18 Oct 2013.

74. Coaxial   Cable   diagram.   Retrieved   from http://en.wikipedia.org/wiki/Coaxial_cable on dated 21 June2012.

75. Competencies for Information Professionals of the 21st Century. (2003) Retrieved from http://www.sla.org/about-sla/competencies/ on dated 20 May 2012.

76. Computer   Hardware.   Retrieved   from http://en.wikipedia.org/wiki/Computer_hardware dated 21 Nov 2013.

77. Computer Network. Retrieved from http://en.wikipedia.org/wiki/Computer_network on dated 12 Feb 2013

78. Computer Software. Retrieved from http://en.wikipedia.org/wiki/Software dated 22 Nov 2013.

79. Confidentiality Integrity Availability (CIA). Retrieved from Wikipedia http://whatis.techtarget.com/definition/Confidentiality-integrity-and-availability-CIA on dated 06 Mar 2012.

80. Convery, Sean. (2012). *Network Security Architectures : It is an expert guidance on designing secure networks*. New Delhi: Pearson Education.

81. Cory Janssen. Peer-To-Peer Network (P2P Network). Retrieved from http://www.techopedia.com/definition/25777/peer-to-peer-network-p2p-network on dated 16 Jun 2012.

82. Council of Scientific and Industrial Research (CSIR). Retrieved from http://en.wikipedia.org/wiki/Council_of_Scientific_and_Industrial_Research on dated 12 Oct 2013.

83. Council of Scientific and Industrial Research (CSIR). Retrieved from www.csir.res.in on dated 15 Jun 2012.

84. Council on Library and Information Resources (CLIR). Retrieved from website http://www.clir.org/about dated 16 Oct 2013.

85. Dahibhate, N. B., Dhamdhere, S. N., & Karambelkar, M. A. (2011). Future of Academic Libraries in ICT Era. Presented at the National Seminar on Impact of ICT on College libraries, Jalgaon. 91–93.

86. David, T. L. (2001). ICT for Library and Information Professionals: A Training Package for Developing Countries (ICTLIP). Retrieved from e-Library Download Page: http://www2.unescobkk.org/elib/publications/ictlip/ index.htm

87. De Gennaro, R. (1983). Library automation and networking perspectives on three decades, *108*(7), 629–632.

88. Defense Scientific Information and Documentation Centre (DESIDOC). Retrieved from http://drdo.gov.in/drdo on dated 5 Dec 2012.

89. Definition of Network Security. Retrieved from Wikipedia http://en.wikipedia.org/wiki/Network_security on dated 5 Feb 2013.

90. Definition of Network Security. Retrieved from www.webopedia.com/TERM/N/network_security.html on dated 5 Feb 2013.

91. Delhi Library Association (DLA). Retrieved from http://www.dlaindia.org on dated 28 Jan 2012.

92. Devarajan, G. (2005). *Applied Research in Library and Information Science*. New Delhi: Ess Ess Publications.

93. Developing Library Network (DELNET). Retrieved from http://delnet.nic.in on dated 22 June 2012.

94. Dewey, J. (2011). Pioneers in Our Field: John Dewey – Father of Pragmatism. Retrieved from http://www.scholastic.com/teachers/article/pioneers-our-field-john-dewey-father-pragmatism. on dated 27 March 2012.

95. Dhar, M. (2010). *Research and Technical Libraries Organisation, Operation and Services*. UK: Ess Ess Publications.

96. Dhawan, S.M. (1999). Towards an Effective Solution for Resource Sharing. In *Proceedings on Libraries and Information Services in the Electronic Information Era.* 214–219.

97. Dhiman, A. K. (2003). *Basics of Information Technology for Librarians and Information Scientists*. New Delhi: Ess Ess Publications.

98. Dickson, Andrea, & Holley, Robert P. (2010). Social Networking in Academic Libraries: The Possibilities and the Concerns. *New Library World*, *111*(11/12), 468–479.

99. Directorate of Technical Education (DTE). Retrieved from website http://www.dtemaharashtra.gov.in on dated 21 Jan 2012.

100. Distance MBA College in Pune. Retrieved from website http://www.mbacollegespune.co.in/distance.html on dated 21 Jan 2012.

101. Documentation Research and Training Centre (DRTC). Retrieved from http://drtc.isi.bang.ac.in/DRTC/ on dated 19 Frb 2013.

102. Dubey, Y. P., Menon, V. V., & Prasad, H. H. (n.d.). *Information Technology and National Development*. Agra: Y. K. Publishers.

103. Education. Retrieved from website http://www.indiaeducation.net/apexbodies/dte on dated 21 Jan 2012.

104. e-Granthalaya**:** A Digital Agenda for Library Automation and Networking from NATIONAL INFORMATICS CENTRE, Government of India.

105. Engwall Lars, & Zamagni Vera Negri. (1998a). *Management education in*

historical perspective. England: Manchester University Press.

106.   Engwall Lars, & Zamagni Vera Negri. (1998b). *Management education in historical perspective*. UK: Manchester University Press.

107.   Esmail, S. M., Kanakaraj, M., & Sivaraj, S. (2008). Bridging the Information Divide am one Engineering College Libraries in Tamil Nadu, India: A Network Design. Presented at the Library Philosophy and Practice. 1–10.

108.   Esmail, S. S., & Kanakaraj, S. S. (2008). Resource sharing among engineering college libraries in Tamil Nadu in a networking system, *14*(1), 39–49.

109.   Ethernet Cable diagram. Retrieved from http://www.cablewholesale.com/products/network-phone/cat-5-e-stp-cables/product-10x6-56103.php on dated 21 June 2012.

110.   Fiber Optic Cables. Retrieved from website http://www.technoriya.in/fiber.php on dated 18 Jan 2013.

111.   File Transfer Protocol. access from http://en.wikipedia.org/wiki/File_Transfer_Protocol on dated 28 Jan 2013.

112.   Forouzan, B. (2009). *Data communications and networking*. New Delhi: Tata McGraw-Hill Publishing Company.

113.   Fortz, B. (2010). Applications of meta-heuristics to traffic engineering in IP networks, *18*(2), 131–147.

114.   Fyodor, Nmap Security Scanner. Retrieved from http://www.insecure.org/nmap/index.html; Internet on dated 24 Feb 2012.

115.   Gateway. Retrieved from http://compnetworking.about.com/od/internetaccessbestuses/f/default_gateway.htm on dated 15 Jan 2013.

116.   Gateway. Retrieved from Website http://www.webopedia.com/TERM/G/gateway.html on dated 21 on dated 15 Jan 2013.

117.   Ghante, P. B. (2011). Skills for librarians in the age of knowledge. *Indian Streams Research Journal*, *1*(1), 187–190.

118.   Gill, Gurupreet Singh. (2012). *Management Education in India: A Case Study of Selected B-Schools"*. Punjab Technical University, Jalandhar.

119.   Globalization of Management Education: Changing International Structures, Adaptive Strategies, and the Impact on Institutions. Report of the

AACSB International Globalization of Management Education Task Force. (2011). UK: Emerald Group Publishing Limited.

120.   Gong, Y. (1996). The initial development of networking in Chinese libraries, *22*(6), 462.

121.   Gordon, Robert Aaron, & Howel, James Edwinl. (1959). *Higher Education for Business*. New York: Columbia University Press.

122.   Gorman, G. E., & Cullenna, Rowena. (2007). The knowledge model applied to library networks in Asia. *Library Consortium Management: An International Journal*, *2*(7).

123.   Goswami, P. R. (2009). *Academic Librarianship in India: Exploring Strategic Intent and Core Competencies in the Present Era*. International Conference on Academic Libraries ICADL 2009. Retrieved from http://crl.du.ac.in/ical09/papers /index_files/ical-57_148_324_2_RV.pdf

124.   Griffiths. (1984). Multitype Library Networking: A Framework For Decision-Making, *2*(1), 31–39.

125.   Groth, David and Skandler, Toby (2009). Network+ Study Guide, Fourth Edition. Sybex, Inc. ISBN 0-7821-4406-3.

126.   Hallberg, B. (2005). *Networking: a beginner's guide*. New Delhi: Tata McGraw-Hill Publishing Company.

127.   Hardware   Security.   Model.   Retrieved   from   Wikipedia http://en.wikipedia.org/wiki/Hardware_security_module on dated 11 Dec 2011.

128.   Harinarayana, N.S. (1991). Concept of Library Automation. *Herald of Library Science*, *30*(3-4), 176–177.

129.   Hartley, Judy (2012). Peer-to-Peer Networking: A Mobile Coming of Age. *Intel Magazine*. Retrieved from https://software.intel.com/en-us/articles/peer-to-peer-networking-a-mobile-coming-of-age on dated 12 Oct 2013.

130.   Health Sciences Library & Information Network (HELINET). Retrieved from http://www.rguhs.ac.in/hn/newhell.html on dated 15 Jan 2013.

131.   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.

132.   Hildreth, C. R. (1987). *Library Automation in North America: A Reassessment of the Impact of New Technologies on Networking. Munich: K.G. Saur*.

133.   Hill, J., Horton, M., & Kling, R. (2004). The Platforms Enabling Wireless Sensor Networks. Communications of the ACM - Wireless sensor networks, *47*(6), 41–46.

134.   Horst Albach, & Brian Bloch. (2000). Management as a science: emerging trends in economic and managerial theory. *Journal of Management History (Archive)*, *6*(3), 138–158.

135.   Hubs.   Retrieved   from   http://www.omnisecu.com/basic-networking/network-infrastructure-devices-what-is-a-hub.php on dated 20 May 2012.

136.   Hybrid   Topology   diagram.   Retrieved   from http://infobyaj.blogspot.in/2012/06/computer-network-typologies.html on 28 Jan 2011.

137.   IBM Cooperation (1994). Introduction to Networking Technologies. International Technical Support Organization Raleigh Center. P.202. Access from http://www.redbooks.ibm.com/redbooks/pdfs/gg244338.pdf dated 21 Nov 2013.

138.   IEEE Std 802-2002, IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture, page 1, section 1.2: "Key Concepts", "basic   technologies"   Retrieved   from http://standards.ieee.org/getieee802/download/802-2001.pdf on dated 20 July 2012.

139.   IISC. Retrieved from http://www.iisc.ernet.in/insa/ch25.pdf dated on 16 Oct 2013

140.   IMPACTMAX. (2009). *Sharing Your Knowledge Base: Meet the User Needs,   Think   Beyond   PDF's*.   Retrieved   from impactmax.wordpress.com/2009/03/22/sharing-your-knowledge-base-meet-the-users-needs-think-beyond-pdf

141.   Importance   of   Education.   Retrieved   from   website http://www.facebook.com/notes/ncb-foundation/importance-of-education/340177865996265 on dated 21 Jan 2012.

142.   Indian Association of Special Libraries and Information Centers (IASLIC). Retrieved from http://www.iaslic1955.org.in on dated 15 Sep 2012.

143.   Indian Council of Medical Research (ICMR). Retrieved from http://icmr.nic.in/icmrnews/e_consortia.htm on dated 15 Sep 2013.

144.   Indian Institute of Management (IIM) Library Consortia (IIM's Library Consortia). Retrieved from http://www.iimsworld.in/consort.html on dated 29 Aug 2012.

145.   Indian Library Association (ILA). Retrieved from http://www.ilaindia.net on dated 28 Jan 2011.

146.   Indian National Digital Library in Engineering Sciences and Technology (INDEST-AICTE). Retrieved from http://paniit.iitd.ac.in/indest on dated 28 Sep 2012.

147.   Indian Space Research Organization (ISRO). Retrieved from http://www.isro.org/satellites/studsat.aspx on dated 29 Aug 2012.

148.   Indore Library Network (INDOLIBNET). Retrieved from http://indolibnet.blogspot.com on dated 20 Nov 2012.

149.   Industrial Credit and Investment Corporation of India (ICICI) Knowledge Park (ICICI Knowledge Park). Retrieved from www.ikpknowledgepark.com/ on dated 12 Apr 2013.

150.   Information and Communication Technology. Retrieved from http://en.wikipedia.org/wiki/Information_and_communications_technology

151.   Information and Library Network (INFLIBNET). Retrieved from http://www.inflibnet.ac.in/econ/ dated on 16 Oct 2013.

152.   Information and Library Network (INFLIBNET). Retrieved from http://en.wikipedia.org/wiki/INFLIBNET on dated 12 Oct 2013.

153.   Information and Library Network (INFLIBNET). Retrieved from http://web.inflibnet.ac.in/info/ugcinfonet/ugcinfonet.jsp on dated 20 Oct 2013.

154.   International Association of Technological University Libraries (IATUL). Retrieved from http://www.iatul.org/about/ dated on 16 Oct 2013.

155.   International Association of Technological University Libraries (IATUL). Retrieved from http://en.wikipedia.org/wiki/International_Association_of_Scientific_and_Technological_University_Libraries dated 15 Oct 2013.

156.   International Federation of Library Association and Institutions (IFLA). Retrieved from http://en.wikipedia.org/wiki/International_Federation_of_Library_Associations_and_Institutions on dated 15 Oct 2013.

157.   International Federation of Library Associations and Institutions (IFLA). Retrieved from www.ifla.org on dated 18 Oct 2013.

158.   International Library Information and Analytical Center (ILIAC). Retrieved from http://www.iliac.org/about-iliac/general-information.html dated on 16 Oct 2013

159.   Internet Protocol (IP). Retrieved from http://en.wikipedia.org/wiki/Internet_protocol_suite on dated 17 Feb 2013.

160.   Islam, Md. Shariful, & Islam, Md. Nazmul. (2007). Use of ICT in Libraries: An Empirical Study of Selected Libraries in Bangladesh. *Library Philosophy and Practice (e-Journal.) Paper 143*. Retrieved from http://digitalcommons.unl.edu/libphilprac/143

161.   Iwhiwhu, Basil, Enemute, Ruteyan, Josiah Oghenero, & Eghwubare, Aroghene. (2010). Mobile Phones for Library Services: Prospects for Delta State University Library, Abraka. *Library Philosophy and Practice 2010*.

162.   Jambhekar, A., & Pandian, S. P. (1999). Internet as an opportunity for libraries. Presented at the CALIBER 99, Nagpur. 10–19.

163.   Jebaraj, Franklin David. (2004). Library and Information Networks in India. *Library Philosophy and Practice*, *6*(2). Retrieved from libr.unl.edu:2000/LPP/lppv6n2.htm

164.   Jenster, Per V. (2011). *The Business of Management Education: A Strategic Analysis of the Industry. Market Situation, Trends and Strategic Issues for Business Schools.* Retrieved from website http://www.autjorstream.com/presentation/pjenser/45976.management.education-market on dated 21 Jan 2012.

165.   Jestin, Joseph and B. Parameswari (2002). Challenges for Library Professionals in India in the New Millennium. Library Philosophy and Practice Vol. 4, No. 2 Retrieved from http://unllib.unl.edu/LPP/jestin1.html on dated 15 June 2012.

166.   Jharotia, Anil Kumar, & Shukla, Deepak. (2010). Development of

Consortia and Library Networking in India. In *National Conference held at J. K. Business School.* Gurgoan. 164–176.

167.   John Collins. (2010). Library as Place. Retrieved from http://www.gse.harvard.edu/ppe/enews/hihe/09hihe4/collins.html

168.   John, W. C. (1995). *Magnetic Tape Storage and Handling: A Guide for Libraries and Archives*. Washington: The Commission on Preservation and Access.

169.   Joint Information Systems Committee (JISC). Retrieved from http://www.jisc.ac.uk on dated 28 Marc 2012.

170.   Joint Information Systems Committee (JISC). Retrieved from jisc.ac.uk on dated 18 Oct 2013.

171.   Joshi, Pradip, & Nikose, Satyaprakash. (2010). Problems and Prospects in Automation and Networking in Libraries in India. Retrieved from http://eprints.rclis.org/14339/1/Problems_and_Prospects_in_Automation_and_Net working_in_Libraries_in_India.pdf

172.   Juneja, P. K., & Parthasarathy, S. (2006). Networking and Libraries. Computer Applications to Library and Informational Retrieval and Networking. *Intternational Journal of Computer Science Issues*, *3*(2), 120.

173.   Kadiri, Jasiliu A., & Adetoro, Niran A. (2012). Information explosion and the challenges of the information and communication technology utilization in Nigerian libraries and information centres. *Ozean Journal of Social Sciences*, *5*(1), 21–30.

174.   Kadli, Jayadev, & Kumbar, B. D. (2013). Library Resources, services and information seeking behavior in changing ICT environment: a literature review. *Library Philosophy and Practice (e-journal).Paper 951*.

175.   Kanamadi Satish, & Kumbar B.D. (2007). Impact of Information Technology Innovations on Resources and Services of Management Institute's Libraries in Mumbai: A librarian approach. *Electronic Journal of Academic and Special Librarianship*, *8*(1), 1–10.

176.   Kanamadi, S., & Kumbar, B D. (2006). Web-Based Services Expected from Libraries: A Case Study of Management Institutes in Mumbai City, *3*(2). Retrieved from http://www.webology.ir/2006/v3n2/a26.html

177.   Kar, Debal C, Bhattacharya, Parha, & Deb, Subrata. (1999). Library

Networking in India for Resource Sharing : Present Status and Prospects., *9*(1).

178.   Karambelkar, Manjiri, Phugnar, Prashant, & Dahibhate, N. B. (2012). Emerging Technology Trends and its Benefits of the Academic Libraries. Presented at the International conference on Knowledge Management and Resource Sharing, Masqat. 65–70.

179.   Karn, Sanjay Kumar, & Das, Basanta Kumar. (2009). Information and Library Network (INFLIBNET) : A boon for higher education in India. In *ICAL 2009*. 698–700.

180.   Kaul, H. K. (1992). *Library Networks: An Indian Experience*. New Delhi: Virgo Publications.

181.   Kaul, H. K. (1993). DELNET: An Overview. In *IASLIC Bulletin* Vol. 38(3). 113–122.

182.   Kaul, H. K. (1999). *Library Resource Sharing and Networks*. New Delhi: Virgo Publications. 63–101.

183.   Kaul, Sangeeta. (2010). DELNET - the functional resource sharing library network: a success story from India. *Interlending & Document Supply*, *38*(2), 93–101.

184.   Kaula, P. N. (1986). Towards Resource Sharing in Libraries. In *Planning in Library Resource Sharing*. Lucknow: Print House. 1–15.

185.   Kemdarne, Suryakant B. (2012). *A Study of Library Automation and Networking in Dental College Libraries Affiliated to Rajiv Gandhi University of Health Sciences, Bangalore*. Tilak Maharashtra Vidyapeeth, Pune.

186.   Kemdarne, Suryakant B. (2012). *A Study of Library Automation and Networking in Dental College Libraries affiliated to Rajiv Gandhi University of Health Sciences, Bangalore*. Tilak Maharashtra Vidyapeeth, Pune.

187.   Kenneth C. Laudan and Jane P. Laudon (2001), Management Information Systems: Managing the Digital Firm, 10th ed.

188.   Kent, Allen (1974). *Resource Sharing in Libraries: Why, How, When. Next Action Steps*. New York: Dekker. P. 3.

189.   Kent, Allen. (1978). Encyclopaedia of Library and Information Science. New York: Marcel Dekker Inc.

190.   Kerala Library Association (KLA). Retrieved from http://www.keralalibraryassociation.org/on dated 25 Dec 2013.

191. Khandare, Dhanishtha. (2013). *Information Seeking Behaviour of Users of Management Institute Libraries in Pune*. Tilak Maharashtra Vidyapeeth, Pune.

192. Khanna, Babita. (2005). *Automation and Networking of Delhi based Academic Libraries under D. A. V. Management*. Bundelkhand University, Jhansi, New Delhi.

193. Khurana, Rakesh (2007). Higher Aims to Hired Hands: The Social Transformation of American Business Schools and the Unfulfilled Promise of Management as a Profession, Princeton University Press, Princeton, NJ.

194. Korobili, Stella, Tilikidou, Irene, & Delistavrou, Antonia. (2006). Factors that Influence the use of Library Resources by Faculty Members. *Library Review*, (55). Retrieved from www.emraldinsight.com/0024-2535.htm.

195. Kumar B. D, Kanamadi Satish, & Ramesha, B. D. (2004). Evaluation of IT based Services on the basis of User Requirements and Satisfaction: A Case Study of University Libraries of Karnataka State. In *Second International CALIBER 2004 on Roadmap to New Generation of Libraries Using Emerging Technologies*. Ahmadabad.

196. Kuldeep Kumar. (2013). An Overview of IT Application in Special Libraries and Information Centers In Modern Age. *Journal of Indian Research*, 1(3), 146-150.

197. Kumar Sanjeev, & Dash M.K. (2011). Management Education in India: Trends, Issues and Implications. *Research Journal of International Studies*, *18*, 15–25.

198. Kumbar, T. S. (1999). Internet and Academic libraries: Indian scenario. Presented at the CALIBER 99, Nagpur: INFLIBNET.

199. LAN Switching. Retrieved from http://www.cisco.com/cpress/cc/td/cpress/ccie/ndcs798/nd2023.htm on dated 25 May 2012.

200. Lander, S. J. (1990). Networking and special libraries: Impact of technology, economics and human nature. Presented at the IOLS'90.

201. Lata Suresh. (2011). Resource Sharing and Networking of Libraries in Rajasthan : A Proposal. In *ICoASL*. 1–5.

202. Lewis, Sally. (2013). Public Library Networking Focus. Retrieved from

website http://www.ukoln.ac.uk/public

203.   Library and Information Science (LIS). Retrieved from website http://en.wikipedia.org/wiki/Library_and_information_science on dated 15 Oct 2013.

204.   Limbachiya, Suresh. (2010). Outsourcing for Library and Information Services: An Idea. Retrieved from http://sureshlibrarian.wordpress.com/2010/01/26/outsourcing-for-library-and-information-services-an-idea/

205.   Local Area Network (LAN). Retrieved from http://compnetworking.about.com/cs/lanvlanwan/g/bldef_lan.htm on dated 21 June 2011.

206.   Local Area Network (LAN). Retrieved from http://mynetworksource.blogspot.in/p/lan-local-area-network-lan-network.html on 12 July 2012.

207.   Local Area Network (LAN). Retrieved from http://www.webopedia.com/TERM/L/local_area_network_LAN.html on dated 12 Jun 2012.

208.   Lynch, Matthew. (2014). Future Trends in K-12 Classroom Management and Discipline. Retrieved from http://www.huffingtonpost.com/matthew-lynch-edd/future-trends-in-k-12-cla_b_4706571.html

209.   Madras Library Association (MALA). Retrieved from http://mala.managedbiz.com/index.htm on dated 20 Jan 2011.

210.   Madras Library Network (MALIBNET). Retrieved from www.malibnetonline.com on dated 12 Dec 2012.

211.   Mahajan, P. (2005). Academic libraries in India: A present day scenario. *Library Philosophy and Practice*, *8*(1), 1–4.

212.   Mahajan, S. G., & Patil, S. K. (1999). Internet: its use in university libraries in India (experiences at Pune University). In *CALIBER 99*.478–483. Nagpur.

213.   Mahapatra, Rabindra K. (2010). *Capacity Building and Restructuring of Library and Information Centres*. New Delhi: Ess Ess Publications.

214.   Mairaj, Muhammad Ijaz. (2012). Applications of information and communication technologies in libraries in Pakistan. *Journal of Medical Library*

Association, *100*(3), 218–222.

215.   Maiwald Eric. (2003). *Network Security: A Beginner's Guide, Essential Skills made Easy, Network Professionals' Library*. New Delhi: Tata McGraw-Hill Publishing Company.

216.   Malviya, R., & Kumar, Anil. (2007). Networking and Consortia Management Techniques. *DESIDOC Bulletin of Information Technology*, *27*(3), 21–30.

217.   Management Education. Retrieved from website http.www.authorstream.com/presentation/pjenster/45976.management.education-market on dated 21 Jan 2012.

218.   Management Education. Retrieved from website http://www.polish-youth.org/263-role-in-management-education-in-todays-world.html on dated 21 Jan 2012.

219.   Management Library Network (MANLIBNET). Retrieved from http://manlibnet.in on 8 Aug 2012.

220.   Mandal, B. R., Podder, A. K., & Choudhuri, B.C. (2012). Building Knowledge Management System: the key to Special libraries renaissance at the digital era. *Challenges in Library Management System*, *24*, 369.

221.   Manhas, Rajeev. (2010). Bridging Information Divide among Health Science Libraries in Punjab: A Health Science Library Network System. *IASLIC Bulletin*, *55*(1). 29–34.

222.   Mansfield Kenneth C., & Antonakos, James L. (2010). *Computer Networking for LANS to WANS: Hardware, Software and Security*. Boston: Cengage Learning.

223.   Margaret MacNamara, Arnold Anne, & Margaret Meyler. (1990). Management education and the challenge of action learning Higher education, *19*(4), 419–433.

224.   Martey, A. K. (2002). Building Consortia in Nigeria and Senegal: Learning from the Ghana Experience. *SCALNULWA News Letter*, *3*(1). 44–60.

225.   Master of Business Management. Retrieved from website http://en.wikipedia.org/wiki/Master_of_Business_and_Management on dated 21 Jan 2012.

226.   McClure, Charles R., Feldman, Sari, & Ryan, Joe. (2006). Politics and

Advocacy: The Role of Networking in Selling the Library to your Community. *Information Use Management and Policy Institute, Florida State University*, Public Library Quarterly. 137–154.

227.   Meitei L Shanta, & Th Purnima Devi. (2006). Library networking: a conceptual model of rural library Information netwok system for easy access by rural Community of Manipur. In *4th Convention Planner. Mizoram University*. Aizawal.

228.   Mello, Bernard. (1999). Management education a critical appraisal. *Economic and Political Weekly*, *34*(48), 169–176.

229.   Mesh Topology diagram. Retrieved from http://www.computer-networking-success.com/network-topologies.html on dated 21 Jan 2011.

230.   Metropolitan Area Networks (MAN). Retrieved from http://en.wikipedia.org/wiki/Metropolitan_area_network on dated 20 May 2013.

231.   Microblogging. Retrieved from http://www.libsuccess.org/index.php?title=Microblogging

232.   Mitra, A. C. (1996). CALIBNET on Stream. *DESIDOC Bulletin of Information Technology*, *16*(2). 35–40.

233.   Model. (n.d.). *Oxford Dictionary*. Retrieved from http://www.investorwords.com/5662/model.html on dated 21May 2012.

234.   Model: Definition. Retrieved from http://serc.carleton.edu/introgeo/models/whatisamodel.html on dated 21 May 2012.

235.   Model: Definition. Retrieved from http://www.businessdictionary.com/definition/model.html on dated 21 May 2012.

236.   Model: Definition. Retrieved from http://www.investorwords.com/5662/model.html on dated 21 May 2012.

237.   Model: Definition. Retrieved from http://www.tiu.ac.jp/org/forum-01/index.files/html on dated 21 May 2012.

238.   Modems. Retrieved from http://thegadgetsquare.com/1117/what-is-modem-and-types-of-modems on dated 23 Apr 2012.

239.   Molholt, P. (1996). The Influence of Technology on Library Networking. *Special Libraries*, *87*(4), 318–321.

240. Moorthy, A. L., & Karisiddappa, C. R. (1998). Impact of internet on library and information centers: Review Festschrift in honor of Prof. N Guruswamy Naidu, *2*, 308–324.

241. Mudbidri Arun. (2004). *An empirical study ofacademic excellence in management based in Pune city.* University of Pune, Pune.

242. Multiple Operating Systems. Retrieved from http://www.wisegeek.com/what-is-a-multi-user-operating-system.htm on dated 25 Aug 2011.

243. Murthy, S. S. (1996). Library Networks in India – an overview. *DESIDOC Bulletin of Information Technology*, *16*(2), 3–9.

244. Mysore Library Network (MYLBNET). Retrieved from http://mylibnet.org on dated 18 Apr 2012.

245. Nagarkar, Shubhada. (2000). Pune-Net: Current Status. *Information Today and Tomorrow*, *19*(3), 16–18. Retrieved from http://itt.nissat.tripod.com/itt20003/punenet.html on dated 20 May 2012.

246. Natashaa Kaul. (2011). Management Education in India: A Case Study. *Asian Journal Of Management Research*, 2(1), 533-552.

247. National Board of Accreditation (NBA). Retrieved from website http://www.nbaind.org/views/Home.aspx on dated 23 Apr 2012.

248. National Center for Science Information (NCSI). Retrieved from http://ncsinet.org/ncsi on dated 15 Sep 2013.

249. National Commission on Libraries and Information Science (NCLIS). (1975). Library Networks. Retrieved from http:// www.netugc.com/library-network on dated 12 June 2013.

250. National Forum on Information Literacy (INFOLIT). Retrieved from http://infol it.org/ on dated 15 Oct 2013.

251. National Information System for Science and Technology (NISSAT) Newsletter (1993). Vol. 12 No. 3. INFLIBNET: Current Programme. P. 19.

252. National Knowledge Network. (2010). Retrieved from http://www.nkn.in/index.php on dated 21 May 2012.

253. National Open and Distance Learner's Library and Information Network (NODLIBNET). Retrieved from http://nodlibnet.blogspot.com on dated 17 Oct 2012.

254.   National Social Science Documentation Center (NASSDOC). Retrieved from http://www.icssr.org on dated 15 Sep 2013.

255.   Netware. Retrieved from http://en.wikipedia.org/wiki/NetWare dated 22 Nov 2013.

256.   Network Architecture. Retrieved from http://en.kioskea.net/faq/2761-what-is-network-architecture#definition dated 25 June 2012.

257.   Network Components. Retrieved from http://www.all-about-computer-parts.com/computer_network_components.html dated 21 Jan 2013.

258.   Network Hardware. Retrieved from http://www.buzzle.com/articles/types-of-network-hardware.html on dated 21 Jan 2013.

259.   Network Mapping.   Retrieved   from   Wikipedia http://en.wikipedia.org/wiki/Network_Mapping; Internet on dated 20 Aug 2012.

260.   Network Mapping.   Retrieved   from   Wikipedia http://en.wikipedia.org/wiki/Network_mapping#Notable_network_mappers   on dated 28 Sep 2012.

261.   Network Security.   Retrieved   from   Wikipedia https://security.untsystem.edu/resources/networksecurity on 30 Mar 2012.

262.   Network   Software.   Retrieved   from http://www.webopedia.com/TERM/N/network_software.html on dated 25 Mar 2012.

263.   Network   Topology.   Retrieved   from http://ecestudyaid.blogspot.in/2012/07/different-kids-of-network-topology-in.html on dated 21 Jan 2013.

264.   Network   Topology.   Retrieved   from   Wikipedia http://en.wikipedia.org/wiki/Network_topology on dated 15 Feb 2013.

265.   Network. Retrieved from http://fcit.usf.edu/network/chap3/chap3.htm on 28 May 2012.

266.   Networking   Cables.   Retrieved   from http://compnetworking.about.com/od/networkcables/a/network-cables-introduction.htm dated 25 Jan 2013.

267.   Networking   Cables.   Retrieved   from http://en.wikipedia.org/wiki/Networking_cables on dated 27 Jan 2013.

268.   Networking Components and Devices. Retrieved from http://gonda.nic.in/swangonda/pdf/0789732556.pdf on 21 Oct 2012.

269.   Networking. Retrieved from http://www.supermicro.com/products/nfo/networking.cfm on dated 20 May 2012.

270.   Networking. Retrieved from http://www.tcpipguide.com/free/t_WhatIsNetworking.htm dated 21 Nov 2013

271.   Networks. Retrieved from http://fcit.usf.edu/network/chap4/chap4.htm on dated 24 Jan 2013.

272.   Networks. Retrieved from http://homepages.uel.ac.uk/u0306091/Network.htm dated 21 Nov 2013.

273.   Networks. Retrieved from http://www.omnisecu.com/basic-networking/network-infrastructure-devices-what-is-a-hub.php on dated 22 Nov 2013.

274.   Networks. Retrieved from website http://fcit.usf.edu/network/chap5/chap5.htm on dated 21 Jan 2013.

275.   New Jersey Administrative Code. Title 15 – Department of State. Chapter 22- Library Network Services. Definition

276.   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.

277.   Odiase, J.O.U, Unegbu, V. E., & Haliso, Y. L. (2001). *Introduction to the Use of Libraries and Information Sources.* Benin City: Nationwide Publications.

278.   Okeagu, Glory, & Okeagu, Blessing. (2008). Networking and Resource Sharing in Library and Information Services: the Case for Consortium Building. *Information, Society and Justice*, *1*(2). 255–262.

279.   Online Computer Library Center (*OCLC). Retrieved from www.oclc.org on dated 20 Oct 2013.*

280.   Oppenheimer, Priscilla. (2011). *Top-Down Network Design: A systems analysis approach to enterprise network design* (3rd ed.). USA: Cisco Press.

281.   Oppliger, Rolf (May 1997). "Internet Security: FIREWALLS and BEYOND". *Communications of the ACM* **40**(5): 94. Retrieved from http://en.wikipedia.org/wiki/Firewall_(computing) on dated 20 Jul 2012.

282.   Oshiro, Zensei. (2000). Co-operative: Programmes and Networking in Japanese Academic Libraries. *Library Review*, *49*(8). 370–379.

283.   OSI Model. Retrieved from http://en.wikipedia.org/wiki/OSI_model on dated 15 Feb 2013

284.   OSI Model. Retrieved from http://gtcc-it.net/billings/osi1.htm on dated 15 Feb 2013.

285.   Paliwal P.K., & Balakrishnan Shyama. (2001). *Management of Library Networking*. New Delhi: Anmol Publications Pvt. Ltd.

286.   Pandey, S. K. (1999). Encyclopedia of Library Automation Systems and Network. New Delhi: Anmol Publications Pvt. Ltd.

287.   Pandian, P., Jambhekar, A., & Karsiddappa, C. R. (2002). IIM Digital Library System: Consortia-based Approach, *20*(2). Retrieved from www.emraldinsight.com/0264-0473.htm.

288.   Parvez, Javed. (2010). *Security Aspects and Performance Analysis of Mobile and IP Networks*. Universitry of Kashmir, Srinagar.

289.   Password   Cracking.   Retrieved   from   Wikipedia http://en.wikipedia.org/wiki/Password_cracking; Internet retrieved from 21 Jan 2014.

290.   Patch   Cables   diagram   access   from http://www.videk.co.uk/section.php/178/1/booted-cat5e-utp-patch-cables on dated 18 Jan 2013.

291.   Patch Cables. Retrieved from http://en.wikipedia.org/wiki/Patch_cable on dated 18 Jan 2013.

292.   Pathak, R C. (2009). Enhancing Academic Excellence in Management Education in India. Presented at the Global Meltdown, Pune.

293.   Patil, Varsha. (2013). Library automation and networking: need and importance of Maharashtra public libraries. *Journal of Advances in Library and Information Science*, *2*(3), 152–156.

294.   Paul Innella, The Evolution of Intrusion Detection Systems. Retrieved http://www.securityfocus.com/infocus/1514; Internet on dated 28 July 2011.

295.   Peer to Peer Network. Retrieved from http://www.skullbox.net/ntoplogy.php on 15 Feb 2013.

296.   Penthoi, Ajay Kumar, & Dash, Sankarashan. (2005). Indian Higher Education in the Era of Globalization: Challenges & Quality Management Strategies. *University News*, *December*.

297.   Personal Area Network (PAN) diagram. Retrieved from http://kingofnetworking.weebly.com/different-types-of-computer-networks.html on 21 Jan 2013.

298.   Personal Area Network (PAN). Retrieved from http://en.wikipedia.org/wiki/Personal_area_network dated 25 Jan 2013.

299.   Peter A Jaszi. (2010). Fair Use Challenges in Academic and Research Libraries. Presented at the Association of Research Libraries, Washington, DC.

300.   Pfeffer, Jeffrey, & Lawrence E. McKibbin. (2004). The Business School "Business": Some Lessons from the U.S. Experience. *Journal of Management Studies*, *41*(8), 1–20.

301.   Philip, J. (2008). Management Education in India. In *XIII International Study and Practical Conference Competitiveness in Information Society: BRICS-countries Experience*. Russia: Moscow. Retrieved from http://www.docstoc.com/docs/46820519/management-education-in-India on dated 25 April 2012.

302.   Pierson, R.C. (1959). The Education of American Businessmen. New York: McGraw-Hill.

303.   Pilioura, Teresa C. (2004). *Network Design, Second Edition: Management and Technical Perspectives* (2nd ed.). USA: CRC Press.

304.   Plemnek, Alexander. (2006). *The Electronic Library*. MCB UP Ltd.

305.   Porter, Lyman W., Lawrence E. McKibbin, & American Assembly of Collegiate Schools of Business. (1988). *Management Education and Development: Drift or Thrust into the 21st Century?* (Vol. Ch. 1). New York: McGraw-Hill Book Company.

306.   Potdar, S. P., & Joshi, D. K. (1997). Library Networking : A Proposal for Amravati University Region (p. 112). Presented at the Fourth National Convention for Automation of Libraries in Education and Research of

INFLIBNET on IT Application in Academic Libraries, Patiala.

307.   Prabhu, P. (2011). *Networking of College Libraries Affiliated to Bharathidasan University: A Study*. Bharathidasan University, Tiruchirappalli.

308.   Pradhan P.D. (2012). *Modernization of Libraries of Management Institutes in Pune City: A Survey*. Bharati Vidyapeeth University, Pune.

309.   Protocols.   Retrieved   from http://compnetworking.about.com/od/networkprotocols/g/protocols.htm on dated 18 Feb 2013.

310.   Public Key Infrastructure (PKI). Retrieved from Wikipedia http://searchsecurity.techtarget.com/definition/PKI on dated 25 May 2012.

311.   Public Key Infrastructure (PKI). Retrieved from Wikipedia http://en.wikipedia.org/wiki/Public_key_infrastructure; Internet on dated 25 May 2012.

312.   Pune Library Network (PUNENET). Retrieved from http://itt.nissat.tripod.com/itt20003/punenet.htm dated 15 Oct 2013.

313.   Pune Library Network (PUNENET). Retrieved from http://punenet.ernet.in or at http://202.41.70.50/index.html 15 Oct 2013.

314.   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.

315.   Raina, R. (1997). *Library Resource Sharing and Networking: An Approach to Management Schools in India*. New Delhi: Vikas Publication.

316.   Rajasekaran, K. (2010). *Digital Library*. New Delhi: Ess Ess Publications.

317.   Rajoli, Iqbalahmad U., Birdie, Christina, & Karisaddappa, C.R. (n.d.). Use of Resources through Consortia Made in Indian Library & Information Centers: A Case Study of FORSA Consortium (Vol. 50(2). Presented at the IASLIC Bulletin, 2005. 74–82.

318.   Ramabhadran, Tito. (2012). MBA History and Evolution. *Planning in Library Resource Sharing*. Retrieved from http://titoramabhadran.blogspot.in/ on dated 12 Oct 2012.

319.   Rao S.L (2005). Report of the working group on management education formed by National Knowledge Committee.

320.   Rao, S. (2001). Networking of Libraries and Information Centres: Challenges in India. *Library Hi Tech*, (19), 2.

321.   Rastogi, Ashish (2001). *Network Management using the Services of Network Oriented Communication Protocol.* Guru Ghasidas University, Bilaspur.

322.   Raval, D. A. M. (2013). E-environment and new challenges for academic libraries and librarians. *Education*, *2*(1).

323.   Reitz, Joan M. (2004). Dictionary for Library and Information Science. *Westport: Libraries Unlimited.*

324.   Repeater.   Retrieved   from http://www.thebryantadvantage.com/CCNACCENTCertificationTrainingHubsCollisionDomains.htm on dated 22 Nov 2013.

325.   Rezaul, Islam, & Mirza, Mohd. (2012). Present status of library cooperation, networking, and resource sharing in Bangladesh: Web-based library cooperation for access to world-wide information. *Library Philosophy and Practice (e-Journal). Paper 784*, 1–12.

326.   Riggs, Donal E. (1987). Networking and institutional planning. *Journal of Library Administration*, *8*, 59–65.

327.   Ring Topology diagram. Retrieved from http://www.computerhope.com on 24 Jan 2011.

328.   Robin, Kinder. (1994). *Librarians on the internet: impact on reference services*. New York: Haworth Press.

329.   Router.   Retrieved   from   http://www.omnisecu.com/basic-networking/network-infrastructure-devices-what-is-a-router.php on dated 27 Apr 2012.

330.   Roxanne, Missingham. (2007). Networking a nation: ILL developments in Australia. *Library Hi Tech*, *25*(2). 188–196.

331.   Rumeia, Guo. (2004). Constructing library networks with Chinese characteristics: bringing about society-wide sharing of information resources. *Library Review*, *36*(4), 283–290.

332.   SAARC   Documentation   Centre   (NISCAIR).   Retrieved   from http://www.sdc.gov.in on dated 31 Sep 2013.

333.   Sadowsky, George. (1993). Network Connectivity for Developing

Countries. *Communications of the ACM - Special Issue on Internetworking*, *36*(8), 42–47.

334. Saha, Goutam G. (2012). Management Education in India: Issues & Concerns. *Journal of Information, Knowledge and Research in Business Management and Administration*, *2*(1), 35-40.

335. Saha, N. (2009). Academic Libraries and Librarian in the Electronic Teaching-Learning Era: Is There Any More Need? In *International Conference on Academic libraries*. 2009. Retrieved from crl.du.ac.in/ical09/165-170

336. Sahney Sangeeta. (2011). Delighting customers of management education in India: a student perspective, part II. *The TQM Journal*, *23*(5), 531–548.

337. Sahoo, Bibhuti Bhusan. (2002). Need For A National Resource Sharing Network in India: Proposed Model. Workshop on Information Resource Management. Presented at the DRTC, Bangalore.

338. Sahoo, K. C. (2004). Information Management with IT Application. Ludhiana: Medallion Press. 134–154.

339. Salm, Amber. (2011). Network Security and Cryptography. Retrieved from http://www.creativeworld9.com/2011/04/abstract-and-full-paper-on-network_13.html

340. Sanjeev Kumar, & Dash, M K. (2011). Management Education in India: Trends, Issues, and Implications. *Research Journal of International Studies*, *18*(1), 16–26.

341. Sasi, Kumar (2011). Education System in India. Retrieved from website http://www.gnu.org/education/edu-system-india.html on dated 21 Jan 2012.

342. Satinder Kaur Ramdev Memorial Trust for Advancement of Leadership (SATKAL). Retrieved from http://www.satkal.org/SATKAL-INDEX/ on dated 25 May 2012.

343. Satpathy, K. C. (2012). INDOLIBNET: A Proposal. In *Information-Innovation-Technology: Creating Seamless Linkages*. Assam. Retrieved from http://indolibnet.blogspot.in

344. Satyanarayana, N.R. (2003). *A Manual of Library Automation and Networking*. New Delhi: New Royal Book Co.

345. Schwarzwalder, Robert. (2011). The changing face of academic libraries: Why less space does not have to mean less impact. Library Connect Partnering

with the library community. Retrieved from http://libraryconnect.elsevier.com/articles/roles-professional-development/2011-03/changing-face-academic-libraries

346. Scottish Confederation of University and Research Libraries (SCURL). Retrieved from http://icolc.net/consortia/230 on dated 28 June 2012.

347. Scottish Confederation of University and Research Libraries (SCURL). Retrieved from http://www.scurl.ac.uk on dated 30 June 2012.

348. Security Software. Retrieved from Wikipedia http://en.wikipedia.org/wiki/Security_software

349. Selvi, G. T. (1999). Internet and web search engines and their impact on academic library services. In *CALIBER 99.* Nagpur. 305–315.

350. Shahid, Syed Md. (2005). Use of RFID Technology in Libraries: A New Approach to Circulation, Tracking, Inventorying, and Security of Library Materials. *Library Philosophy and Practice*, *8*(1).

351. Sheshadri, K. N, Manjunatha, K., Shivalingaiah , D., & Radhakrishnan, N. (2011). Library Consortium, Resource sharing and Networking in United Arab Emirates – A Study. *International Journal of Library Science*, *3*(1).

352. Shinder, Debra Littlejohn. (2001). *Computer Networking Essentials: An essential guide to understanding networking theory, implementation, and interoperability*. USA: Cisco Press.

353. Simple Mail Transfer Protocol (SMTP). Retrieved from http://www.techterms.com/definition/smtp on dated 20 Aug 2012.

354. Singh, C. P. (2008). *Library Automation in Modern Age* (Vol. 18). New Delhi: Alfa Publications.

355. Singh, C. P. (2008). *Library Automation in Modern Age*. New Delhi: Alfa Publications.

356. Singh, J., & and Kaur, T. (2009). Future of Academic Libraries in India: challenges and   opportunities (p. 52). Presented at the International Conference on Academic   Libraries (ICAL), University of Delhi.

357. Singh, S.P. (1985). Automation in Libraries. *Metropolitan Book Company*, 87–88.

358. Sinha, Dharni P. (2004). *Management Education in India: Perspectives and Challenges*. Hyderabad: ICFAI University Press.

359.   Sinha, M. K. (2004). Scenario of Automation and Networking of Library and Information Centers (LICs) of North Eastern Region of India: An Evaluative Study. In *In Roadmap to New Generation of Libraries Using Emerging Technologies*. Ahmadabad.

360.   Sivaraj, S., Esmail, S. M., & Kanakaraj, M. (2007). Bridging Information Divide among Engineering College Libraries in Tamil Nadu, India: A Network. *Library Progress (International)*, *27*(2), 107–117.

361.   Sloan, Tom. (1996). Delaware: Library automation and networking. *Library Hi Tech*, *14*(2/3), 81–83.

362.   Society for Advancement of Library and Information Science (SALIS). Retrieved from http://autolib-india.net/salis/salis-about.asp on dated 31 Jan 2013.

363.   Society of College, National and University Libraries (SCONUL). Retrieved from http://www.sconul.ac.uk/ dated on 16 Oct 2013.

364.   Special Library Association (SLA). Retrieved from http://en.wikipedia.org/wiki/Special_Libraries_Association dated 15 Oct 2013.

365.   Staley, D. J., & Malenfant, K. J. (2010). Future Thinking for Academic Librarians: Higher Education. *ACRL*. Retrieved from www.ala.org/ala/mgrps/divs/acrl/issues/value/futures.cfm

366.   Stalling, William. (2009). *Network security essentials: applications and standards* (3rd Ed.). New Delhi: Pearson Education.

367.   Star Topology diagram. Retrieved from http://technologytwist.com/top-tips-to-choosing-a-network-topology on 12 Jan 2011.

368.   Storage Area Network (SAN). Retrieved from http://en.wikipedia.org/wiki/Storage_area_network dated 23 Jan 2013.

369.   Subbarao, V. S. (1998). Impact of information technology on the knowledge and skill base of library staff in IIT Bombay: a study of management of change. In *CALIBER 98.* Bhubaneshwar. 35–39.

370.   Sujatha, G. (2000). *Resource Sharing and Networking of University Libraries*. New Delhi: Ess Ess Publications.

371.   Suryakant B. Kemarne. (2012). *A Study of Library Automation and Networking in Dental College Libraries Affiliated to Rajiv Gandhi University of Health Sciences, Bangalore*. Tilak Maharashtra Vidyapeeth, Pune.

372.   Susan, Mathew K. (2011). Impact of Information Communication

Technology (ICT) on Professional Development and Educational Needs of Library Professionals in the Universities of Kerala.

373. System Area Network (SAN). Retrieved from http://en.wikipedia.org/wiki/System_area_network on dated 23 Jan 2013.

374. Tanenbaum, Andrew S. & Wetherall, David J. (2012). *Computer Networks* (5th Ed.). New York: Pearson Education.

375. TCP/IP protocols Retrieved from http://searchnetworking.techtarget.com/definition/TCP-IP on dated 17 Feb 2013.

376. Tedd, L.A. (1997). An Introduction to Computer Based Library Systems. Presented at the Heyden International, London. 129–131.

377. The Forum for Resource Sharing in Astronomy & Astrophysics (FORSA). Retrieved from http://www.iiap.res.in/library/forsa.html on dated 20 Dec 2012.

378. Thu-Thuy Do, & Kim, D. (2005). An Evolvable Operating System For Wireless Sensor Networks. *International Journal of Software Engineering and Knowledge Engineering*, *15*(2), 265–270.

379. Tikekar A. (2009). Towards 21st Century Academic Libraries and Librarianship. In *International Conference on Academic Libraries*. 40–45. Retrieved from crl.du.ac. in/ical09

380. Times of India 18 June 2012 accessed at http://www.gbsnonline.org/ on dated 20 June 2012.

381. Tomsho, Greg. (2011). *Guide to Networking Essentials* (6th ed.). Boston: Cengage Learning.

382. Tree Topology diagram. Retrieved from http://www.ustudy.in/node/5163 on dated 21 Feb 2011.

383. Twisted Cable. Retrieved from website http://simuncettnakcakapp.blogspot.in/ on dated 15 Jan 2013.

384. Types of Operating System. Retrieved from http://computer.howstuffworks.com/operating-system3.htm on dated 25 Aug 2011.

385. UGC-DAE Consortium for Scientific Research (UGC-DAE). Retrieved from http://www.tifr.res.in/~libws on dated 12 Oct 2011.

386. UNESCO (1979). *United Nations Educational, Scientific and Cultural Organization. UNISIST II: main working document.*

387.   United Nations Educational, Scientific and Cultural Organization. (1979). UNISIST II: main working document. UNESCO. Paris.

388.   Urquhart, Donald J. (1981). The Principles of Librarianship. N. J. and Methuen: Scarecrow Press.

389.   Usman, Ibrahim. (2006). New Approaches in Library Resources Sharing in the Digital Age. In *Conference Proceeding of the Nigerian Library Association*. Abuja. 45–52.

390.   Vaidhyasubramaniam S. (2009) compared the growth of management education in USA with India, using different models of organizational decision making.

391.   Venugopal M. V. (1999). *Vistas in Library, Information Systems and Networks*. Agra: Y.K. Publishers.

392.   Vijaykumar, A., & Thomas, Jaison. (2012). Application of information communication technology in college libraries. *International Multidisciplinary Research Journal*, *2*(2), 91–94.

393.   Virtual Private Network (VPN) diagram. Retrieved from http://www.allsan.com/sanoverview.php3 on dated 20 June 2013.

394.   Virtual Private Network (VPN). Retrieved from http://searchenterprisewan.techtarget.com/definition/virtual-private-network on dated 25 Jan 2013.

395.   Virtual Private Network (VPN). Retrieved from Wikipedia http://en.wikipedia.org/wiki/Virtual_private_network on dated 25 Jan 2013.

396.   Wayane. (2005). Top Technology Trends in Texas Libraries: Wireless Networking & Anti-Spyware Software. *Texas Library Journal*.

397.   What is Model. (n.d.). Retrieved from http://serc.carleton.edu/introgeo/models/whatisamodel.html on dated 21May 2012.

398.   Whelan, David P. (2001). Extending Library Services with Wireless Networking. Presented at the The Technology Conference for Information Age Librarians, Washington, DC.

399.   White, P., & Twomey, C. (2006). Informing Interlibrary Networking and Document Supply in the English National Health Service: A Comparison of Models from five Countries and a Caribbean Network. Interlending and

Document Supply, *34*(2). Retrieved from www.emraldinsight.com/0264-1615.html

400. Wide Area Network (WAN). Retrieved from http://en.wikipedia.org/wiki/Wide_area_network on dated 2 May 2012.

401. Wide Area Network (WAN). Retrieved from http://orbit-computer-solutions.com/WAN.php on dated 12 May 2012.

402. Wide Area Network (WAN). Retrieved from http://www.netprivateer.com/lanwan.html on dated 25 May 2012.

403. Wireless Adapter. Retrieved from http://compnetworking.about.com/od/hardwarenetworkgear/ss/wirelessadapter_4.htm on dated 27 June 2012.

404. Wong, Angus, & Yeung, Alan. (2009). *Network Infrastructure Security*. New York: Springer Science + Business Media.

405. Zacker, Craig. (2011). *Networking: The Complete Reference*. New Delhi: Tata McGraw-Hill Publishing Company.

QUESTIONNAIRE

Purpose of the questionnaires: To review the status of management institute libraries in Pune city and efforts made for the resource sharing activities. The purpose is to conduct a research study in LIS and prepare a viable model for the resource sharing among management libraries at city level by coordinating libraries by networking.

I) Please tick mark ( ) to indicate answers wherever mentioned.

II) If necessary, please attach a separate sheet for information on any of the items.

A Organization / Institute

1. Name of the Institute:_____

   _____

2. Communication Address:_____

   _____

   _____

3. Contact Details:

   Phone No.:_____ Fax: _____

   E-Mail:_____ Web: _____

4. Establishment Year:_____

5. Strength of Employees: Teaching Faculty:_____

   Technical Staff: _____

   Non Teaching Staff:_____

   Total: _____

6. Total Strength of Students on Campus: _____

7. Nature of Institute (Aided/ Non Aided / Autonomous): _____

8. Courses Conducted (UG / PG/ Diploma/ Certificate): (BBA/ MBA/ MPM/MMM) _____

9. Specialized Courses Conducted if any : _____

10. Distance/ Online/ Correspondance Courses Availablable: (Yes/ No):_____

_____

B Library

11. Name of the Librarian:_____

12. Pay scale of Librarian (Optional): _____

13. Qualifications of Librarian (Optional): _____

14. Communication Address : _____

_____

_____

15. Working Hours of Library:_____

16. Library Staff:

    i.   Professional:_____

    ii.   Technical Staff: _____

    iii.   Non Technical Staff: _____

    iv.   Total: _____

17. Total Collection in Library:_____

18. Annual Additions to Library:_____

19. Cataloguing System Used: _____

20. Classification System Used: _____

21. Is the Library Committee formed? (Yes/No):_____

22. Has Library an Open Access System? (Yes/No): _____

23. Library Services Provided Viz. CAS/SDI/Newspaper Clippings/ Reading Room etc.) (Please Specify):

[ ]	ILL	[ ]	CAS
[ ]	SDI	[ ]	Clipping
[ ]	Reading Room	[ ]	Book Bank
[ ]	Home Loans	[ ]	Photocopy
[ ]	Alert and Digest	[ ]	Library Extension Services
[ ]	Orientation	[ ]	Any Other

C Library Collection Development

24. Available Print Material (Approx Number):

    i.   Books:_____

    ii.   Journals:_____

    iii.   Bound Volumes:_____

    iv.   Technical Reports:_____

    v.   Thesis or Research Dissertations:_____

    vi.   Proceedings: _____

    vii.   Manuscripts:_____

    viii.   Newspapers:_____

    ix.   Others (If Any):_____

25. Available E-Resources (Approx Number):

    i.   E-books:_____

    ii.   Audio and Video Material:_____

    iii.   E-Journals (Subscribed):

                           _____

    iv.   Databases:_____

    v.   e- Technical Reports:_____

    vi.   e-Thesis or Research Dissertations:_____

    vii.   e-Proceedings:_____

    viii. Use of Internet Resources:_____

    ix.   e-News Papers (subscribed):_____

    x.   Offline Databases: _____

D Automation Status

26. Is Your Library Automated? (Yes / No):_____

If yes: Library is Fully Automated / Partially Automated / In Process.

27. Name of the Library Management Software used for Automation:_____

_____

28. How many PCs are there in Library? :_____

29. Has library E-Collection? (Yes / No): _____

30. Have you provided Internet Facility form Library? (Yes / No):_____

E Internet

31. Is Internet Facility Available in Library? (Yes / No):_____

    If yes type of Connection: _____

_____

32. Is Library Wi-Fi Enabled? (Yes / No):_____

33. How often Internet is used for Service Purpose?:

    i.   Hourly: Yes /No

    ii.   Daily: Yes / No

    iii.   Weekly: Yes/ No

    iv.   Monthly: Yes / No

    v.   Frequently: Yes / No

    vi.   Not at all: Yes / No

34. Do you feel Library users are getting benefits from Internet? (Yes / No):

    _____

35. Which kind of users getting benefited from Internet (UG / PG / Researchers / Faculty):_____

F Resource Sharing Activity at local level – (ILL, Cooperatives, Library Network)

36. Do you share your Resources? (Yes/No):_____

    If yes, with how many libraries do you share your resources? :

    _____

    _____

    _____

37. Which library resources you exchange in Resource Sharing? :

    _____

    _____

    _____

38. Have you developed any Policy for Resource Sharing? (Yes/ No):_____

39. Which Services/ Facilities do you provide to your users for Resource Sharing? :

_____

_____

40. Response Time of ILL/ DDS Services: _____

_____

G About Network (Computer)

41. Do you think there is a need of Library Networks? (Yes/No): _____

42. Is your Library Networked? (Yes/ No): _____

If yes, how many PC's are connected in Network? (LAN/MAN/WAN):

_____

43. Which type of Network facility your Library have? (Central Networking/ Departmental Networking/ Managed through Library): _____

44. Topology used for Networks: _____

45. What is the future applications decided regarding Library Network?

_____

46. Is your library a member of any Library Network? (Yes/ No): _____

If no, would you like to be a part of Library Network if developed? (Yes/ No)

_____

47. How many library members take the advantage of Library Networks? :

_____

48. Do you feel library users are getting benefited by Networks? (Yes/ No):

H Requirements for Establishing Networks

49. What are the equipments used for building networks? (e.g. Hubs/ Switches/ Modem/ Packets/ Bridges) Please specify: _____

_____

50. Which network protocol is used? : _____

_____

51. Has library a separate Server in the network? (Yes/ No): _____

52. Name of the Network Operating System (NOS) used? _____

53. Internet Service Provider (ISP) used: _____

54. Has Library Domain Name Server (DNS)? (Yes /No): _____

55. Status of DNS (Owned / Subscribed): _____

56. Has Library Multiprotocol Label Switching (MPLS) (Yes/ No): _____

I Network Security Measures

57. Have your Network Secured? (Yes/ No): _____

58. Wre you using Firewall? (Yes/ No): _____

59. Have your network Mirror Server facility (Proxy Server)? (Yes/ No):

_____

60. Has each user its User-Id and Password for Security Purpose? (Yes/ No):

61. Have you protected system from viruses? (Yes / No): _____

If yes which Antivirus software is used?_____

Is it free or paid?   (Yes / No): _____

365

62. What are the problems faced in developing Library Networks? (Elaborate)

_____

63. What are the different safety equipments are made available in library for safety Purpose?

[ ] CCTV Camera   [ ] Bio-metrics

[ ] RFID   [ ] Smart Card Facility

[ ] Automatic Door Control   [ ] Fire Alaram System

[ ] Fire Extinguisher   [ ] Humidity Control

[ ] Visitors Entry Register   [ ] Smoke Detectors

[ ] Any Other

_____

64. Which measures have to taken for network security?

_____

65. Are you using Spam / Mail Protecting System? (Yes/ No): _____

66. List the security measures specially developed by you to protect the network data elaborately.

[ ] Data Backup

[ ] Lock System

[ ] Disable / Remove Devices

[ ] Update Hardware and Software

[ ] Hardware Components (Firewall and Proxy Server)

[ ] Any Other

LIST OF MANAGEMENT INSTITUTE IN PUNE CITY

Sr. No.	Name of the Management Institute with Address	Acronym	Year of Establishment	Student Intake
1	Abhinav Education Society Institute of Management and Research, Narhe Ambegaon, Pune - 411 041.		2007	90
2	Aditya Education Foundations Aditya Institute of Management Narhe, Pune. - 411 041.		2009	120
3	Akemi Education Society's, Akemi Business School. Survey No. 30/3/1, 30/4/A, 30/4/B Buchade Wasti, Marunje Goan, Mulshi, Pune-411 057.		2011	120
4	Alard Charitable Trust, Alard Institute of Management Science. Survey No.47950, A/P - Marunje, Near Infotech Park, Mulshi, Pune - 411 057.	ALARD	2005	120
5	Alard Charitable Trust, Alard School of Business Management. Survey No. 47950, A/P-Marunje, Near Infotech Park, Mulshi, Pune - 411 057.	ASBM	2007	120
6	All India Shri Shivaji Memorial Society's Institute of Management. Near R.T.O. Kenedy Road, Pune 411 001.	AISSMS	2002	120
7	Apex Institute of Management and Research. Survey No.59, Near Atur Hills, Undri, Pune - 4110 28.	APEX-AIM	2008	120
8	Arihant Education Foundation's Arihant Institute of Business Management (AIBM). Survey No. 276/1/2, Behind Crystal Honda Showroom, Bawdhan BK, Pune - 411 021.	ARIHANT - AIBM	2010	60

Sr. No.	Name of the Management Institute with Address	Acronym	Year of Establishment	Student Intake
9	ASMA Institute of Management. Survey No. 85, Shivane, Pune - 411 023.	ASMA	2008	60
10	Audyogik Shikshan Mandal's, Institute of Business Management and Research. M.I.D.C, Block C, Pimpri Industrial Area, Chinchwad, Pune-411 019.	IBMR	1984	240
11	Audyogik Shikshan Mandal's, Institute of International Business and Research. Survey No.-29/1+2A 'T' Wing, CTS No.4695, Old Mumbai-Pune Road, Near Empire Estate Pimpri, Pune - 411 018.	IIBR	2011	120
12	Audyogik Tantra Shikshan Sanstha's Institute of Industrial and Computer Management and Research. C-2, M.I.D.C. Chinchwad, Pune - 411 019.	IICMR	2002	120
13	Bansilal Ramnath Agarwal Charitable Trust's Vishwakarma Institute of Management. Survey No. 2/3 Kondwa (Bk), Pune - 411 048.	VIM	2002	180
14	Bharti Vidyapeeth's Institute of Management and Entrepreneurship Development. Paud Road, Erandwane, Pune - 411 038.	IMED	2001	420
15	Camp Education Society's Institute of Management. Sector No. 27/A Nigdi Pradhikaran, Pune - 411 044.		2001	60
16	Chanakya Education Society's Indira College of Engineering and Management. Parandwadi Pune – 410 506.	ICEM	2007	60

Sr. No.	Name of the Management Institute with Address	Acronym	Year of Establishment	Student Intake
17	Chankya Education Society, Indira Global Business School. Survey No. 64, 65, Gat No. 276, Parandwadi, Pune - 410 506.	IGBS	2011	60
18	Chankya Education Society's Indira Institute of Management. 85/5, "TAPASYA", New Pune - Mumbai Highway, Near Wakad Police Station Thathwade, Pune -411 033.	IIMP	1994	180
19	Chanakya Edu. Society's Indira School of Business Studies. 89/2-A, New Mumbai Pune Highway, Near Wakad Police Station, Tathawade, Pune - 411 033.	ISBS	1994	60
20	Chaudhri Atuarsing Yadav Memorial Education Trust, Siddhant Institute of Business Management. Sudumbare, Pune-412 109.	SCMS	2005	120
21	Choudhary Attar Singh Yadav Memorial Trust, Siddhant College of Engineering. Pune Chakan Talegaon Road, Sudumbare, Pune - 412 109.		2007	60
22	Department of Management Sciences (PUMBA). Univerty of Pune University Department, Ganeshkhind, Pune - 411 007.	PUMBA	1971	180
23	Dhareshwar Institute of Management. Survey. No. 48, Indraprasth Nagar, Dhayari, Pune - 411 041.		2010	120
24	Dhole Patil Education Society, Dhole Patil College of Engineering. Wagholi, Pune - 412 207.		2010	60
25	Dr .D. Y. Patil Institute of Engineering and Technology, Pimpri, Pune - 411 018		1998	120

Sr. No.	Name of the Management Institute with Address	Acronym	Year of Establishment	Student Intake
26	Dr. D. Y. Patil School of Management. Survey No. 163, Dr. D. Y. Patil Technical Campus, Charholi Bk. Via Lohegaon, Pune - 412 105.		2010	120
27	Dr. D.Y. Patil Centere of Management and Rasearch. Plot No. 1029/1030, Chikhali, Pune - 411 019.		2008	60
28	Dr. D.Y. Patil Insitute of Management at Ambi. Survey.No. 124, Talegaon Dabhade, Pune - 410 506.		2008	60
29	Dr. D.Y. Patil Institute of Management and Research. Pimpri, Pune-411 018.	IMR	1994	120
30	Dr. Vikhe - Patil Foundation's, Center for Management Research and Development. Near Patrakarnagar, Pune-411 053.	PCMRD	1984	120
31	Eagale Education Society's Unique Institute of Management. Survey No. 36/3C, Katraj Kondhava Rd. Pune-411 046.	UIM	2009	60
32	G. H. Raisoni Institute of Management and Research. Gat No. 1200, Nagar Road, Wagholi, Pune - 412 207.		2007	180
33	Genba Sopanrao Moze Trust Parvatibai Genba Moze College of Engineering. Wagholi, Pune - 412 207.		2008	60
34	Gramoday Trust's Rajeev Business School. Tathawade, Pune-411 033.	RBS	2009	60
35	Impulse Education Society's Moment Institute of Business Management. Survey No. 54/14/18, Ambegaon (BK.) Pune - 411 046.	IESMIBM	2009	120

Sr. No.	Name of the Management Institute with Address	Acronym	Year of Establishment	Student Intake
36	Indian Institute of Cost and Management Studies and Research (IndSearch). 85/1, Chiplunkar Road, Erandawana, Pune - 411 004.	INDSEARCH	1973	180
37	Indian Institute of Management Training Pune EL-39/5, M.I.D.C., Indrayani Nagar, Bhosari, Pune - 411 026.	IIMT	2001	120
38	Indus Business School Indian Institute of Entrepreneurial Business Management. Survey No.114/1/3, Bhumkas Dash Grunge Rd, Bhumkar Nagar, Wakad-Marunje Road, off Mumbai-Bangalore Highway, Wakad, Pune - 411 057.	INDUS - IIEBM	2000	120
39	Indyana Group of Institutions. Indyana Global Technical Campus. Vidya Laxmi Educational Trust, Survey No.114, Nere Dattawadi, Pune - 411 056.		2009	60
40	Institute of Science's Institute of Business Management and Research. Survey No. 130, opp. Wakad Police Station, Wakad, Mumbai - Banglor Highway, Pune - 411 033.	IBMR	1984	90
41	Jayawant Shikshan Prasarak Mandal's, Imperial College of Engineering and Research. Gat No. 720 (1, 2), Pune Nagar Road, Wagholi, Pune - 412 207.		2007	60
42	Jaywant Institute of Management Studies. Survey No. 80, Pune-Mumbai By pass Highway, Tathwade, Pune-411 033.	JIMS	2004	120

Sr. No.	Name of the Management Institute with Address	Acronym	Year of Establishment	Student Intake
43	Jaywant Shikshan Prasarak Mandal's Jaywantrao Sawant College of Engineering. Survey No.80, Pune-Mumbai Bypass Highway, Tathwade, Pune-411 033.		2006	60
44	Jaywant Shikshan Prasarak Mandal's, Jayawantrao Sawant Institute of Management and Research. Survey No. - 58, Indrayani Nagar, Handewadi Road, Hadapsar, Pune - 411 028.	JSIMR	2007	120
45	Jaywant Shikshan Prasarak Mandal's, Abacus Institute of Computer Application. Gat No. 58, Handewadi Road, Hadapsar, Pune-411 028.	ABACUS	2007	60
46	Jaywant Shikshan Prasarak Mandal's, Kautilya Institute of Management and Research. Gat. No 720/2, Wagholi, Pune-411 028.	JSPM-KIMR	2006	120
47	Jaywant Shikshan Prasarak Mandal's, Rajarshi Shahu College of Engineering. Survey No.80/3, Pune-Mumbai Bypass Highway, Tathawade, Pune- 411 033.		2006	60
48	K. J.'s Educational Institute Trinity College of Engineering and Research. Survey No. 25 /7 /27, Pisoli, Pune - 411 048.	TIMR	2009	120
49	K. J's. Education Institute Trinity Institute of Management and Research. Survey No. 25/7/27 Pisoli, Pune - 411 048.	TRINITY	2008	120
50	Kamala Education Society Pratibha Institute of Business Management. Block No, D-3, Behind Mehata Hospital, Chinchwad, Pune-411 019.	PIBM - KES's	2008	60

Sr. No.	Name of the Management Institute with Address	Acronym	Year of Establishment	Student Intake
51	Kasegaon Education Society's Rajarambapu Institute of Business Management. Ambegaon, Pune - 411 046.		2007	120
52	Kohinoor Business School and Center for Management Research. Survey No.29, City Survey. No. 627, Old Mumbai-Pune Highway, Khandala Pune-410 301.	KOHINOOR	2010	60
53	M.E.S.' Ideal Institute of Management and Computer Application. Technical Campus, Savargaon (Paud), Pune - 412 401.		2012	120
54	M.I.T School of Management. Sector No. 124 Paud Road, Pune-411 038.	MITSOM	1990	90
55	M.I.T. College of Engineering. Survey No. 124, Paud Road, Kothrud, Pune - 411 038.		2007	120
56	Magar-Patta City, Institute of Management and Technology. Survey No.l30, Plot No. MP-4, Magarpatta city, Hadapsar, Pune - 411 028.		2010	60
57	Maharashtra Cosmopolitan Education Society's Allana Institute of Management Science. Camp, Pune - 411 001.	ALLANA	1998	60
58	Maharashtra Institute of Technology. Survey No.124, Paud Road, Kothrud, Pune - 411 038.		2007	60
59	Maharshi Karve Stree Shikshan Sanstha's Shrimati Hiraben Nanavati Institute and Management of Research for Women. Karvenagar. Cummins College Campus, Karve Nagar, Pune - 411 052.		1996	120

Sr. No.	Name of the Management Institute with Address	Acronym	Year of Establishment	Student Intake
60	Managerial Excellence Resource Centre (MERC) Institute of Management. Bhukum, Mulshi, Pune – 412 108.	MERC	2008	60
61	Marathwada Mitra Mandal's College of Engineering. Karvenagar, Pune - 411 058.	MMCOE	2007	60
62	Marathwada Mitra Mandal's Institute of Management Education Research and Training. 302/1 Deccan Gymkhana, Near Gokhale Institute, Pune - 411 004.	IMERT	1994	60
63	Marathwada Mitra Mandal's Institute of Technology. Survey No. 35. Lohgaon, Pune - 411 032.	MMIT	2009	60
64	Matrix Education Foundation's Matrix Business School. Wadgaon, Ambegaon (BK), Pune-411 041.		2005	120
65	MIT School of Telecom Management. Survey No.124, Paud Road, Kothrud, Pune – 411 038.	MITSOT	2007	120
66	Modern Education Society's Neville Wadia Institute of Management Studies and Career Development. 19, Late Principal V.K. Joag Path, Pune-411 001.	WADIA	1991	60
67	Mula Education Society's Sahayadri Institute of Management Studies, A/p, Tathawade, Mulshi, Pune.		2007	120
68	Namadeorao Mohol Vidya and Krida Pratishtan's Mamasaheb College of Business Administration Pirangut, Mulshi, Pune – 411 033.		2008	60

Sr. No.	Name of the Management Institute with Address	Acronym	Year of Establishment	Student Intake
69	Navsahyadri Charitable Trust's Institute of Business Management and Research. Gat No. 94/1B, Chakreshwar Nagar, Chakan, Pune – 410 501.		2008	120
70	Navsahyadri Charitable Trust's Insitute of Management Science, Pimpri BK, Payeet Road, Pune - 410 501.		2009	60
71	NBN Sinhgad Technical Institutes Campus. Survey No. 10/1, Ambegaon (Bk), Off Sinhgad Road, Pune - 411 041.		2011	180
72	Novel Institute of Management Studies. Chinchawad, Pune - 411 019.	NIBMR	2008	60
73	Padmashri Dr. D.Y. Patil Institute of Management Studies. Sector No. 29 behind Akurdi Railway Station Nigdi, Pradhikaran Pune - 411 044.		2004	120
74	PDEA's Institute of Technical Education, Research and Management. Sector No.28, Ganganagar, Pradhikarn, Akurdi, Pune -411 044.		2010	60
75	Pimpri Chinchwad Education Trust's S.B. Patil Institute of Management. Survey No. 26, Pradhikaran, Nigdi, Pune - 411 044.		2009	300
76	Poona District Education Association's, Mahatma Phule Institute of Management and Computer Studies. A. M. College Campus, Manjari Road, Hadapsar, Pune - 411 028.		1994	120
77	Poona Institute of Management Studies and Entrepreneurship. Camp, Pune – 411 001		1990	120

Sr. No.	Name of the Management Institute with Address	Acronym	Year of Establishment	Student Intake
78	Pravara Centre for Management Research and Development. Off Senapati Bapat Road, Near Patrakar Nagar, Pune - 411 016.	PCMRD	1980	120
79	Progressive Education Society's Institute of Management Studies and Career Development. Modern High School Compound, Yamuna Nagar, Nigdi, Pune - 411 044.	IMSCD	1991	60
80	Progressive Education Society's Modern College of Engineering. J. M. Road, Shivajinagar, Pune - 411 005.		2005	120
81	Pune District Education Association's College of Engineering. Hadapsar -Manjari Road, Manjari (Bk), Pune-412 307.		2009	60
82	Pune Jilha Shikshan Mandal's Mahatma Phule Institute of Computer Management Studies and Research. Annasaheb Magar College Campus, Hadpsar, Pune -411028.		1990	60
83	Pune Viyarthi Griha's, Late Govind Kashinath Pate (Wani), Institute of Management, Survey No.44, Vidyanagari, Parvati, Pune - 411 009.		2011	60
84	Raja Shivrai Pratisthan's Institute of Management and Computer studies Baburao Sutar Path, Rambag, Paud Road, Kothrud, Pune - 411 038.	IMCS	1998	60
85	Rajgad Gnyanpeet's Rajgad Institute of Management Research Development. Dhankwadi, Pune-411 043.	RIMRD	2008	180

Sr. No.	Name of the Management Institute with Address	Acronym	Year of Establishment	Student Intake
86	Rajmata Jijau Shikshan Prasarak Mandal's Institute of Computer and Management Research. Gat No. 101-102, Moshi, Alandi Road, Dudulgaon, Pune - 412 105.	ICMR	2007	120
87	Sadhu Vaswani Institute of Management Studies for Girls. 6, Koregoan Road, Pune - 411 001.	SVIMS	2010	60
88	Sai Balaji Education Society's, International Institute of Management and Human Resource Development (IIMHRD). Survey No.54 (lA / l), Nere Marunje, Hinjewadi Info-Tech Park, Pune - 411 033.	IIMHRD	2009	60
89	Sai Balaji Education Society's, Saibalaji International Institute of Management Sciences. Nere Marunje, Hinjewadi IT Park, Pune - 411 033.	SBIIMS	2006	60
90	Sankalp Education Society's Sankalp Business School. Survey No.9/1/1, Ambegoan Bk, Behind Sinhagad College Wadgaon (Bk.), Pune - 411 041.	SANKALP	2010	120
91	Shikshan Maharshi Dr. D.Y. Patil Centre for Management and Research. Gat No. 1029/1030 Nevale Vasti Chikhali, Pimpri-Chinchwad, Pune - 412 014.		1995	120
92	Shree Sai Education Society's, Sai Sinhgad Business School. Survey No.9/1/3, Ambegaon (BK), Pune-411 041.		2010	120

Sr. No.	Name of the Management Institute with Address	Acronym	Year of Establishment	Student Intake
93	Shri Bhairavnath Shikshan Prasarak Mandal's, Adhalrao Patil Institute of Management and Research. A/p Landewadi, Chincholi, Ambegaon, Pune - 410 503.		2009	60
94	Shri Jagdamba Sanstha's, Tirupati Institute of Management, Gat No.110, Shindewadi Octria Naka,Shindewadi, Bhor, Pune -412 205.		2008	60
95	Shri Khanderai Pratishthan Dnyasagar Institute of Management and Research. Survey No. 4/2, 4/3, Balewadi, Pune-411 045	DIMR	2008	60
96	Shri Shivaji Maratha Society's Institute of Management and Research, 74/1 A, 74/1 -B , Parvati Aranyeshwar, Pune -411 009.	IMR	2001	60
97	Shri. Gajanan Maharaj Education Society, Noble Institute of Business Management. Gat. No.242, Gorhe Budruk, Pune - 411 025.	NOBLE	2011	120
98	Sinhgad Academy of Engineering (SAE). Kondhwa (Bk), Kondhwa-Saswad Road, Pune 411 048.	SAE	2009	60
99	Sinhgad Business School (SBS). 19/15, Erandwane, Khilare Marg, off Karve Road, Pune – 411 004.	SBS	2007	60
100	Sinhgad College of Engineering (SCOE). Survey No.44/1, Vadgaon (Bk), off Sinhgad Road, Pune – 411 041.	SCOE	1996	60
101	Sinhgad Institute of Business Administration and Research (SIBAR). Kondhwa (Bk), Kondhwa Saswad Road, Pune - 411 048.	SIBAR	2004	360

Sr. No.	Name of the Management Institute with Address	Acronym	Year of Establishment	Student Intake
102	Sinhgad Institute of Management and Computer Application (SIMCA). Survey No. 45/15/1, 2, 3 Narhe Pune - 411 041.	SIMCA	2004	180
103	Sinhgad Institute of Management (SIOM). Survey No.44/1, Vadgaon (Bk), off Sinhgad Road, Pune - 411 041.	SIOM	1994	420
104	Sinhgad Institute of Technology and Science (SITS). Survey No. 49/1, off Westerly Bypass, Mumbai-Banglore Bypass, Narhe, Pune - 411 041.	SITS	2008	60
105	Sinhgad School of Business Studies (SSBS), Sr. No. 45/15/1, 2, 3 Narhe, Pune - 411 041.	SSBS	2008	300
106	Sinhgad Technical Education Society Rasiklal M. Dhariwal (RMD) Sinhgad Technical Institutes. Campus 111/1, Warje, Mumbai-Banglore Bypass, Pune-411 058.	RMD	2011	240
107	SKN Sinhgad School of Business Management (SKNSSBM). Survey No. 101/1, Ambegaon (BK), off Sinhgad Road, Pune - 411 041	SKNSSBM	2009	300
108	Smt. Kashibai Navale College of Engineering (SKNCOE). Survey No. 44/1, Vadgaon (Bk), off Sinhgad Road, Pune-411 041.	SKNCOE	2001	60
109	Sukhdev and Kamal Sharma Education Trust's Lexicon Institut of Management Education. Gate No. 726, Wagholi, Pune - 412 207.	LEXICON LIME	2009	60

Sr. No.	Name of the Management Institute with Address	Acronym	Year of Establishment	Student Intake
110	Suryadatta Education Foundation's, Suryadatta Institute of Business Management and Technology (SIBMT). "Shree Ganesh", B. No. 2, Sr. No. 342, Chandani Chowk, Pashan Road, Near DSK Ranwara, Bavdhan (BK), Pune - 411 021.	SIBMT	2011	120
111	Suryadatta Education Foundation's, Suryadatta Institute of Management and Mass Communication, (SIMMC). "Saraswati", Sr. No. 342, Chandani Chowk, Pashan Road, Beside DSK Ranwara, Bavdhan BK, Pune - 411 021.	SIMMC	2011	120
112	Swami Sevabhavi Sanstha's Lotus Business School. Survey No. -158 Mumbai Pune Expressways, Tathwade, Pune - 411 033.	LOTUS	2010	120
113	Symbiosis Centre for Information Technology (SCIT). Symbiosis InfoTech Campus, Plot No. 15, Rajiv Gandhi Infotech Park, MIDC, Hinjewadi, Pune - 411 057.	SCIT	1999	120
114	Symbiosis Centre for Management and Human Resource Development (SCMHRD). Symbiosis Infotech Campus, Plot No. 15, Rajiv Gandhi Infotech Park, MIDC, Hinjewadi, Pune - 411 057.	SCMHRD	1995	360
115	Symbiosis Institute of Business Management (SIBM). Lavale, Pune – 411042	SIBM	1978	180

Sr. No.	Name of the Management Institute with Address	Acronym	Year of Establishment	Student Intake
116	Symbiosis Institute of Computer Studies and Research (SICSR) MBA-IT. Symbiosis Institute of Computer Studies and Research. 1st Floor, Atur Centre, Gokhale Cross Road, Model Colony, Pune - 411 016.	SICSR	1985	90
117	Symbiosis Institute of Health Sciences (SIHS) Senapati Bapat Road, Pune – 411 004.	SIHS	2006	70
118	Symbiosis Institute of International Business (SIIB). Symbiosis InfoTech Campus, Plot No. 15, Rajiv Gandhi Infotech Park, MIDC, Hinjewadi, Pune - 411 057.	SIIB	1992	30
119	Symbiosis Institute of Management Studies (SIMS). Range Hills Road, Khadki Cantt, Pune - 411 020.	SIMS	1993	360
120	Symbiosis Institute of Media and Communication (SIMC). Symbiosis Knowledge Village, Lavale, Pune - 412 115.	SIMC	2007	120
121	Symbiosis Institute of Telecom Management (SITM). Lavale, Pune - 411 042.	SITM	1996	180
122	Symbiosis School of Banking Management. Lavale, Pune - 411 042.	SSBM		60
123	The Matrix Education's, Matrix School of Management Studies. Survey No.9/1/5,9/2/4 and 9/1/4, Next to Sinhgad Science College, Ambegoan (Bk), Pune - 411 041.	MATRIX	2010	180
124	TMVs Institute of Management. Tilak Maharasthra Vidyapeeth, Mukundnagar, Gultekdi, Pune - 411 037.	TMV	2006	60

Sr. No.	Name of the Management Institute with Address	Acronym	Year of Establishment	Student Intake
125	Vedanta Institute of Management and Studies. Gat No. 916, BAIF Road, off Nagar Road, Wagholi, Pune - 412 207.		2011	120
126	Yashaswi Education Society's International Institute of Management Science. Survey No. 169/1 A, Elpro International, Chinchwad, Pune - 411 033.	IIMS	2008	60
127	Zeal Education Society's, Zeal Institute of Management and Computer Application. Survey No. 39, A/p Narhe, Pune- 411 041.	ZIMCA	2007	120

SPECIALIZATIONS IN MBA EDUCATION

1. MBA in Accounting Management
2. MBA in Administrative Management
3. MBA in Agribusiness
4. MBA in Association Management
5. MBA in Aviation Management
6. MBA in Banking Management
7. MBA in Biotechnology Management
8. MBA in Brand Management
9. MBA in Business Administration
10. MBA in Business Management
11. MBA in Business Process Management
12. MBA in Change Management
13. MBA in Clinical Research
14. MBA in Communication Management
15. MBA in Construction Management
16. MBA in Consumer Behavior
17. MBA in Co-operative Management
18. MBA in Cost Management
19. MBA in Criminal Justice
20. MBA in Crisis Management
21. MBA in Customer Relationship Management
22. MBA in Dairy Management
23. MBA in Design Management
24. MBA in Disaster Management
25. MBA in e-Business Management
26. MBA in Economics
27. MBA in Education
28. MBA in Engineering
29. MBA in Entertainment Management
30. MBA in Entrepreneurship

31. MBA in Event Management

32. MBA in Executive Management

33. MBA in Export Management

34. MBA in Facility Management

35. MBA in Fashion Designing Management

36. MBA in Finance

37. MBA in Forest Management

38. MBA in General Management

39. MBA in Global Management

40. MBA in Health Care

41. MBA in Hospital Administration / Management

42. MBA in Hospitality Management

43. MBA in Hotel Management

44. MBA in Human Resources Management

45. MBA in Industrial Management

46. MBA in Information Technology

47. MBA in Infrastructure Management

48. MBA in Insurance & Risk Management

49. MBA in International Business and Trade

50. MBA in Knowledge Management

51. MBA in Leadership Management

52. MBA in Logistics Management

53. MBA in Marketing Management

54. MBA in Materials Management

55. MBA in Media Management

56. MBA in Nonprofit and Government

57. MBA in Oil Management

58. MBA in Operations and Logistics

59. MBA in Operations Management

60. MBA in Organizational Management

61. MBA in Personnel Management

62. MBA in Petrol Management

63. MBA in Pharmaceutical Science / Pharmacy

64. MBA in Population Management

65. MBA in Process Management

66. MBA in Procurement Management

67. MBA in Product Management

68. MBA in Production Management

69. MBA in Program Management

70. MBA in Project Management

71. MBA in Quality Management

72. MBA in Real Estate Management

73. MBA in Retail Management

74. MBA in Risk Management

75. MBA in Rural Management

76. MBA in Sales Management

77. MBA in Services Management

78. MBA in Shipping and Logistic Management

79. MBA in Shipping Port Management

80. MBA in Sports Management

81. MBA in Strategic Management

82. MBA in Supply Chain Management

83. MBA in Systems Management

84. MBA in Tea Management

85. MBA in Telecommunication / Telecom Management

86. MBA in Textile Management

87. MBA in Tourism Management

88. MBA in Virtual Management