AN ANALYTICAL STUDY OF COLLECTION MANAGEMENT IN SELECT ARCHITECTURE COLLEGE LIBRARIES IN INDIA

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OCTOBER
2020

D E C L A R A T I O N

I hereby declare that the thesis entitled "**An Analytical Study of Collection Management in Select Architecture College Libraries in India.**" completed and written by me has not previously been formed as the basis for the award of any Degree or other similar title upon me of this or any other Vidyapeeth or examining body. I understand that if my Ph.D. Thesis (or part of it) is found duplicate at any point of time my research degree will be withdrawn.

Place: Mumbai (Ms. Manju Kalita)

Date: 19th October, 2020 Research Scholar

C E R T I F I C A T E

This is to certify that the thesis entitled "**An Analytical Study of Collection Management in Select Architectural College Libraries in India.**" which is being submitted herewith for the award of the Degree of Vidyavachaspati **"Doctor of Philosophy"** in **Library and Information Science** of Tilak Maharashtra Vidyapeeth, Pune is the result of original research work completed by **Ms. Manju Kalita**, 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.

Place: Mumbai
Date: 19th October, 2020

Dr. Pratibha A. Gokhale
Research Guide

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LIST OF ABBREVIATIONS AND ACRONYMS

Abbreviations	Full Form
3DCAD	Three-Dimensional Computer-Aided Design (CAD) Software
AICTE	All India Council for Technical Education
ALA	American Library Association
ALA	American Library Association
AMU	Aligarh Muslim University
ASCE	American Society of Civil Engineers
AT&T	American Telephone and Telegraph
AutoCAD	Commercial Computer-Aided Design (CAD) and Drafting Software
B. Arch.	Bachelor of Architecture
B. Des	Bachelor of Design
B.C.	Before Christ
BCE	Before Common Era
BDB	Bharat Diamond Bourse
BIM	Building Information Management
CAS	Current Awareness Service
CC	Colon Classification
CCTV	Closed-circuit television
CDs /DVDs	Compact Disc / Digital Video Disc
CEPT	Centre for Environmental Planning and Technology
CMS	Content Management Software
COA	Council of Architecture
DDC	Dewey decimal classification
DELNET	Developing Library Network
DESIDOC	Defence Scientific Information & Documentation Centre
DL	Digital Library
DLF	Digital Library Federation
DU	Delhi University

EPW	Economic and Political Weekly
ERP	Enterprise resource planning
ETD	Electronic Theses and Dissertations
HTML	Hypertext Markup Language
ICT	Information and Communications Technology
IEEE	Institute of Electrical and Electronics Engineers
IIEST	Indian Institute of Engineering Science and Techology
IIM	Indian Institute of Management
IIPS	International Institute for Population Sciences
IIT	Indian Institute of Technology
ILL	Inter Library Loan
INFLIBNET	Information and Library Network
IR	Institutional Repository
IT	Information Technology
JFK terminal	John F. Kennedy terminal
JNAFAU	Jawaharlal Nehru Architecture and Fine Arts University
KM	Knowledge Management
KOHA	Koha Library Software
KRVIA	Kamla Raheja Vidyanidhi Institute for Architecture and Environmental Studies
LIS	Library and Information System
M. Arch.	Master of Architecture
M. Phil	Master of Philosophy
M.A.N.I.T.	Maulana Azad National Institute of Technology
M.Des	Master of Design
M.Tech.	Master of Technology
MASA	Maharashtra Association of Schools of Architecture
MHRD	Ministry of Human Resource Development
MLISC	Master of Library and Information Science
MMRDA	Mumbai Metropolitan Region Development Authority
MoMA	Museum of Modern Art
NAAC	National Accreditation and Assessment Council

NATA	National Aptitude Test in Architecture
NIFT	National Institute of Fashion Technology
NISO	National Information Standards Organization
NMIMS	Narsee Monjee Institute of Management Studies
OA	Open Access
OCR	Optical Character Recognition
OPAC	Online Public Access Catalogue
OSS	Open Source Software
OTP	One Time Password
PDF	Portable Document Format
Ph.D	Doctor of Philosophy
PULINET	Provincial University Library Network
RIBA	Royal Institute of British Architect
RSS	Really Simple Syndication
SC/ST and OBC	Scheduled Castes/ Scheduled Tribes and Other Backward Classes
SDI	Selective Dissemination of Information
Sir J.J. College of Architecture	Sir Jamshedjee Jeejeebhoy College of Architecture
SMS	Short Message Service
SOP	Standard Operating Process
SPA	School of Planning and Architecture
SPA	School of Planning and Architecture
TISS	Tata Institute of Social Sciences
TWA airlines	Trans World Airlines
UDC	Universal Decimal Classification
UDRI	Urban Design Research Institute
UGC	University Grants Commission
URL	Uniform Resource Locator
V.N.I.T.	Visvesvaraya National Institute of Technology
XML	Extensible Markup Language
ZWCAD	Compatible Computer Aided Design (CAD) Software

CHAPTER - I
I N T R O D U C T I O N

1.1 Introduction

A library is a place where study materials are acquired, maintained and disseminated to develop knowledge among people. The primary function of a library is the collection, preservation and dissemination of information embodied in a document. The birth of a library was traced back to five thousand years ago in the region between 'Mesopotamia' and "The Nile' in Africa. Library collection began with the clay tablets in the form of handwriting which was mostly found in temples in ancient times.

Earlier, a library was considered as a storehouse of reading materials, and handwritten and printed documents were considered as the best medium. Libraries are dynamic and always grow with human civilization. Nevertheless, the development of technology has been widely used in libraries of the present era. Modern Information Communication Technology (ICT) has revolutionized the system of library performance. It has drastically changed the way of disseminating library information from traditional to online form. ICT is being used to collect, process, store and distribute library information. Implementation of modern ICT has allowed libraries to provide the right information to the right users at the right time.

Managing and disseminating library information is precious; indeed, a library plays a vital role in shaping a better society by providing information and knowledge. In the present era, enormous information is being generated in each moment and in many different forms and formats. Hence, society is looking forward to libraries working as a knowledge centre by acquiring, generating and disseminating information to enable seamless use for the users. In order to achieve the desired goals, libraries carry out functions like a collection of resources, process, organize and disseminate information and knowledge. With the help of these functions, libraries can manage library resources and provide information services to the users in a better way.

Libraries can be divided according to the users' groups which can be categorized as the following types of libraries:

- Public Library
- Special Library
- National library
- Academic Library

Public Library:

A public library can be defined as a service to society irrespective of caste, creed, sex, age, and status. A public library is free and open for society and is generally funded from public sources, or the government supports it. Above all, a public library is a source of information and communication to the various statuses of society. This library collects resources that are related to the local population and the place.

Special Library:

Special libraries are for specialized information on a particular subject such as corporate libraries, government libraries, law libraries, medical libraries, museum libraries etc. These types of libraries collect resources only on a concerning subject. A special library started emerging after the 20th century with the growth of libraries in corporates -for example, The Indian Parliament Library.

National Library:

The government establishes a national library as a country's preeminent repository of information. Their primary responsibility is to collect and preserve the literature of the nation within and outside the country. It offers various rare and significant resources along with the publications of the country and overseas. Consequently, a national library serves a large group of users.

Academic Library:

Academic libraries are those libraries that are integrated with educational institutes. Academic libraries support the institutes' curriculum. The activities of the library include acquisition of documents, documents delivery and reference service etc., which are referred by the users. It includes books, periodicals, thesis, maps, CDs/DVDs, project report, course catalogue/brochure, etc. There are three types of academic libraries and traditionally grouped as school, college or university libraries.

a. **School Library:** School library collection contains syllabus textbooks along with some reference, linguistic and moral storybooks. The library tries to build a reading habit and inculcate a social attitude among the school students.

b. **College Library:** The collection of college libraries always gives importance to provide more resources by acquiring reference books on their syllabus. It tries to develop thinking ability and self-learning within users. College libraries play a vital role in the education process. The standard of library maintenance reflects the images of the status of an institute. Thus, the college library becomes an essential instrument in the teaching-learning system.

c. **University Library:** A library is considered the heart of the university. A library can survive without a university, but a university cannot run without a library. University libraries need to acquire more resources to enhance the research sector.

An academic library always offers various resources and services intending to make the new generation more knowledgeable. It needs to take extra efforts to impart the latest and accurate information to meet the institutional expectation. This extra initiative probably requires trained professionals to make use of the library collection effectively.

This study is on architectural college libraries. These libraries can be grouped under the category of an academic as well as a special library. Architecture college libraries possess and manage all those resources which are related to the subject of architecture.

1.2 Library Collection Development and Management

Library collection development and management refers to acquiring, collecting and managing access to their resources. Though developing and managing library collections is following the same tradition, the format of materials collecting and disseminating processes are frequently changing. Collection development and management issues are the same for all kinds of libraries, but the preferences and emphasis on different issues depend on the institutional requirement. The present-day library has changed the scenario of library services which impacts intellectual

freedom, copyright and licensing issues. Hence, it became essential to look into the system of collection management processes in college libraries.

In Library and Information Science (LIS) education, collection management is considered as a wide area compared to collection development. Often, librarians become confused about library collection Development, Acquisition and Management. Hence, it is necessary to make a clear distinction between these three elements: Library collection management, library collection development and library acquisition.

- **Library Collection Management**

Library collection management is a broad area which also includes collection development and acquisition. It is a process of information gathering, communication, coordination, frame policy, evaluation and plan, that affect decision making on acquisition, retention and system of access to the information to meet the institutional goal. A library needs to become more responsible to manage its collection to make use of the collection.

- **Library Collection Development**

Library collection development is a sub-part of collection management that generally affects the decisions taken on the acquisition of library resources. Its emphasis on developing the numbers of resources by many sources like procure, gratis and donations.

- **Library Acquisition**

It is the process of acquiring substantial resources through purchase, gratis, loan or exchange programme. Acquisition of library materials needs utmost care to acquire useful resources.

In the beginning, a library was concerned only with collection development to set up a library with an adequate quantity of resources. At the end of 1970, the term “collection management” came into the light. The growing observation in the profession of a comprehensive set of roles led to the use of the terminology “collection management”. Now, the function of “collection management” is continued in all libraries as it became necessary to meet library user’s expectations.

1.3 Library Collection Management

Collection management is systematic, efficient and involves the economic structuring of collected resources. Managing library collection refers to the evaluating and organizing of the library resources to meet the objectives and needs of the user. Features of managed library resources include the quality of accuracy, timelessness, precession, relevance, conciseness, appropriateness and completeness.

In 1980 the term collection management was coined, and the collection development term was also included, which expanded some sections like weeding library materials, cancelling serials, storage and preservation. Collection development is a part of collection management, and it is often used synonymously.

Library collection management involves budget allocation according to user's need, organization of the collection, analysis of information access, system and the condition of information storage and use, resource sharing, withdrawal and cancellation of obsolete resources. Collection management can be defined as a process of gathering information, processing, and formulating them systematically to give accurate access to the library users as well as preserve those resources for long life. These processes influence the decision about acquisition, retention and provision to access information according to the needs of the organization. Library collection management cannot be successful without involving the other library operations and services like user survey, keeping a healthy environment and protection or security to the collection, which can improve the system to manage library collection in a better way.

Academic Institution also generates non-conventional literature, known as grey literature, usually regarded as a material which is not issued through the normal commercial publishing channels and which is therefore in many cases difficult to access. The term "grey literature" has come into prominence as an expression to denote non-conventional publications. These kinds of grey literature need to maintain with special care. Managing and disseminating grey literature can be an additional resource for a library to give maximum satisfaction to its end users.

Human resource management in the library is also important to provide standard services to library users. In this technology era, modern library users' demands and expectations are different from the traditional ones. They want to get all the

information through technology. Hence, it became essential for library staff or personnel to update them with the latest technology to satisfy library users' needs.

In the era of electronic and technology development, libraries also started collecting electronic resources in many different formats, i.e. e-books, e-journals, databases, films, CD/DVDs etc. Management of electronic resources is the practice of software systems used by librarians to keep track of important electronic information resources. Thus, electronic resources became necessary to keep the library resources safer and long-lasting and avoid missing or loss of data. Electronic resources of library data can be easily accessible by many users as this is available in soft copy, reducing the storage. Today's libraries build vast collections of all types of resources, and finding ways to manage them efficiently has become a significant challenge. The number of journals, books, e-resources, in-house publications/documents held by most libraries has overgrown. Hence, academic libraries started preferring network-based information services. Managing all these resources involves providing convenient ways to the end-users to find and access them easily and quickly, also providing library staff with the tools to keep track of them and give security to the resources and ensure their durability.

One of the crucial roles of librarians in the coming decades is to provide access to all kinds of print and e-resources, whether gratis or purchased, which will become compulsory to give access in a one-stop shop. Also, librarians must be ready anytime to add new services and functions whenever necessary. Best practices for managing library resources are critical. Librarians are still grappling with managing these resources effectively in conjunction with their print, e-resources, and in-house archives.

This study is concerned with the evolution of the collection management process where internal and external influences affect the performance of collection management. In the collection management process, cooperation is used as a fundamental approach to meet the goal of a modern library. Libraries need to grow by adapting continuous changes with the current development of ICT and resources.

It is the right time to evaluate the system of managing library resources to get better service for end-users. This study presents a model on collection management of

architectural college libraries. The study also focused on the current as well as the future status of managing library resources in architectural college libraries.

1.3.1 Library Collection Management in the Modern Era

In this modern era, libraries are highly influenced by Information Communication Technology (ICT), and as a result, users can fulfil their needs through resources available in various formats. Users can access library resources through the network without physically visiting a library which saves time and reduces physical labour of travel. Earlier, due to the unavailability of more than single or limited copies, not many could access the library resource at the same time. Now, many users can have access to the same materials at the same time as the copy of the same is accessible in soft copy.

The application of "Information Communication Technology" in the library has improved the system of managing collection and disseminating them among the users. Information communication technology (ICT) is a combination of different tools for handling information. They are a diverse set of technological tools and resources used to communicate, create, disseminate, store and manage information. ICT can be found in many varieties, such as radio, telephone which has become old fashioned and the new tools of ICTs are computer, wireless technology and the internet etc. Managing resources with ICT is the practice of hardware and software systems to keep track of print and electronic resources. These modern ICT tools are now able to manage information in a way that users can access library resources any time from every corner of the globe.

Libner describes the 2012 library, "We move from a single library to a network of libraries; from one collection to distributed collections; from the catalogue interface to multiple interfaces; from books and journals to information fields and streams encompassing traditional and non-traditional forms of scholarly communication. These include such diverse forms and genres as preprints, Traditional Publications, informal commentary, data sets, software applications, maps, video clips, listserv archives, and web pages- all accessible, at least in principle, anytime and anywhere."

Tonta (2004) 'Electronic information management can be defined as the management of information that is recorded on printed and electronic media using electronic

hardware, software and networks. It includes the description of strategies, process, infrastructure, information technology and access management requirements, as well as that of making economic, legal and administrative policies with regards to the management of electronic information. It includes policies to acquire, analyze the system to give better access to these resources and update the same with the latest technology and look after the security part for managing e-resources.

Information communication technology has altered the library environment drastically. In this techno-savvy society, people prefer to access information through various modern technologies. Libraries have also started using many different multimedia facilities to help their end-users. Some of the latest and famous ICT applications are Android, cloud computing, library 2.0, web 2.0, Rich Site Summary (RSS), Short Message Service (SMS) alerts etc.

The system of managing library collection has tremendously changed, such as its source, arrangement, ownership, size and variety, different life cycle from paper to digital formats. The modern collection management system of a library has affected three key areas: firstly, an extension of traditional activities in collection management; secondly, involvement of vendors or agents of resources. Thirdly, the vital task is giving access to all library resources to the potential remote users. At this juncture, "libraries cooperation" becomes an essential part of the collection management system to provide more resources to the end-users. Library cooperation can happen by adopting open-source software by libraries for all the operations, which give a worldwide standard.

Implementing open-source software to manage library collection became new and feasible for college libraries, especially for colleges that cannot afford expensive proprietary software. Open-source software is not only cost-effective but also structured with standard metadata and which has influenced worldwide. In this present era, all higher institutions are adopting open-source software for managing and disseminating library resources. Several open-source software is available for all kinds of library operations, such as Library automation, creating a digital library, library website and library blog. Institutes can save money by implementing open-source software with the minimum initial cost.

Digital library (DL) became a crucial part of library collection management. The development of technology, along with networks, made DL more useful to any library. DL facilitates remote access to all kinds of resources which break the physical barrier between library resources and users.

Digital Library Federation (1989) defined DL as:

"Digital libraries are organizations that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by a defined community or set of communities."

Implementation of a digital library became popular in all types of libraries. It helps to collect, archive and distribute born-digital and digitized resources. DL preserves the intellectual content produced and required by a particular community. There are good numbers of DL in developed countries to support research sectors. India also embarked on a few Digital Libraries, such as National Digital Library (NDLI), IIT Kharagpur, Vidyanidhi for e-thesis, Traditional Knowledge Digital Library (TKDL) to protect Indian traditional medicinal knowledge, Gyandoot for E-Governance etc.

However, creating a digital library became an easy task due to the availability of several open-source software, such as DSpace, Evergreen, Fedora, and Greenstone. DSpace and Greenstone are the most used software worldwide. DSpace is the most popular and implemented software in the world of the open-source domain. It has implemented the open archive initiative protocol for metadata harvesting (OAI-PMH), which supports interoperability with another digital library that uses DSpace software.

The advantage of open-source software is considerably cost-effective over proprietary software and can be customized according to the need of the institutional requirement. The implementation cost for open-source software would include the cost of an entry-level server and the cost incurred for system support.

Nevertheless, an institute can select open-source software for all kinds of library operations after evaluating the features of that software. The final selection of software is based on design, features, supporting platform and the needs of library users. Nowadays, many vendors started giving support for open-sources software, and

an institute might choose a vendor to get technical support to install and customize and can be maintained with the in-house expert.

In this techno-savvy era, academic libraries have changed in terms of the collection and dissemination of information to their end-users. Information and communication technology (ICT) have changed the needs and expectations of library users. Because of this, academic libraries need to implement ICT and create a benchmark to encounter the needs of library users. A colossal number of architecture colleges are growing day by day, and hence, there is a need to accomplish an accumulation of quality library services for students and teachers of architecture in a better way.

Subsequently, preparing guidelines for the best practice in architecture college libraries to serve the architect community is vital, which will eventually upgrade the library system. In this twenty-first century, the environment of education and information handling systems has changed precisely. The development of any nation depends on the nature of education. The numbers of private architecture schools have been growing, and hence it has become the issue of value education which is assumed as a critical dimension. Academic libraries play a vital role in enhancing the teaching-learning system by disseminating relevant information. Consequently, academic libraries ought to be in a position to be of full use to their library patrons.

1.4 UGC, NAAC, AICTE and COA Norms for Architecture and Town Planning College Library

University Grants Commission (UGC) and the National Accreditation and Assessment Council (NAAC) are concerned about the education standard where the library plays a vital role to get accreditation for Indian Universities and Colleges. NAAC also has some guidelines for libraries to maintain the standard to enhance the teaching-learning system. This study has been organized to involve a few points which need to be incorporated in the architecture college library management given the best practice to give ultimate satisfaction to the architect community.

UGC is a statutory higher education body that regularizes universities in India. The UGC is the only agency for providing the grant to establish educational institutes to maintain standards of higher education. UGC recommends installing at least one computer and creating one post of Information Scientist to handle electronic systems in every college and university library.

UGC established the NAAC, a higher education body, in 1994 to look into the quality and excellence in higher education and promote academic libraries to enhance the education system. NAAC developed a set of norms for academic libraries, which can be categorized into four areas- first preferences on collection and services, second, use of technology, third, management and administration of libraries and fourth to the extent of user services. NAAC also emphasized giving remote access to library resources to the users since 2017.

All India Council of Technical Education (AICTE) (2017) was established in November 1945 as a national Apex Advisory Body to conduct a survey on the facilities available for technical institutes and endorse the growth of technical education in the country. The AICTE includes institutions of Engineering, Architecture, Town Planning, Management, Pharmacy, Applied Arts and Crafts, Hotel Management and Catering Technology disciplines. AICTE has framed some policy to maintain the standard in Indian technical institutions. Special emphasis has been given on the following points to upgrade technical college libraries:

- Digital library with multimedia facilities.
- Reprography service.
- Scanners and printers are essential.
- Classification of library books/non-books materials as per standard classification.
- National Programme on Technology Enhance Learning (NPTEL) facility.
- Computer indexing with barcode or RFID book handling is desired.
- The internet, LAN with Wi-Fi and the latest hardware are recommended.
- Using open-source software may be encouraged.

AICTE has some member councils for different disciplines to maintain the quality of professional education responsible for approving the establishment of a new institute. Bar Council of India (BCI) for Law, Dental Council of India (DCI) for dental education, Pharmacy Council of India for pharmacy and **Council of Architecture (COA)** for architectural disciplines are examples of some regulatory bodies.

Council of Architecture (COA) is a statutory body established under the formation of the Architects Act, 1972 and came into force in September 1972. The COA offers registration of architects to recognize the qualification of architects. The council is

responsible for regulating the education and practice of the profession in India. The COA has farmed a few guidelines for the architecture college library.

Following are the COA norms for college library (As per the COA Directory, 2020):

- Minimum 300 books on subjects of Architecture shall be available in the library for the intake of (including minimum 100 titles) at the time of first inspection.
- 150 books on subject of Architecture (including minimum 50 titles) for every additional intake of 40.
- From second year onwards, minimum 120 books on subject of Architecture (including minimum 40 titles) for every year per intake.
- Library for old schools, for having more than 5000 titles; should acquire minimum 10 titles on subjects of Architecture per intake of 40 every year.
- At least 2 referred journals (Min. 1 international) per intake of 40 shall be subscribed.

Journals & periodicals: 1. For 40 intake ranging from1 International and 4 national to 2 international and 8 nationals. 2. For 80 intake ranging from 1 international and 10 international from 1st year to 5th year.

Desirable: e-books and e-journals along with computer terminal with net facility for references.

It is observed that UGC and AICTE emphasized implementing ICT and remote access of library resources in academic libraries. However, COA has not framed norms to implement any advanced services for architecture college libraries yet.

In 1986, The Information and Library Network (INFLIBNET) centre under the UGC, Ministry of MHRD, took an initiative to upgrade libraries of Indian colleges and universities. INFLIBNET provides various e-resources and training to library personnel to upgrade the Indian education system. INFLIBNET based e-resources are mostly for Arts, Commerce and Science streams but compared to these subjects; architectural contents are significantly less. Therefore, the researcher has been initiated to study the present status of some select Indian architecture college libraries to know how they manage their library collection and disseminate information to the end-users.

The study presents the idea and depicts the method of best practice in an architecture college library. It inquires and analyses the present status of collection management of select 103 architecture college libraries from Maharashtra as well as 12 architecture college libraries from other parts of Indian. The study has proposed the best practice of collection management in an architectural college library which can uplift the teaching-learning system. It introduces the subject 'architecture' and the architecture college library along with their current practice to impart information and knowledge to their end clients. It introduces the contextual analysis of all responded architecture college libraries to represent how they are managing their library collection to disseminate information to the patrons.

1.5 Introduction to Architecture

Architecture is a subject which gives understanding about making design to develop infrastructure and any product which makes people's life more convenient. Architect conceives design of building, public space and product according to the needs of human and environment. Architecture is both the process and product of planning, designing and constructing buildings and other physical structures.

Following are the prescribed definitions of architecture by three prominent architects:
"As an architect, you design for the present with an awareness of the past and future, which is essentially unknown."

by Architect Norman Foster.

"Architecture is a sculpture with the gestures of Human Occupation."

by Architect Charles Correa.

"In the nature of space is the spirit and the will to exist a certain way. Design must closely follow that will. Therefore, a stripe painted horse is not a zebra. Before a railroad station is a building, it wants to be a street. It grows out of the needs of street, out of the order of movement-A meeting of contours unglazed."

By Louis Khan

A wise architect considers himself to engage with a building or object while designing.

1.5.1 Architecture Education

The profession of Architecture came into society in the 18th century in England. Formal architectural education was started when the Royal Academy of Architecture started their school.

Earlier, a one-year diploma course was conducted in India named as a draftsman. Gradually it developed into the bachelor (B.Arch.) and master (M.Arch.) courses. The bachelor course is for five years, and the master is for two years, and in some countries, conduct master courses only for one year. Some architectural schools also conduct a one-year diploma course for interior design which is a part of architectural education.

Architecture education helps students to develop their skills. Teachers teach students about architectural design, which include a theory of architecture, vernacular design, ancient architecture, modern architecture, structural concept, civil design, landscape and also the other subjects which give knowledge about the environment to design for them.

An Architecture school provides formal training, support and recognition by the Council of Architecture (COA, in India) to their students, which help them to grow in their profession.

1.5.2 Architecture College Library

The collection of architecture college libraries is not only on architecture discipline, but it also includes some other subjects which help to understand the subject in a better way. Generally, it collects resources on architectural design, constructions, interiors, landscapes, town planning, technology, environment, humanities, geography, biography, real estate, religion, cinema/documentary, literature, photography and philosophy.

The architecture college libraries are different to some extent to other academic libraries. Some of the important features are that the architecture discipline has no textbook recommended by any University. Architecture teaching-learning process follows all those reading materials which can give understanding about the needs of society, human life and the environment. It also collects maps, development sheets,

gazetteers and municipalities, government reports which help to understand the rules and regulations needed to be followed by an architect when they plan or design any infrastructure.

Apart from all these collections, the library also maintains a “material library” which contains samples of various materials and small-scale models of sanitary fittings and fixtures.

1.6 Significance of the Study

Management of collection or resources of any library is a vital part of library management. Books, Journals, Periodicals, Thesis, Dissertations, Magazines, and Research Reports are part of the classic collection of an academic library. However, for architectural institutions, Maps, Development Sheets, Films, Cinemas, Documentaries, Drawings, Rules, Standards, Patents, Question Papers, Samples of Sanitary Fittings and Fixtures, Photographs, Models need to be managed separately with special care and attention.

Architecture is an old discipline, and it has traditional as well as other non-traditional resources involved in the library collection. The unique collections like architectural models, maps, and drawings are preserved and managed by librarians of architectural institutions across the world; however, a comprehensive survey method adopted by the researcher to study the present status of Indian architecture college libraries.

This study came across such methods adapted by the librarians, which can be helpful for others to follow. The best practices in the collection management of architecture college libraries were documented and brought to the notice of the others to manage their collection in a better manner.

The study can help to understand the process, procedures and usefulness of modern ICT tools and technologies to manage library collection in a better way.

It can help as a guideline for architecture college librarians as well as other college librarians who need to manage library collection. It can also help the publishers and agents to get an idea about what resources are required in architecture college libraries.

1.7 Need for the Study

In India, the phenomenon of collection management of architecture college libraries is still in the developing stage. Only a few libraries started using modern technologies and strategies to manage their library collection, and the rest of the libraries are still in old traditional culture. Hence, there is a need to study the various strategies, guidelines, technologies and collaborative approaches used to manage the collection of architecture college libraries. This study is to understand the present scenario of the collection management of the architectural college libraries in Maharashtra as well as other twelve architectural college libraries which were established before 1970 and situated in various regions of India.

Resources are available almost in all the architectural college libraries, but the collection management practices and overall governance of libraries are not standardized. The major problems are inadequate budget and lack of professionalism. The literature searches revealed that no study on the topic had been done in Maharashtra or India.

Through this research, an attempt was made to present a standardized model to manage library collections of architecture colleges.

1.8 Statement of Problem

In need of the above context, the research topic has been titled as "**An Analytical Study of Collection Management in Select Architectural College Libraries in India**".

1.9 The Objectives of the Study

This study aimed to present a suitable model for collection management in the architecture college library. The study is also aimed to form an understanding of the management of library collection in the rapidly emerging electronic environment among the architecture college libraries. Hence, the work was carried out to know the present condition of collection management of architecture college libraries in Maharashtra and the other twelve selected libraries from the rest of the parts of India.

Subsequently, the objectives of the study are:

1. To find out the nature of collection in architecture college libraries.
2. To document the existing facilities for accessing library resources in architecture college libraries.
3. To examine the potential of information technology as a tool for successful access to library resource in architecture colleges in India.
4. To depict the best practices of management of the collection of architecture colleges.

In this study, the researcher has surveyed resources available in architecture college libraries. This survey was a comprehensive investigation of the collection management of present architecture college libraries. As such, this study aimed to understand and document the management practices followed by the librarians of the institutions engaged in architecture education.

1.10 Hypothesis

The hypothesis is a tentative assumption to test and draw the aspect of the research outcome. It is always specific and limited to the piece of research. After exploring personal investigation, reviewing similar works of literature done in the past and discussing with colleagues and experts, the following hypothesis was drawn for the research.

"Most of the college libraries do not have adequate resources and enough infrastructures to support the needs of the readers".

1.11 Scope of the Study

In India, the Council of Architecture (COA) is an authority for approving educational institutions to conduct degree, postgraduate degree and doctoral degree education in architecture. All institutions must have the approval of COA before starting education in architecture. The committee confirms that institutes have proper and adequate infrastructure and human resources essential for conducting educational courses in the discipline.

1. This study covers all architecture college libraries duly approved by the Council of Architecture (COA) and geographically located in Maharashtra. There are 103 architecture colleges in Maharashtra.

2. This study also includes 12 other prominent architecture college libraries from various parts of India which were established before 1970. The purpose of including these twelve libraries was that being some of the oldest institutions providing architecture education, these have valuable resources on the disciple of architecture as well as have the institutional setup and collection management systems that are quite well developed.

Architecture as a discipline is ancient; however, education in this discipline is a new phenomenon. When the researcher took a preliminary survey of architecture college libraries in India, it was found that 1970 is a landmark year when the growth of private and government colleges took a tremendous leap. The preliminary investigation also revealed that not all architecture colleges have a library as an independent full-fledged set up with qualified librarians. Therefore, the researcher included architecture colleges and some prominent institutes in the country for the purpose of survey. Thus the scope of survey in the present research is limited to architecture college libraries in the state of Maharashtra and those attached to 12 premier architectural academic institutions in India. The result of the survey can be taken as a representative for other architecture college libraries.

Therefore, keeping this fact, researchers decided to cover colleges established before 1970 in the country for the sake of their historical importance in the education of the discipline. There were 12 colleges established before 1970.

A total of 115 architectural libraries were covered for this research. **(Appendix II)**

Hence, the investigation covered all the architecture college libraries in Maharashtra, including the other 12 architecture college libraries. The study was primarily focusing on the Maharashtra region as it has a metropolitan city in the state. The researcher is working in one of the architecture colleges in Maharashtra. Therefore, it was convenient to contact the nearby institutes for the study.

1.12 Limitations

This study does not cover any institution in the field of architectural education outside Maharashtra apart from the 12 specifically mentioned colleges which were established before 1970.

1.13 Research Methodology

Human minds have exceptional quality among all the life forms to think and analyze. The growth of human culture is ensured due to insistent search for prior experience, interpretation, investigation with structure planned and use of logical perspective, which is known as research. According to Busha (1978), the term research can be defined as 'systematic quest for knowledge'. The quest for knowledge is essential in research. This quest of knowledge needs a well-structured method to succeed.

A methodology is a theoretical plan with a systematic and logical process used in a research study, and it can vary depending on the nature and objectives of the study. As this research is on library services, the researcher adopted the survey method.

1.13.1 Methodology

The study has involved two types of the following research:

- Descriptive research
- Exploratory research

Descriptive research elaborates the background of the subject. It provides a brief description of the knowledge of architecture, history of architecture, architectural education and architecture college libraries. This part also included biographies and works of some prominent national and international architects to give an overall understanding of the subject.

Exploratory research focuses on the analysis of the present situation of collection management of targeted architecture college libraries. This part of the study is on the rich experience of the participants.

These two approaches were found suitable for the research study as they could give enough facility to investigate the research problem.

The survey method was adopted to collect primary data. This method was selected to get quantitative data along with their comments on their experiences.

1.13.2 Survey Method

The survey method is most prevalent in social science and humanities research. The interview method is also a well-known method to collect the opinion of experts' or experience holders in social science. A well-conducted survey can give correct and enough data within a time frame.

Looking at the geographical locations and spread of institutions, the researcher conducted two kinds of surveys to get accurate responses of the librarians and collected information through interviews and websites of architectural institutions and libraries.

Survey one was on the present scenario of collection management of architecture college libraries in India. Architecture college libraries in Maharashtra are spread across the state. Similarly, other twelve architecture colleges which were selected for response were from different regions of India.

Therefore, the questionnaire tool was developed for getting responses to research. The questionnaire was structured for architecture college librarians to probe the research problem.

Survey two was for conducting interviews with few professionals of Architecture and Library and Information Science (LIS) and also gathering information from websites of architecture colleges and libraries.

1.13.3 Tools Development

The nature and scope of this research are library service-oriented. Therefore, it requires tools like a questionnaire for data collection from all the architecture college librarians in India. The data collection tool was developed in the form of a questionnaire for survey one.

In order to support the data collected through the questionnaire, some personal interviews with librarians, Directors of some architecture colleges as well as Chairman and vice-chairman of the Council of Architecture (COA) were added as survey two.

The questionnaire was made available for respondents online as well as offline. Respondents were asked to give their responses within the specified time according to their convenience.

The data was also collected through various websites, printed brochures and promotional materials made available through the internet.

1.13.4 Survey One

1.13.4.1 Questionnaire Instrument

The questionnaire was framed to acquire valid and reliable data and information accordingly that the actual research question is answered.

Questionnaire for Librarians	The questionnaire was for Librarians to collect information about the library system they follow to manage their collection.

Questionnaire for Librarians (Appendix III)

The questionnaire was prepared for all the librarians of architecture college libraries. The questionnaire included 7 sets of questions for librarians on different aspects of collection management. It included questions about what type of materials the library collects and what type of strategies and technology used to manage those resources in their college library. Researchers collected data through a questionnaire, along with interview methods. The questionnaire was prepared with the help of experts and the research guide.

The questionnaire included the following aspects for librarians:

- Introduction to the library as well as the librarian
- Strength and type of collection
- Organization of collection and access
- Services
- IT awareness and implementation
- Maintenance and security
- Opinions of librarians on library collection management.

1.13.5 Design and Development of the Questionnaires

The researcher has designed the questionnaire using Google form. The questions were selected, and responses were expected in Yes/No form for some questions, and some question's information was sought from the respondents.

1.13.6 Administration of the Questionnaire

The questionnaire was sent via email to the sample population. The respondents had to respond by submitting the Google form only. Responses were extracted. If required, follow up emails and phone calls were sent to get maximum response.

1.13.7 Survey Two

Interviews with a few professionals from LIS and architecture background were conducted to collect their opinion on the system of collection management of architecture college libraries.

Also, some information was gathered from websites of architecture colleges and their libraries.

1.14 Defining the Universe

The universe comprises all survey segments that confirm its presence in the research work. The specific description of the universe for a certain study is set by the research query, which stipulates who or what is of concentration. The universe may be persons, mass, institutions, or even substances. For the present study, the entire libraries of the architectural institutions are the universe. The list of architecture colleges of India was collected from COA website. Total 465 architecture colleges registered under COA in India (as of January 2020), and the study covered 115 colleges. The researcher selected 103 colleges from Maharashtra and 12 colleges from various states of India, which were established before 1970. The purpose of choosing all architecture colleges of Maharashtra was, as it has a metropolitan city and the first architecture college (Sir J.J. College) in India is situated. Also, the researcher worked in an architecture college in Mumbai, so it was convenient to contact architecture college libraries in Maharashtra.

1.14.1 Population

The theory of population is essential to any survey research. A research population is a precise collection of individuals or objects that belongs to a homogeneous

characteristic. All individuals or objects within a certain population usually have the same nature. Consequently, it can be stated that a population is the whole set of units in which a study is concerned. In the present, study all architecture college libraries in India as a population. The population can be further grouped into the target population and the accessible population.

1.14.2 Target Population

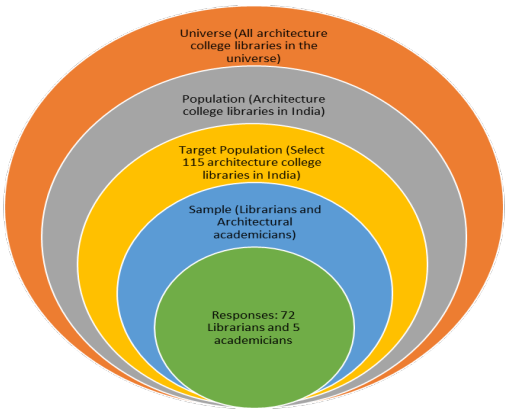
The target population is the collective of samples about which the researcher would like to generalize. All academic institutions offering architectural academic courses may be called as a target population for this study.

1.14.3 Accessible Population

The total samples confirm eligibility norms that they are reachable as subjects for the study. Architectural institutions in India and the state of Maharashtra are the accessible population to this study.

1.14.4 Sample Size

The sample size is used in research to outline the number of volumes included in a sample size. It is a group of samples nominated from the universal population and considered a representative of the actual population for that precise study. For the present study, all architecture college libraries approved by COA in Maharashtra and 12 colleges out of state established before 1970 are sample sizes decided by the researcher.



Picture 1.1 Universes, Population, and Sample of Research

- Universe (All architecture college libraries in the universe)
- Population (Architecture colleges libraries in India)
- Target population [Select (115) architecture college libraries in India]

- Sample (Librarians and Architectural academician)
- Respondents (72 Librarians and 5 Academicians)

1.14.5 Sampling Unit

In the environment of a research field, a sampling unit is a specific person or object. The word sampling unit denotes a particular worth from a sample database, and it states to an Institute, an architecture college library. Sampling units from select architecture college libraries from India were taken. Select sample units were all architecture college libraries from Maharashtra, as well as twelve select architecture college libraries from various states of India were taken to form a research sample. After receiving a list of all architectural institutions of the country, librarians are contacted to collect information along with the COA approved all colleges from Maharashtra.

1.14.6 Selection of Sample

The approved list of architectural institutions in India was collected from the COA website. Those institutions which are not functioning at present are eliminated. The survey institutions which are at present functioning are selected for receiving information and response for the current research purpose. The study has chosen all the architecture colleges from Maharashtra state along with 12 colleges from out of Maharashtra. A total of 115 architecture colleges were selected for the study.

1.15 Presentation of Data

Google forms automatically generate collected data in excel sheet format. The data were collected in the excel sheet and analyzed with excel formulas. Interpretation of the data along with the observations is presented for better understanding in the forms of tables, graphs and pie-charts.

1.16 Summary

The chapter introduced each term of the research title. It presents the concept of information development and management along with a brief on architecture education and its library. Norms of various authorized bodies for architectural libraries also elaborated in this chapter.

The chapter also expanded the research problem with objectives, methodology and workflow of the research study. The next chapter reviewed pieces of literature on the topics briefed in this chapter.

1.17 Conspectus

As per the guidelines of the Tilak Maharashtra University, for presentation, the thesis is organized in the following chapters.

The organization of the study was done as follows:

Chapter- 1 Introduction

This chapter introduces the topic of the present study, which highlights the features of the topic. This chapter articulates the research methodology, need of the study, the significance of the study, aim of the study, objectives and scope of the study, limitations, and hypothesis. It also includes an introduction to the discipline of Architecture.

Chapter- 2 Review of Literature

The chapter includes a review of literature on managing library collections, their availability and use in architecture college libraries and also managing e-resources available in the architecture colleges.

Chapter-3 Architecture Education and Their Libraries in India: An Overview

It includes information about architecture as a discipline, history of architecture, profile of architects and architecture college library.

Chapter- 4 Data Analysis and Observations

This chapter presents the analysis of data collected through a questionnaire, survey websites and personal interviews. Questions regarding types of format, strategies to manage resources, the impact of efficient management of library resources are analyzed in this chapter.

The chapter also presents the status of interviews conducted with a few personnel from the architecture and LIS profession.

Chapter- 5 Conclusion, Suggestions and Future Research

This chapter gives the conclusion of the research and suggests how to manage library collections in an architecture college library. The researcher suggested a model for the collection management of architecture college libraries. This chapter also includes recommendations for further research.

Appendices:

Appendix I- Bibliography

Appendix II- List of Select Architecture Colleges

Appendix III- Questionnaire for Librarians

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CHAPTER - II
LITERATURE REVIEW

2.1 Introduction

Any research requires a literature survey or literature review related to the topic to acquire a depth of knowledge. A researcher needs to consult reference documents on the topic of research such as journal articles, indexes, bibliographies, conference proceedings, reports, books and websites. In this era, the internet and various web-based sources have proved to be a great help to access literature from many different sources. A literature search is a crucial step and an essential part of the research. It helps the researcher get an overall idea about what and how to start his/her research. The researcher was able to collect relevant primary and secondary literature available on Library and Information Science (Library, University of Mumbai), on architecture (Library, KRVIA), some research papers presented in the annual lecture series (2000-2001) at Kamla Raheja Vidyanidhi Institute for Architecture and Environmental Studies (Mumbai), Ph.D. thesis from ShodhGanga (INFLIBNET) and various journal articles from journals and databases of many publishers. These are the sources from where related literature was collected.

This research study aimed to examine the process of collection management in architecture college libraries in Maharashtra as well as some prominent architecture college libraries in India to investigate the technologies used by those libraries to manage and give smooth access to their resources. In this chapter, the researcher presents reviews of literature related to library collection management from India as well as from other countries.

The literature on library collection Management was divided into the following categories:

- Library collection management
- Implementation of IT in collection management
- Collection management in architecture college libraries.

2.2 Library Collection Management

Kaur (2014) presented in his article that to manage a library collection, the first and the most important thing that needs to be done is the classification and cataloguing of library resources that help the library users and library staff locate and identify resources without any hindrance and interruption. Apart from shelving in the right as well as correct order, a library must take the initiative to show and display their resources in different shelving techniques to attract the user's interest. For example, bookshelves, magazine stands, newspaper displays, wall mount displays, bookcases, DVD displays, bookends, book easels and brochure displays etc.

The author also said that eliminating library materials from time to time is essential to manage the collection. The library materials that are obsolete, outdated, damaged, poor physical condition or inconsistent with the present selection policy criteria must be weeded out to help library users access rationalizing, updated and useful resources. The librarian must routinely and regularly access the collection and remove unnecessary, unrelated parts of the library's collection.

Sheeja et al., (2013) published the article titled, 'Collection and Assets Management: One University Library's Journey to the Future'. The article presents the problems and prospects of collection and assets management of the University of Cochin University of Science and Technology. The study found that the management of academic library collection and assets is a challenging task in this digital era. Library collection management must include tasks like a collection of all kinds of resources, selection of materials in different formats and evaluation of its significance and uses are indispensable. The process must be taking place from time to time.

Schonfeld (2011) stated in his article on Ithaka S+R's Regular faculty survey that three-quarter of faculty members have agreed with the proposal of replacing print journals with e-journals. Ithaka S+R is a USA based research site which researches to track the changes in research, teaching and learning practices of faculty members of higher education since 2000. He also specified what to withdraw and how to preserve scholarly print journals.

Annapurna (2019) stated in his thesis that a library could collect resources as gratis from many sources. It can be alumni of the college, local vendors, such as Shri Siddhivinayak Ganapati Mandir Trust, Mumbai, which provides books as per need of streams and users of college libraries free of cost. A Library can search for local donors who can give financial support to some extent. The study also mentioned that the libraries are having slow internet facilities and could tie-up with some internet provider companies to get services on mobile for their library users. The researcher also noted adopting open-source software like KOHA for managing library collections.

Konnur et al., (2009) published a paper title 'Collaborative Repository for Academic Libraries' and explained the need for a collaborative repository among academic libraries. A collaborative repository is needed in today's libraries to save space and budget, which is considered the primary concern. It can help users to access the valuable collection of other university libraries. The administrative authorities also will be relieved from extending library infrastructure to accommodate the new collection. The report suggested starting a network within a few states where many users do not use old libraries with good number collection. The policy and guidelines must be prepared beforehand to strengthen the network system. Guidelines must be cleared in terms of the roles of the participating libraries, which are agreeable and feasible to all the participating libraries. The author also suggested that networks may be created in zonal bases-such as North, South, West and East and Central.

In conclusion, the study mentioned that by creating collaborative repositories, it becomes possible to preserve and convey historical and scientific information to a large community of users. Librarians must think about serving users with resources available beyond their libraries along with their in-house collection. An academic library plays a vital role in knowledge management. Knowledge is the most significant resource in today's world, and hence, libraries are expected to manage and disseminate in a well-structured manner.

Alasdair (1999) stated in his article 'AHEAD OF THE GAME: DEVELOPING ACADEMIC LIBRARY STAFF FOR THE 21ST CENTURY' that ''A library is an investment in humanity in its progress and its struggles and its traditions''. To

facilitate improvement in humanities, libraries must evaluate and manage their resources to provide brilliant and maximum information to determined users. To manage library collection, library staff play a significant role and hence, they need to update and train themselves continuously, and without human resources, the library would become disordered. The article stated for spending a little porting of the annual budget for human resource development. The article gave an example of British Library organizations like the Standing Conference of National and University Libraries (SCONUL) who have started conducting seminars and development courses for Directors of libraries.

Demas and Miller (2012) explained in their article about a plan for library collection management in a collaborative context. The collaborative plan was for a library's collection management in a shared base with other local libraries for print and digital resources, which can be a cost-effective system. The authors said that collection analysis is a vital part of preparing a collection management policy. It was mentioned that libraries must compare library collections with local libraries to identify duplicity and get the benefits of a consortia-based subscription.

Agee (2005) stated that collection evaluation is an important part of collection development. The author emphasized three approaches: user-centered evaluation, physical assessment and assessment of specific subject support. It was mentioned that these three approaches may not be outfit for all the libraries but emphasized to give an understanding to librarians about the importance of collection evaluation. The expert articulated that collection development intends to create a library collection that supplies information need including support of specific interest subject.

Genoni (2004) mentioned that content development in an institutional repository is a crucial task for a librarian. It was suggested that a librarian or archivist must apply some proper procedure and skills associated with collection management. The author also mentioned that the content of an institutional repository must be framed according to the institutional requirement. The author elaborated that there are decent numbers procedure and standard to structure the contents of an institutional repository (IR). Such as:

- Negotiating content priorities with users,
- As per the content description and definition priorities,
- Selection as per the performance of the collection,
- Preferences on access frequency and
- Managing conservation and preservation.

Ghezzi & Zhao (2014) expressed in Dartmouth college library collection development and management policy that it is necessary to regularly assess and review library collection and resources and confirm that library resources are actively using by users. The policy draft also mentioned that the Dartmouth library ensures holding the intellectual content of all materials during their lifecycle and confirmed preservation and long-term access to resources in all formats. The policy reveals proper storage and housing facilities for their collections. Apart from the mentioned points, the plan also emphasizes training staff and user education for appropriate handling, binding and treatment of library resources to increase the lifetime of the original form.

Kumar (2013) articulated in his book chapter that old documents such as books, manuscripts, thesis, painting, drawings etc. are vibrant and valuable resources for any library. A librarian uses various methods to maintain, preserve and conserve all those resources, either by physical conservation and preservation or by other means such as reprography, microfilm, and microfiche or in digital format. These kinds of old, valuable, precious resources can be used virtually without touching or handling to aid maintenance.

Varalakshmi (2013) specified in her study that information professionals have some important responsibility of managing their resources to serve their end-users in a better way. They must understand the needs of the users and attempt and endeavour to meet them. Also, must organise and manage print and digital collections, offer training and guidance, provide network support to the users. It is possible only through proper education and training imparting to librarians or information managers and updating with the change in the information environment.

Jenkins (1999) presented that the concept of collection management is frequently distinguished between two sections, i.e. collection development (including acquisition

policy and selection procedures) and material management of acquired documents (including weeding and storage). He also recommended engaging college students in operational works for managing the library and its collections to get a better result.

Reddy & Chandra (2013) mentioned in their book that information management and the development of collection could be a significant contribution to the achievement of organizational and institutional goals. She said that information management and its development is the processes that include information products, information services, information flow, and information used in the organization and association is the useful measurement. These processes of information management can impact any organization to meet its goal in a better and faster way.

Saarti and Vattulainen (2013) expressed and stressed the need for collection management through digital books, which were started in the early 1990s and is still ongoing. The system seems destined to be in both print and digital culture in future. They also indicate and mention that the international library community has started framing their databases to give access to print materials that are now traditional and heritage. They suggested that the library must take the initiative to provide open access to materials that are out of copyright and print in the market.

Rao (1998) said in his article that the basic elements of information management include accessing, evaluating, managing, organizing, filtering and distributing information according to the user's need. Information management includes merging of the internal and external information of the institution and makes it useful resources for users, and gives smooth access through IT platforms. He also mentioned that libraries and IT experts of the institution must work together to manage the information of the organization.

Khan & Khan (2010) have done a comparative study on the practice of collection development in the Maulana Azad Library of Aligarh Muslim University (AMU) and the Central Library of Delhi University (DU). The study included library user's needs, evaluation of current library collections, analysis and storage of collected items with the intention of sharing resources. The article also stated that there are two structures of collection development, i.e. Central library collection responsibilities are with a

central library, and decentralized means the department library's collection development responsibility must be with the department library. Both the libraries have proprietary software for automation, and they have resource sharing facilities with other libraries through DELNET and INFLIBNET.

Chigbu & Idoko (2013) elaborated in their article that a librarian can play a vital role to develop economic growth. Nigeria planned to become one of the top 20 economies of the world with the vision of a governmental policy named 20-20-20. It was found that the concept of 20-20-20 was knowledge-driven. After the investigation, it was found that libraries and librarians are playing an invaluable role in identifying, managing and generating available knowledge assets.

Sanap (2019) recommended in his Ph.D. thesis titled 'Re-Engineering of College Library Services: A Study of Arts, Commerce and Science College Libraries of Maharashtra' that aided colleges needs to re-engineer their library services to meet their users' need. A library website is an essential service to give information about the library as well as links to open-source resources. He also recommended having a collection of qualitative and economic resources in all formats, along with free resources. Modern technology must be implemented in libraries to update users instantly. Modern technology like high-speed internet, Wi-fi facility, firewall system, scanner, UPS and proxy server are the essential parts which need to be implemented in all libraries. The study also stated that creating an institutional repository and library networking is also a significant part of making a modern library. Apart from the implementation of modern technology in a library, librarians must update their professional skills and knowledge from time to time.

Gregroy (2011) revealed in his findings that there is a continuous change in the format of library materials collect and use. Still, the entire process to select and evaluate library resources persists the same. The author also mentioned that the cooperation and drive behind planning, emerging, licensing, procuring, and managing collections are both physical and virtual, and it is regularly altering. The author elaborated how open access, web 2.0 and globalization have influenced library collection systems. This system has changed how and what a library owns and gives access to users.

Gregory also stated that a library needs to develop a marketing system to use the collection. He explained that there are various types of marketing processes and platforms which can be developed from time to time. The researcher also emphasized the participation of libraries in the acquisition of all kinds of library resources which can save money and efforts. The research report stated that exchange programmes with local, national and international could be encouraged to share resources among community libraries. At last, it was suggested that a librarian must continuously update his /her knowledge by reading newly published library literature, higher education and learning from peer groups to give ultimate satisfaction to their users.

2.3 Use of ICT in Collection Management

Bodi (2005) predict one of the most significant challenges facing collection management in near the future is the linguistic, political and financial problem of dealing with the print and non-print digital environment. The author said that libraries must invest in preparation for managing print and non-print digital library collection.

Lewis (2007) suggests a digital collection management strategy for academic libraries in the 21st century. The author stated that modern digital technology has changed the scenario of traditional libraries and libraries are in a dilemma to structure libraries due to abandonly available facilities like the internet, ICT tools and web-based content. The article suggested five components as strategies for academic libraries. They are:

- Migration from print to electronic resources,
- Withdraw irrelevant resources and
- Reshape library space
- Transpose information tools, resources and expertise
- Shifting from purchase materials to the curation of content.

Kavitha (2009) stated in her article that how technology has changed the system of acquisition, repossession and storage of library resources. She also portrayed how a librarian's role changed due to technology development. According to her, digital resources are affecting collection development and management policy and emphasis on two areas, i.e. change in the searching system and fulfilling user's needs. Hence,

the library collection and management policy should include or update to acquire, preserve and disseminate these digital resources in a better way.

Maalempati et al. (2011) stated in their patent publication on 'Management of Space in Shared Libraries' that computer system gets crashed when the storage space is not maintained or used correctly. The invention was a computer process which offered sufficient shared space in shared libraries for storing process data. The process is- when a specific computer loads process objects into the shared space and the system fails due to insufficient space in that particular area, then the system automatically creates a separate space within the shared space with a new name for that particular data without user's interaction.

Vasishta (2013) said that implementing information technology (IT) can enhance the library and librarians. Adopting IT in the library became necessary to survive in the present era. The author also mentioned that only implementing IT in the library is not enough until it becomes familiar to the users. User awareness is essential, which can be initiated through the Library Homepage, E-Mail, Blogs, Really Simple Syndication (RSS) Feed, E-brochures, Online Public Access Catalogues (OPAC), Electronic Bulletin Board, E-journal Alerting Service, Web-Casting, Virtual Exhibitions, Webinars etc.

Adesoji et al. (2013) has strained to articulate how the development of Information and Communication Technology can enhance the collection development of school libraries in Nigeria. The development of information and communication technology (ICT) and its use in libraries became necessary. It should be implemented to serve library users to fulfil their needs. It can enhance library users' learning capabilities and expand understanding of the scientific concept, improve problem-solving skills, help to hypothesize scientific relationships and help to select better resources for the library collection.

Prabu & Sridhar (2012) emphasized the advent of computer networking implementation in libraries and information infrastructures in their article. The survey included the skills of library automation and networking, institutional repository and web technology. Their survey found the digital divide gap among the information

professionals in the college libraries affiliated with Bharathidasan University. The report stated that the level of ICT skills is high by 43% of librarians of autonomous colleges and 20% of librarians of non-autonomous colleges. It is also presented in the surveyed report that content management and learning management systems were getting the least importance.

Koganuramath & Angadi (2010**)** articulated that digitization of scholarly information is a vital part of a digital library. It facilitates library users to get coherent access, recognize and utilize some additional information and knowledge. The article expanded the digitization process followed in two projects, where the institutional two kinds of publications were digitized to streamline the research sector in the social science area. For example, running OCR and providing navigation facilities on CD etc.

Kulhavy et al., (2017) reviewed the current status of digitization and preservation of natural resources for a North American University. They stated that digital collection must include ancillary materials along with published resources. The authors reviewed the collected resources for digitization, i.e. faculty publications, research projects, e-books, journals, galleries and e-thesis etc. and recommended including community participation in the process of digitization and access. They also recommended that a digital library can be open access for the public to help policymakers, educators, community groups, citizens and other scientists.

Verna (2017) reviewed digital libraries' role in supporting e-learning and observed that digital libraries have great potential and are leaning to support the teaching and learning system. Digital libraries enable users to access information from anywhere at any time. The report stated that the education sector is unable to take the full advantages of digital libraries due to legal and technical barriers. Still, many educational institutes are not able to afford the cost of digital resources offered by many publishers. The study also found that digital libraries are mostly used by national libraries to preserve national heritage rather than supporting academic libraries. Very few digital libraries were created with enough educational content as an integral part of their website to enhance the teaching and learning system. A digital

library supposed to support the teachers and students by providing teaching and learning aids.

Khan and Sudharani (2013) have explained in their study that a digital environment is an ideal approach, and library digitization has become the single most powerful tool. It does not substitute the library, but it can enhance the library for better service. Today society is growing fast, and many user-friendly systems have been launched on the web. At last, the authors suggested having technically sound staff in the library to handle technology.

Dhandar (2013) mentioned that introduction of CD-ROM databases in the academic library has declined in the request for online searches and considerably increased in the request for the use of databases. Many CD-ROM publishers develop CAI online help and videotapes to accompany their products. These teaching tools can be used flexibly by Librarians without spending significant time on developing in-house approaches.

Kumar (2013) stated in his chapter that according to the National Institute of Standard and Technology, DVD or CD could preserve data for 75 to 200 years if it is properly handled and stored. The author also writes about managing e-resources subscriptions through consortia which help libraries to give maximum access at a lower cost.

Lobo & Tikam (2013) explained in their book chapter that there are three different aspects of preservation for library e-resources. They are medium preservation, technology and intellectual preservation.

- Medium preservations are print media, magnetic media and optical media preservation.
- Technology preservations are like HTML, XML and PDF format.
- Intellectual preservation deals with the integrity and authenticity of the information as originally recorded.

Gkoumas and Lazarinis (2015) presented in their article that implementing an Open Source Digital Library software is a handy tool to manage today's library efficiently.

They expressed that these tools are very important, especially in an academic library. The great features of this software are that they are cost-effective, and the source code is freely available. It offers advanced operations and supports various metadata and customization facilities. They have compared thirteen digital libraries and collection management software. They are Greenstone, DSpace, Ganesh, Erpint and Fedora etc. for the digital library and Koha, Evergreen, NewGenLib and OPALS etc. for collection management (automation). They also mentioned that while implementing open-source software (OSS), one might face language and functional problems, which can be solved easily. Almost all OSS offer a multi-languages facility and different features. Technology experts must be involved to select accurate software according to user needs.

Rao et al., (2013) presented in their chapter that every library must attempt to provide for at least one open access (OA) journal within their institution.

Jain (2013) evaluated four open-source digital library (DL) software in her book chapter. Those are DSpace, EPrints, GreenStone and Fedora. The author said that it is impossible to specify any single digital library software as an ultimate solution for every library. Each system has its advantages and disadvantages. The needs for each institution vary and depend on its objectives, the number of collections, nature of materials, frequency of update, the format of resources and the time limit for the development of a digital library. She end-up with few guidelines, i.e.

1) If an institution wants to digitize their research papers and dissertations/ thesis of their faculty and students, then DSpace is the perfect software for DL.
2) If any institution needs one type of digital collection in a simple form within a stringent time limit, then EPrint is the preferable software,
3) If any institution wants to give access on a single platform for various e-resources collected from different sources like libraries, archive and museums can choose the open-source software Fedora because it has a multiple modules facility,
4) If any institution wants to archive only ebooks with better customization, then GreenStone is the most helpful software.

Pencheva & Atanasov (2009) said that the purpose of collection/resources management is to enable the telecommunication network, which gives information according to user's demand with maximum satisfaction as well as the operators to enable them to provide these services at the lowest possible cost. Managing resources as open access with the help of Internet protocol multimedia networks is a very useful technique to serve library users in a better way. Open-service access is defined as a service architecture for delivering value-added information in third-generation (3G) mobile networks. He also mentioned that network basis resources are very helpful as they are available at anytime and anywhere.

Pal (2013) presented in his chapter that electronic resources management deals with various aspects such as acquisition, selection, licensing, troubleshooting, the protection of legal rights and promotional activities. The various pricing models, licensing terms and conditions, and the issues mentioned above make e-resources management very complicated. Hence a library professional needs technology proficiency, skill and knowledge to handle these issues.

Paul & Devi (2014) explored in their article on workforce training and the attitude of library professionals towards training in the North East. Due to the changing scenario of the library with the application of information and communication technology (ICT) and to meet the dynamic needs of the users, the library professionals are required to increase their skills and knowledge through training programmes. This study reveals that most library professionals need to change their attitude to participate in training programmes conducted by different organizations.

Bod (2011) in his presentation at a NISO webinar, mentioned the three S's of Electronic Resource Management, i.e. Systems, Standards, & Subscriptions. The author also presented in his PPT about some important points which need to be given importance by a librarian while managing e-resources which are - capturing data, license details, access and registration of data, order activation, package renewal, holding list, updating ERM system, feeding other systems and influencing processes.

Chakravarthy & Reddy (2013) stated in their chapter that today's library is not only considered as a storehouse but known as a knowledge management centre or

information provider. Modern libraries started adopting new technologies to manage their collection in the form of automation, digitization, online services and advanced applications such as android, cloud computing, library 2.0, Rich Site Summary (RSS), Short Message Service (SMS) and web 2.0 etc. They said that implementing these advanced technologies in the library will help users to get information at their fingertips and also will save time and money for the users.

Madhusudhan (2013) has discussed in his article about digital preservation issues related to technology, strategy, archival and legal. The author said that librarians must become aware of issues that occur in a digital preservation system. In this modern world, more than 200 digital storage mediums have been invented, such as magnetic tape, CD-ROM, external hard disk etc. Selecting and implementing a preservation format affects the access and life of library resources. Libraries must implement preservation formats along with policies and procedures to ensure the quality and durability of information. The author focused on the following issues:

- Technical issues like obsolescence of hardware, computer viruses, computer crimes, disappearing information etc. need to be resolved from time to time.
- Strategic issues such as the identification of what needs to be preserved, economic issues, the lack of standards, management of the process etc. needs to be taken care of by an archivist or information manager.
- Archival issues as selection and appraisal, conceptual issues, authenticity and reliability etc. also must be dealt with by the information manager.
- Legal issues such as when a digital record migrates from one format to another format, the previous relationship that exists in the original format becomes obsolete. Hence an archivist or librarian must be concerned about the authenticity of a digital record while migrating.

The author also added at the end of his article that information preservers or librarians must do constant research on new technology and digital storage formats that appear in society from time to time to meet the ultimate needs of the users.

Rao & Chandrasekhara (2013) elaborated in their chapter about the importance of institutional repository (IR) and selecting open-source software (SSS) for building IR.

According to them, an institution must take an interest in creating their IR for their scholarly publications. The advantages of IR are that it can be accessed from anywhere any time through the internet and can be used for a multipurpose archive such as staff publications, institutional reports, working papers, e-thesis/ dissertations etc., which are also important for research. It also encourages college students towards research and publication. Rao and his friend mentioned that there is several open-source software in the market. They identified twenty-two open-source software to create IR and elaborated on their originalities and usefulness. For example- ARNO, Alfresco, Bepress, DigiTool, DSpace, E-print, FEDORA, Ganesha Digital Library etc. They mention that while selecting open-source software for institutional IR, some important issues need to be considered, such as what does the institution want to do, what the institution will be able to do with its contents in future, how it will fit with the current institution's library system and what the library users need etc. At last, they also state that one must learn from the experience of other institutions that have already implemented the open-source software for their IR.

Devi (2015) expressed in her article that digital preservation needs appropriate adoption of technology and a long-term strategy to manage resources. Librarians are still struggling to settle with technologies which are globally accepted, but due to the continual development of IT facilities, archivists are seeking out the best path for a long term of digital resources. Digital preservation and archives are dependent on many people like authors, libraries, publishers, distributors, archives centers, IT suppliers, and legal depositors. Devi also mentions that archivists or librarians must take care of the safety, durability and accessibility of the collection, and the library should not be lest depend on vendors and external service providers. Reasonable efforts must be taken to implement legal deposit law, which helps to archive for a longer-term free of hassles.

Naika and Kanamadi (2016) mentioned in their article about the advantages of electronic thesis and dissertation at IIT Bombay. It gives full access to a centralized database and improves the visibility of research with no cost for the university as well as students. The most important thing is that they are using plagiarism software to detect the duplication of thesis and dissertations, which help the universities to produce quality research reports.

Patnaik and Shelley (2016) stated in their article that information and computer technology (ICT) provide the opportunity to store, organize and disseminate information. They also mention that an institutional repository (IR) can be a better way to archive and get access to institutional scholarly information over a more extended period. It has the potential to bring together all institutional outputs of research in a single platform and give constant access to the users.

Shivarama and Kumari (2016) expressed in their article that digital networking, technology, cooperation and collaboration with the digital repositories, digital archive etc. offer a great opportunity to the researchers to unlock the vast wealth of information resources.

Casserly (2008) stated in her article that collection managers must update from time to time with collection growth, prices and expenditures and analyses these data, which can be helpful for collection managers to advocate for a new budget and reduce unnecessary budgets. The author also mentioned that the manager must always focus on effectiveness, outcomes and impact, which may lead to improving the system from time to time with changing formats of the latest resources.

Walters (2013) suggested in his article that there are two important points which need to be taken care of while managing E-books in the academic library. First, librarians must update themselves with the latest information about technology, economics and legal context in which information is produced, developed, marketed and used. Secondly, E-books purchases must be based on substantial evidence of costs and benefits. He also mentioned that librarians must be ready to work with publishers and consortia to give a better form of e-books licenses and platform to the benefit of libraries and users.

Shivarama & Dawar (2016) have explained in their article that the security of digital information is paramount in the academic library. It is a vital part of any e-resource management. They expressed that access to information in the academic libraries is open for diverse sets of users, which makes it a challenge to manage information. To protect all those valuable resources, the library must have legally protected

information security policies, measures and regular audits for information security, which can secure the works from unfair use.

Teimtinakrit (2019) specified in his article about risk management of the digital library. He stated that the digital library needs to develop a security system to prevent threats in operating digital libraries, which are called risk management plans. Digital library websites must develop security systems by applying various methods. Such as user ID and password, voice identification, fingerprint scan and One Time Password (OTP) for mobile number verification etc. for the identification of users and improving accessibility.

Wen (2005) expressed that Academic libraries are pinched by both-side, i.e. limited budgets and increased demand by faculty members and students. Hence knowledge management became a must in academic libraries. Knowledge management can be implemented in academic libraries by utilizing the existing human resources and technology. Due to the complicated nature of knowledge and its management, it is often difficult to estimate the value of knowledge management. However, besides having a variety of knowledge management products in the market, none of them is well suited for libraries nor flexible enough to cope with the upgrade and maintenance cost. Hence, Libraries should utilize the current management structure and technology to implement knowledge management.

Nimnoi (2019) articulated that a written policy can be helpful to develop library resources to start a collaborative network between libraries to share resources among them. This policy needs to be established systematically and continuously to ensure end-users' needs. He also mentioned that in this information era, resources are diverse in content and format; hence it became difficult for libraries to procure all these resources with their limited budget. Therefore, networking between libraries is important to share their resources with a minimum expense. The Mahasarakham University, Thailand has developed a written policy to develop the 'Provincial University Library Network' (PULINET) under which 20 university libraries share their resources.

Jalagar (2019) elaborated in his article that ICT has brought the prosperous capability of handling data. ICT has become an unavoidable necessity for libraries to give ultimate satisfaction to their end-users. He also mentioned that the effect of social media networks in libraries is increasing day by day. Library users also utilize social media to access and share resources among their community. Examples are- Facebook, WhatsApp, Telegram, Instagram, Blog, Twitter and YouTube etc.

Vikramsinh & Koganuramath (2019) stated in their article that the open-source CMS 'Drupal' could be a great option to create a library website to host any library. It does not require much knowledge about HTML pages and HTML tags.

Scott (1984) specifically emphasized the archival management process. The author mentioned in his book that the archival process and management must be carried out in coordination with other community institutional libraries.

Nwosu et al., (2013) surveyed two university libraries on managing electronic information and improving library services. The study found that despite having a sizable budget, the University libraries are facing difficulties to cope with the incessant changes in e-resources. The major problems associated with managing e-resources are maintenance of computers, irregular power supply, low bandwidth and little awareness of the benefits of e-resources. They suggested that librarians must update themselves by continuing engagement with training, workshops, research and internet updates. Also, the authorities should encourage librarians and users to excel their knowledge of technology as well as library services. The librarians must be encouraged to form consortia to facilitate access to scholarly publications.

Uwesh (2013) stated in his article, electronic resources are growing very fast. The author suggested that aggregate in a static webpage of sites and portals according to subjects or users' needs can be helpful.

Patel (2013) elaborated in his article that nowadays, all kinds of libraries started joining for the consortia-based subscription. Consortia systems can get a 'Big Deal' with many additional titles with a little extra cost which plays a significant role in enhancing the research sector. The author also mentioned some advantages of e-journals consortia, such as consortia not only provide access to maximum e-journals at the lowest cost but also help to give library services like CAS and SDI.

Nagalakshmi (2011) elaborated about RFID (Radio Frequency Identification). It's implementation, issues and best practice in an academic library. RFID can be used for many services in a library. Such as automation, stock verification, security purpose, theft detection etc. The specialty of this technology is the circulation of library resources without staff intervention.

Sheeja et al. (2015) articulated on open access and open source software and stated that open access systems became a priority for an educational institute in this modern era. It can include open access publishing and self-archiving. The article emphasized on self-archiving where several grey literatures can be made available to enhance the research sector. Self-archiving facilities can be possible by creating a digital repository. They also said that open access software provides several options to users. Open-source software can be downloaded from the respective websites or sourceforge.net and can be installed and customized by the institution or vendors. The authors mentioned the priority of DSpace and Fedora software worldwide. In conclusion, the authors recommended that the open access movement is a vital part of an institute as it can provide an opportunity to give access to more users and software platforms are playing a significant role in creating this open access system.

Cherukodan (2015) has stated in his thesis title 'Measuring the Maturity of Open Source Software for Digital Libraries: A Case Study of DSpace' and described in his article about the features of the software. Most of the modules of DSpace are developed in Java programming language, and the software is available in binary and source code forms. DSpace is the most popular and widely used digital library software in the world. It can be installed in various operating systems. It is the software which comes up with many new features with every newly released version. DSpace is composed of three layers and they are application layer, business layer and storage layer. The application layer helps to communicate with the world; the business layer offers authorization and workflow and the storage layer deals with the storage of metadata and content.

Kaur & Kathuria (2016) mentioned in their study the use of e-resources and their purpose. The study found that the e-resources are popular because of easy access, fast download and searching, and became an integral part of their library collection. The authors also mentioned that users are aware of the use of consortia and tops in the

usage compared to other resources. Though the e-resources are favourable for users, they still prefer to have print and electronic resources. Therefore, the study recommended conducting training for staff, mandatory user education programme, consortia services, advocacy of various e-resources, infrastructural needs and use of web2.0 services.

Ambika and Khaiser (2016) explored the process of digital preservation in their article. The policy ensured the usability, authenticity and accessibility of digitized resources for a long time. It also mentioned that technology preservation means software and hardware to store data. The technology must be refreshed or updated from time to time.

Nwokedi (2020) Presented in his article that libraries and librarians are the custodians of knowledge and hence, libraries must be soundly subsidized, and the librarians should be skilled well in ICTs. He also suggested that the government must take the initiative to inform the masses, especially in rural areas. The paper also accomplished that as a knowledge custodian, librarians must play a pivotal role to include digital features and make libraries sustainable in the future.

Patel (2018) elaborated in his article that ICT has influenced several factors in libraries. Such as:

- ICT implementation became necessary in libraries due to the tremendous information explosion, and most of the resources are present in e-version.
- Acquiring all information is impossible for a library and ICT can be the solution for resource sharing among libraries to get rid of the problem.
- ICT can help to provide better and faster service and can improve the efficiency of library staff.
- Enactment of barcode and RFID can increase the performance in services like circulation and stock verification.
- ICT can save time in literature search by implementing a standard browsing engine.
- ICT also helps to provide a faster mood for anticipatory services like translation, bulletin board and employment alert etc. than the manual method.

Cherukodan et al. (2017) has studied and observed how the role of scholarly communication influence in an institutional ranking. The study found that scholarly communication is the most important factor which affects the ranking status of an institute. All ranking agencies emphasize the number of publications and number of citations. The article recommended that a librarian can take the initiative to conduct workshops and seminars on research tools and academic publications. Orientation programmes on databases and e-journals can be conducted to introduce e-resources to users. It was also mentioned that librarians also could help authors by arranging a meeting or gathering with publishers.

Shah & Bano (2020) presented the article on 'Smart Library'. They elaborated the smart library as a combination of hardware and software with numerous facilities for searching and disseminating information to virtual users. The smart library provides information in many devices with various facilities like computer added services, hypertext services, personalized and cross-media services etc. which make the library energetic and more brilliant. The authors emphasized the smart library's features are Cloud Computing, RFID, Magic Mirror, Pressure pad sensor services, Institutional repository, Library 2.0 and Micrographic etc.

Dayaganesha and Sampathkumar (2020) researched to know the various problems faced by learners and teachers while using library print and e-resources. The research found that 81.02% of library users, including students and faculty members, used print media and 76.4% of users used e-versions. Most of the users visit the library to read print media resources. The result of the research had indicated that computer literacy needed to make use of e-resources. The author felt the need to include a computer literacy programme to make the users understand the various browsing skills, and it will be beneficial if the Institute augments the bandwidth to increase the internet speed.

Dhanasekaran (2020) stated that Social Networking Sites (SNS) play a vibrant role in sharing information & knowledge in this modern era. The SNS influences are tremendous, and learners are taking advantage of sharing information within a second. Social media like Facebook, WhatsApp, LinkedIn etc. used by students and faculty members. Libraries also can use social media to promote and provide other services

through the blog, LinkedIn, Twitter, YouTube, flicker and SlideShare etc. The study found that students exchange information quickly through SNS.

National Assessment and Accreditation Council (NAAC) (2020) mentioned in their latest manual that Institute and library must implement ICT for regular activities. Having adequate infrastructure in a library is not enough until and unless the infrastructures are not utilizing optimally and not maintained or updated from time to time. According to the NAAC 4.2 criteria, 'Library as a Learning Resources', the library must have e-journals, e-books along with the subscription to 'e-Shodhsindhu' and providing remote access to e-resources.

ALA guidelines (2006) framed some standard strategies for librarians to manage library collection. The guidelines stated about how library collection needs to be maintained. It also specified that ALA obtains coordination from other national and international organizations to prepare those guidelines. Following are some of the organizations, and they are concerned:

- National Information Standard Organization (NISO): The organization addresses the library issues on the format of information transfer, publication format and library equipment for information communication. For example, Z39.7 for information facilities, Z39.41 for printed information on the spine, Z39.50 for information retrieval and Z39.88 for open URL framework etc.

- International Organization for Standard (ISO): It is involved in preparing international standards for library and information structure. For example, ANSI/NISO/ISO 12083 is for electronic manuscript preparation and markup.

Roger Williams University Library Collection Management Policy (2015) the purpose of the policy was to frame a planning document on how the library can organize and disseminate print and digital resources, and it is revised from time to time whenever needed. The policy included replacing missing books if it is relevant to the current content and available in the market. Worn books are reviewed for repair or purchase, depending on the utility of the document. De-selection of documents can take place whenever the curriculum gets changed. The policy also stated that the archivist is responsible for selecting and managing the archive.

Library of Congress Collection Policy Guidelines (2008) documented for retention of e-resources:

- E-resources created by the library
- E-resources which are not available in any other format must be retained.
- E-resources of print materials
- Exclusive e-resources collected by the library

Apart from the points mentioned above, the policy also included the process of selection of a computer programme. Before selecting to acquire these, the library will inquire about all the features of the software and hardware.

Verna (2016) mentioned in her article, the title "Use of Online databases in Central Science Library, University of Delhi: A Survey" that most of the library users are aware and use online databases to enhance their research and knowledge. The study found that lacking enough information about the databases subscribed by the university was the major problem. The study also revealed that 80% of library users were satisfied with the infrastructures the Central Science Library provided to access online databases. The database "ScienceDirect' by Springer is accessed by 97.22% of postgraduate students which shows the usefulness of the database. It was also mentioned that more than 80% of users found relevant information in online databases. Students are well versed in archival data and the importance of the impact factor of online journals. After analysis of data, the researcher suggested conducting hands-on training in a library orientation programme, which can be beneficial for users to access online databases without wasting much time. Advanced search facilities must be introduced through an orientation programme to retrieve more relevant documents. The survey report also suggested that there should be a survey on users from time to time to know their strength in searching skills.

As a result, after evaluating various online databases from a user's point of view, it was found that users are skilled enough to browse online resources and have knowledge about databases like 'Web of Science', 'IEEE Xplore', 'ScienceDirect' etc. and 'ScienceDirect' database were found to be a more accessible database for research sectors.

2.4 Collection Management in Architecture College Libraries

Brown (2006) mentioned that if a librarian builds their collections and serves with the consequences of ongoing changes, it can strengthen the library services. He also mentioned that it is necessary to develop expertise on scholarly communication and digital repositories which are currently missing in most architecture college libraries. In the 21st century, librarians explore the developing area in architecture and library science and build awareness among the patrons as per their priorities. Librarian also translates the needs and expectations of the users into vital and robust library services.

Erbil (2013) explains in his article, knowledge management in architectural design firms in Turkey. The author mentioned that knowledge management (KM) needs time, financial investment and experts in this area. The article indicated that the architectural design firms of Turkey utilize sufficient standards of technology, but they are not able to use it effectively. The reason behind it is insufficient knowledge of information technologies and the fact that full-time employees (architects) are unstable due to the project size.

Aubin & Brown (2008) presented that the library must create an experience to interact between library users and library materials, library staff and between library patrons. They have suggested some guidelines to create an environment to attract library patrons. Some of them are:

- Installed a Plasma screen near the entrance to highlight and announce upcoming events, display students work, promote new arrivals and services etc.
- Place a dry board on a library table where library users can use it for their work, like writing notes, drawing or announcements. Library staff never erase the board so that the next users may find help or get inspired by looking at the activities of their peer groups.
- New arrivals display near the service area to attract users. Display of DVDs which can increase the circulation of those materials.
- Exhibition of selected architectural works along with student's works where people can interact with presenters.
- Create a place to display faculty art annually and display some books which were lying unused.

- Library galleries can be used to display the student's best works to impart knowledge to their peer groups.
- Installed computers and space for collaborative works. Provided furniture for interaction.
- Installed a student's art piece, which was donated to the library to create uniqueness.

The library was also planning to provide chairs with moving facilities, which can fulfil the patrons changing requirements.

Waithaka (2013) found after the investigation that maximum students and the public use email daily to communicate for all purposes. The article stated that though students are competent in internet use, they are not well versed in search skills and strategies. It indicates that initiating information literacy programmes are necessary for any library.

Ramanjineya & Keshave (2019) articulated in their article title "Information Seeking Behaviour of Research Scholar of Acharya N G Ranga Agricultural University: A Study" about user's behaviour for seeking information. They stated that faculty members and research scholars mostly search for e-journals, databases, social networking, thesis and dissertation for their research. The users also expressed that the source of information is a display of library resources, social media, library websites and forums as well as help from library staff. Acharya University library users also opined that library working hours is not enough for seeking the correct amount of information. It can be outlined from the article that libraries must subscribe to scholarly e-journals and databases to give remote access to library users.

Jones et al. (2000) mentioned in their article that library patrons were very keen to have remote access to library catalogues, which helped them to save time. Online chat was suggested by students to solve reference questions instantly. Students also expressed positivity about interlibrary loan, hold and recalls library resources as useful facilities.

2.5 Summary

After reviewing several articles, it was realized that library collection management is not only contingent on the library or librarians but should also encourage the authority of an Institute to play a pivotal role to maintain a standard system. It was also comprehended that ICT is the emerging trend that can be implemented for all kinds of services in any library to give ultimate satisfaction to the end-users. The reviewed articles also specify that networking and resource sharing programmes are encouraged and implemented by numerous libraries of other disciplines to manage their inadequate funds allocated to acquire maximum resources.

In connection to the library collection management, adopting ICT tools and initiative of open access facilities were focused on by many experts. Many librarians felt after their study to manage a hybrid library with a combination of print and e-resources to provide better assistance to their library users.

The literature review was done in three different areas, i.e. library collection management, ICT implantation and collection management in architecture college libraries. It was found from the study that literature on collection management and implementation of ICT are available, but publications on architecture libraries are almost zero. However, hardly any references in literature were available on an analytical study of collection management in architecture college libraries. In India, to fill this lacuna in the literature, the researcher was motivated to undertake the research study. Therefore, an overview of architectural education and its libraries are elaborated in the next chapter.

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CHAPTER - III
ARCHITECTURE EDUCATION AND THEIR LIBRARIES IN INDIA: AN OVERVIEW

3.1 Introduction to Architecture

Architecture deals with the design of infrastructure necessary for society or any organization. Architecture is the expression of many ideas which help to build a systematic society. It is a branch of the combination of the knowledge of art, science, technology and humanities.

Architectural design can be outlined in various types depending on the place, time and religion. For example; Hindu, Islamic and Sikh architecture designs are different in nature.

Following are the three definitions of architecture given by prominent architects:

“Architecture is the masterly, correct and magnificent play of masses brought together in light. Our eyes are made to see forms in light; light and shade reveal these forms cubs, cones, spheres, cylinders, or pyramids are the great primary forms which light reveals to advantage; the image of these is distinct and tangible within us and without ambiguity. It is for that reason that these are beautiful forms, the most beautiful forms.” By Le Corbusier.

"Architecture is a way of seeing, thinking and questioning our world and our place in it." By Thom Mayne**.**

"Architecture is the art and science of making sure that our cities and buildings actually fit with the way we want to live our lives: the process of manifesting our society into our physical world. By Bjarke Ingels in AD Interviews.

Architecture starts with a theory and the architect always starts thinking based on his / her previous knowledge and theory available around them to develop their critical thinking skill.

The emphasis of architectural theory is on personal work rather than formalized prototypes. Many architectural books are written on individual projects and ideas.

Even architectural practice not only depends on books but also includes an on-going conversation on the subject in academics as well as in the practice world.
Architecture theory began with Marcus Vitruvius's book 'Ten Books on Architecture' written in the First Century B.C.E., which is still considered as a bible of architectural theory. Architectural theory on all practical work has been in publication since the 15th century.

3.2 History of Architecture

The Nile, Tigris and Euphrates valley (Greek) architecture are known as the initial or born stage of architecture during the time of 6000-5000 B.C. Roman architecture has given an image of the structure and decorative art in the architectural design, which leads to the civilized world. Roman decorative art can be traced back to old churches and monuments, which became centres for many tourists and archaeologists.

Architectural design started with churches and monuments, which were influenced by Roman art. In the 19th century, countries like India, China and Japan started developing architectural designs with a new perspective. The architecture of ancient times became very famous because of their decorative art and design, and it started attracting tourists to visit them. The young generation took the initiative to study those designs as archaeological students.

Architectural design can be categorized according to the time, cast, religion and place etc. for example- Buddhist, Hindu, Sikh architecture have their style of design. Hindu temple designs are based on Shastras. The Islamic architectural design developed in the 17th century which can be found in the Middle East, North Africa, Spain and India.

Following are the images of some historical architectural design



Picture 1.1 Nile Valley

Source: https://images.app.goo.gl/vkSctvYHADAGysmx9



Picture 1.2 Amarnath temple, Maharashtra (1060 A.D.)

Source: https://images.app.goo.gl/BezQ3V1m2KSHmkNY9

Architects started designing infrastructure and buildings according to people's needs and their culture. For example - Hindu temples were designed according to Shastras and with the decoration of Hindu mythological art. In the 17th century, people felt the need to be closer to nature to live in a better way. For example, construction of rail communication, cottage weaving industry was upgraded by James Hargreaves, and the spinning Jenny was initiated.

In the 18th century, people developed some of the infrastructures with a special design for a particular use. Such as the Bibliotheque Nationale library in Paris, the first public rail service between Stockton and Darlington in 1825, which led to migration of more people from Europe to America and hence, the necessity of more housing and infrastructure was developed. Similarly, in India also, migration of people from rural to urban areas took place. Hence the Indian government initiated urban development plans and started the J.J. College of Architecture to train local people in the field of architecture. By the 19th century, many Indian individuals were trained with a Bachelor of Architecture degree and became Architects to work on the urban development plan.

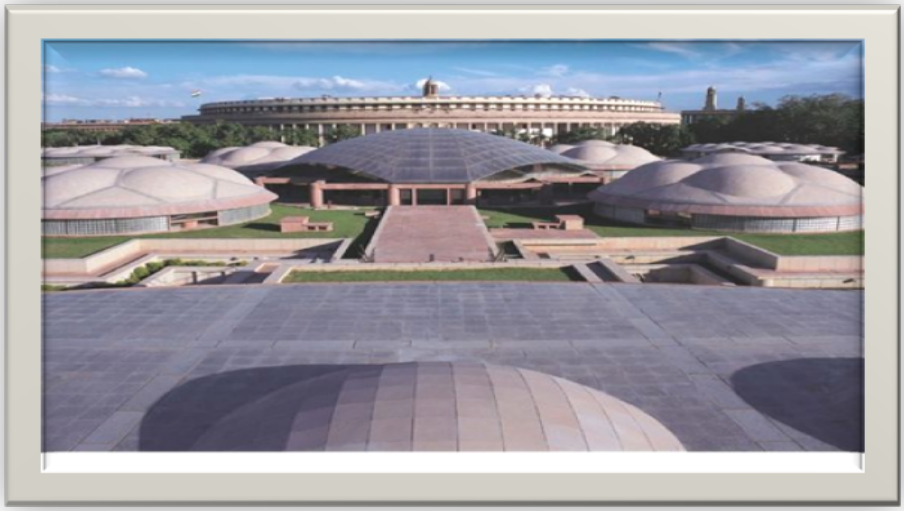
Following are the examples of some peculiar construction that took place after independence are:



Picture 1.3 Exhibition Complex Pragati Maidan

Source: https://images.app.goo.gl/vByTQrX5qVjnzDk48

Picture 1.3 is the Pragati maidan, designed by architect Raj Rawal in 1972 at Delhi. It is an exhibition complex with an area of 130 acres. It was designed in a geometrical pattern which facilitates direct sunlight and good air circulation.



Picture 1.4 Parliament Library built-in 2003 by Raj Rawal

Source: https://images.app.goo.gl/QixVwrfaj8qcUBXi6

The parliament library was built up in a modern style without the influence of Indian classical style which follows the "Beaux-Arts". It is a space of 50,000 sqm area, and the speciality of the design is dust-free and heat protecting.

3.3 Architect and Architecture

The Sanskrit word 'Stha Pati', literally means master of space. It specifies the architect who designs the space necessary for various functions. An architect creates designs and crafts a building. The old artistry culture on wood and stone is known as the history of architecture. The word 'Architect' was conceived in the 15th century, and during early of this century, the first portrayal of this traditional architecture appeared in Italy.

The legendary architect Le Corbusier mentioned in his theoretical writings, "The task of the architect: Knowledge of men, creative imagination, beauty and freedom of choice."

Architects always interact with many other professionals or experts like civil engineers, contractors, plumbing consultants, lighting consultants etc. to create better infrastructure. A wise architect engages with building or object while designing.

3.3.1 Some Prominent Architects in India and Abroad

In order to understand the architecture, let us look at some well-known architects who have marked their name in history internationally and nationally.

3.3.1.1 International

Following are some well-known architects who contributed to architectural works in the world:

i) Steven Holl

Ar. Holl was born in 1947 in Washington and graduated from the University of Washington College of Architecture and Urban Planning. He received several prestigious prizes for his innovative architectural design. He is considered one of American's most prominent architects, and the Time magazine has declared him as 'America's best architect'. Steven Holl has been appreciated for his extensive knowledge of architectural works. He designed museums, galleries, exhibition halls and many residential buildings.

The Czech Concert Hall in Ostrava is one of his iconic designs and is a concert hall with a 1,300-seating capacity.



Picture 1.5 Steven Holl's Czech Concert Hall, Ostrava

Source: https://images.app.goo.gl/9SP9kEKdqeLYC7uP6

ii) Frank Lloyd Wright (1867-1959)

Frank Lloyd was an American Architect. He created more than 1,000 projects in his 70 years of a professional lifetime. He believed in design with harmony with humanity and was famous for the creation of organic architecture.

One of his prominent projects is 'Dallas Museum Art' in 1903, America. He also invented the Prairie House style in 1893.



Picture 1.6 Prairie style house.

Source: https://in.pinterest.com/pin/513903007473463689/

iii) Mies Van der Rohe (1886- 1969)

Mies was a German-American and was also known as a modern architect. Mies exposed the form of geometric architecture and concentrated on simplicity. He was famous for his effective construction works due to the different quality and beauty of steel wood, glass and fibers used in his building. One example is The Seagram Tower in New York.

iv) Philip Johnson (1906-2005)

Architect Johnson was American born and was well known as a modern architect. He was honoured with two prestigious prizes, i.e. 'Pritzker' and 'AIA' Gold medal in 1979 and 1978 respectively. Johnson was the first recipient of the 'Pritzker Architecture Prize'. He was the founder of MoMA architectural department which has a collection of modern and contemporary art since 1932 and is the world's first architectural curatorial centre. The most notable design house was his house-made in New Canaan in 1949.



Picture 1.7 Model picture of Johnson's residence glasshouse

Source: https://images.app.goo.gl/WWUBaN9Y75p1LTFV7

v) Eero Saarinen (1910- 1961)

Saarinen was an American architect and well-known industrial designer. He completed a large number of remarkable projects in his tenure. Following are the two remarkable projects 'St. Louis's Magisterial Gateway Arch' which was built in 1947, and the TWA terminal in Washington Dulles international airport, which has the iconic design airport in the world:



Picture 1.8 St. Louis's Magisterial Gateway Arch, Missouri.

Source: https://commons.wikimedia.org/w/index.php?curid=14673204



Picture 1.9 Washington D.C., Dulles international airport.

Source: https://commons.wikimedia.org/w/index.php?curid=4307554

vi) Patrick Geddes (1854 – 1932)

He was a world-famous city planner in the time of British period. He became famous due to his work in Dublin and was invited to many countries to enhance the

infrastructure in their cities. In the year of 1914, he was invited by Lord Pentland, Governor of Madras to develop the city. In 1915 he was appointed as a town planner officer in Madras. Soon, after getting the post, he started carrying out survey work on local conditions including maps illustration, the occupational structures, population densities, rates of mortality, infant mortality which were very important reports to develop the city. He worked for fifty different cities in India like Bombay to Calcutta and from Amritsar to Madurai till 1924. His prolific influences in India were on towns, universities, zoological and botanical gardens in Delhi, Agra, Lucknow and Hyderabad. He also gave many lectures on town planning in many Indian academic institutes.

3.3.1.2 Indian

Following are some well-known architects who contributed to developing infrastructure in India:

i) Charles Mark Correa (1930 – 2015)

He was an Indian architect and worked as an urban planner in the post-independence era. He was known for the development of urban poor people. He was awarded the 'Padma Shri', 'Padma Vibhushan', and 'Royal Gold Medal' which was given by the Royal Institute of British Architect for his work. His well-known work on building projects are: 'Mahatma Gandhi Sangrahalaya' at Sabarmati Ashram, Ahmadabad, 'Jawahar Kala Kendra', National Crafts Museum and Bharat Bhavan etc.

ii) Balkrishna Vithaldas Doshi (26th August 1927)

B.V. Doshi is a well-known Indian Architect from Ahmedabad, Gujrat. He was also awarded 'Padma Shri', the prestigious international prize 'Pritzker Architecture Prize' in 2018 and on 26th January 2020 Doshi was conferred 'Padma Bhushan' award.

Doshi is one of the pioneers of modern Indian architecture who emphasized on Indian history along with contemporary design after independence. In 1955 he established his office in Ahmedabad, Gujarat and made a list of 'Must-see buildings' in Gujarat with the location in a map for visitors. Architect Doshi's commitment to the educational field is also remarkable. He takes special lectures from time to time in many different architectural institutes.

Ar. Doshi has been involved in numerous projects including town planning, individual building as well as the incorporation of traditional art with contemporary design. His notable projects are 'Husain-Doshi- Gufa' in Ahmedabad, Bharat Diamond Bourse (BDB), Mumbai, IIM Bangalore, IIM Udaipur, and National Institute of Fashion Technology (NIFT), Delhi etc.



Picture 1.10 Husain-Doshi Gufa

Source: https://images.app.goo.gl/FP4WnZhE6fNhKL759



Picture 1.11 Husain-Doshi Gufa

Source: https://images.app.goo.gl/RY5VeaWNKKBWL6Ws5



Picture 1.12

BDB (The largest business hub for Diamond cuttings)

Source: https://images.app.goo.gl/UNfedA2XfCgSgX9g8

iii) Achyut Kanvinde (1916-2000)

A. Kanvinde was an Indian architect who was awarded 'Padma Shri' in 1974. He designed it with proportional geometry, steel frames and concrete. He graduated in 1942 from Sir J. J. School of Arts and then the government of India sent him to Harvard for higher studies. Some of his notable projects are IIT Kanpur hostel walkways which were connected to discrete areas and the 'Dudhsagar dairy', the biggest dairy in India.

iv) Brinda Somaya (Born in 1949)

Brinda Somaya is known as an urban conservationist and has published a large number of articles and books on the subject. Brinda has been engaged with the build as well as conservation activities. She has many projects in her credits like academic, healthcare, corporate, residential and conservation heritage etc. Presently, Brinda is engaged with projects like academic buildings in IIT Bombay campus, Lodha projects etc.

v) Hafeez Contractor (Born in 1950)

He is a famous Indian architect who has designed many skyscrapers in Mumbai City. His most prominent project is 'The 42' with 63 floors building in Kolkata is the tallest building in India. His maximum projects located in Mumbai and Pune city and the

most famous project is Hiranandani Gardens, Powai a residential as well as a commercial township in Mumbai city.



Picture 1.13

The 42 building (Kolkata)

Source: https://images.app.goo.gl/P87qw7N395nuVwqa9

vi) Laurie Baker (1917-2007)

Laurie Baker was an English architect who lived and worked in India. He always gave preference to vernacular and sustainable design. Ar. Baker has done various designs with maximum ventilation with air and heat protection, minimum materials with appealing beauty. He reintroduced Mangalorean clay tiles, plaited palm thatches and courtyards in building projects. Indian architect Nari Gandhi was one of his good friends. He died in the city of Thiruvananthapuram in 2007.

vii) Nari Gandhi (1934-1993)

Nari Gandhi was famous for organic architecture, i.e. design with the concern of local environment and nature. He always preferred innovative ideas to adjust with local needs. He used to prefer to spend time on-site than make architectural drawings.

viii) Sheila Sri Prakash (1955)

She was born in Bhopal, 1955 and known as a famous urban designer. Sheila is the first woman architect in India to start private architectural practice. However, her designs are famous for socio-economically sustainable construction for modern society but still maintain the cultural heritage. Sheila's designs are always shaped with enough ventilation of natural light and air.

3.4 Architecture as a Discipline

Architectural education imparts knowledge to the individual who develops their skills to design any infrastructure or product for a society like design a house, building, bridge, road, public place, interior etc. The system of architectural education is peculiar than the other streams of education like Arts, Commerce or Science. One of the most important things in architecture as a discipline is including multi-disciplinary subjects which are related to the architecture domain. Though the emphasis of the architectural course on design, they equally give importance to humanities and technology, which gives a clear assumption of design infrastructure for any kind of life.

The objective of architectural education is to mold an individual into a professional who would be able to stand independently in the practical field. Architectural education tries to make a competent professional by giving multi-disciplinary training during the five years' bachelor course.

3.4.1 History of Indian Architectural Education

Indian architectural education was initiated by the British. During the British period, many infrastructures were built in India, which were influenced by British culture. These buildings were designed according to British design because Indian architecture was not identified or recognized until then**.** When the demand for architectural work started increasing, the Indian government brought qualified people from England for counselling architects. They started draftsman classes to meet the needs of the Indian requirements in the 19th century by John Begg and later on it was extended to 4 years course.

History of architectural education can be divided into four phases. The phases are pre-independence, post-independence, end of the 19th century and the present scenario of the 21st century.

3.4.1.1 Phase One (1750-1939)

The period of 1750 to 1900 is known as the Neoclassical architectural period, known as the British period. British initiated developing infrastructure in India with British architects who also trained some Indian personnel to get help for themselves. The demand for an architecture institute was made in the year 1859, and the Bombay government accepted it to meet the needs of new infrastructures in the growing city of Mumbai, previously known as Bombay. Railways, Post office, the port and Banks were established to make the city a commercial hub in the country. The first cotton mill was established in Bombay. Most of Bombay's building designs were influenced by European style. The first school to introduce a structured course in architecture was Sir J. J. School of Architecture from Mumbai, Maharashtra.

Some colleges established during the first phase are:

- Sir Jamshetjee Jeejeebhoy College of Architecture (J.J. College of Architecture), 1859
- School of Planning and Architecture (SPA), Hyderabad (1940)
- School of Planning and Architecture (SPA), Delhi, 1941

The British also started institutions of architecture education in India. In 1913, Claude Batley, an English architect who came to India and started successful practice with Gregson and King. He started teaching as a visiting professor in Sir J.J. School of Art, Mumbai, Maharashtra, in 1914 and continued as the Principal from 1923 to 1943. During his tenure, he took his students to different parts of India and did measured drawings of buildings and significant architectural works. He spent most of his time in research and documented Jaipur’s architecture, which recognised traditional Indian Architecture. Later the curriculum was redesigned by him, and the approach to modernism in Indian architecture was added. This was later compiled in a book titled “Design Development of Indian Architecture”.

The measured drawings of Claude Batley on Indian buildings are stored in the library of Sir J.J. College of Architecture as a 'The Claude Batley Gallery'.

3.4.1.2 Phase Two (1947-1960)

It was immediately after independence when Jawaharlal Nehru became the prime minister and initiated a plan to develop the infrastructure of all the cities as well as villages in the country. The plan aimed to build infrastructure with modern trends without ignoring the original culture of the nation. The plan was to develop futuristic utopian cities in the country. Only a few professionals deal with the situation who were trained in foreign countries like Great Britain. Hence, it was essential to initiate architectural education and training to inculcate architectural knowledge in the country. Consequently, the Indian government started establishing more architectural institutes to start training students for city planning and architecture that the country needed. The government established an architectural department in IIEST Howrah, IIT Kharagpur, M.S. University, Vadodara and IIT Roorkee after independence.

Following are the few architectural colleges which started after independence.

- School of Planning and Architecture (SPA), Delhi,1941
- Department of Town and Regional Planning, IIEST, Howrah, 1950
- Department of Architecture and Regional Planning, IIT Kharagpur
- Department of Architecture, M.S, University, Vadodara, 1954

In 1950, after independence, people started moving towards urban centres from rural areas in search of better prospects. Also, near about 400 Pakistani migrated illegally as Hindu refugees. As a consequence, the Indian government planned to build houses in an easy and economically affordable way for all those people. During this period, a few Indian architects got trained abroad and set up their practices in metropolitan cities in India; some of the prominent architects are Charles Correa, B.V. Doshi etc.

3.4.1.3 Phase Three (1961- 1990)

In 1970-80, Indian architecture education was introduced with a new perspective. Architects started considering traditional Indian architecture, the climate in different parts of India, materials available and the comfort of people etc. During that time, very few institutes were available for architectural education in India.

In the third phase, people started imparting knowledge beyond city planning, such as building design, interior design and environment, and many societies and state governments started establishing architectural institutes. Centre for Environmental Planning and Technology (CEPT) is an initiative of a similar kind of institute which slowly became an Architectural University with many different departments on architecture discipline to give deeper knowledge to architecture learners.

Some of the colleges from phase three are mentioned below:

- Centre for Environmental Planning and Technology (CEPT), 1962
- College of Engineering Trivandrum (1964)
- Maulana Azad National Institute of Technology (1963), Bhopal
- School of Architecture University Visvesvaraya College of Engineering (1967)

3.4.1.4 Phase Four (1991 to 2015)

In 1992, with the tremendous advancement in information technology, new methods and tools were introduced to architectural education which changed the architectural aspect. The growing concerns of ecology have influenced Indian architecture in the modern era. Indian urban design, urban planning started considering other country's culture which led to price rises in property in various cities in India. By that time a good number of architectural schools were introduced in India.

In this modern phase, many architectural colleges were established all over India. Apart from B. Arch and M. Arch., they also started giving diplomas along with some research programs like fellowship and local government projects. Now, architectural institutes and enrolment of learners are growing each year. The architecture education system also changed a lot by implementing modern skills and technology. During this period almost all major cities in the country have started establishing a good number of architectural institutes by private sectors. Few colleges from Maharashtra are mentioned below as the study is specifically on Maharashtra state.

Some colleges established during phase four are:

- Kamla Raheja Vidyanidhi Institute for Architecture and Environmental Studies (KRVIA),1992, Mumbai
- Viva School of Architecture, Palghar (2010)

- Sinhagad College of Architecture, Pune (2000)
- Dr. J. J. Magdum College of Architecture, Kolhapur (2019)

After independence, the Indian government has established few architectural institutions to develop the structure of Indian cities, but after the 90s it started growing in good numbers of institutes. The rapid growth of architectural institutions in India can be visible from the history as mentioned above of establishing architectural institutions.

3.5 Council of Architecture (COA) and Architecture Courses

The Council of Architecture (COA) is an autonomous statutory authority of the government of India who monitors and maintains the standard of architecture education in India, set up under the Architects Act, 1972. Apart from this, COA also regulates professional architects by giving the registration number to each professional.

In India, the architectural courses are guided by respective university syllabus with the guidance of the Council of Architecture (COA). Apart from the syllabus, each institute tries to involve some extracurricular activities like workshop, lecture series, exhibitions, an exchange programme with other Indian institutions as well as foreign institutes etc. who can enhance understanding of the discipline. Most institutions evolve their philosophy to develop student's ideology to develop designs. The syllabus changes from time to time to adjust to the changes in the socio-economic system of the society.

The Indian architecture education consists of bachelor course (B.Arch.) with a duration of minimum five years or ten semesters, master course (M. Arch.) with a duration of minimum two years or four semesters, diploma and certificate courses and doctoral level courses.

Norms for admission of B.Arch.:

- Senior secondary certificate. (12^{th} standard) with a minimum of 50% marks in aggregate.
- 10+2 science stream from any recognized university or board with English, Physics, Chemistry and Mathematics as compulsory subjects.
- Candidate needs to score in an aptitude test specially designed for the architecture course, i.e. 'National Aptitude Test in Architecture (**NATA**)' or

local state board test like 'Maharashtra Association of Schools of Architecture (**MASA**)'.

This study is going to explore the education system of the University of Mumbai as the research is on the libraries of Maharashtra state.

3.6 Courses in Architecture Discipline

Architectural education starts after 12th, and there is graduation (degree), postgraduate and doctoral degree in the discipline.

3.6.1 Bachelor of Architecture (B. Arch.)

Bachelor of Architecture (B.Arch.) is a five years course which conducts studios in three broad categories. They are design, humanities and technology. These three subjects are inter-related to each other and broaden to some more subcategories in each year are elaborated below:

Courses of B.Arch.

There are three main groups in degree education. These are designing, humanities and technology. Students can have the option to select one of these groups.

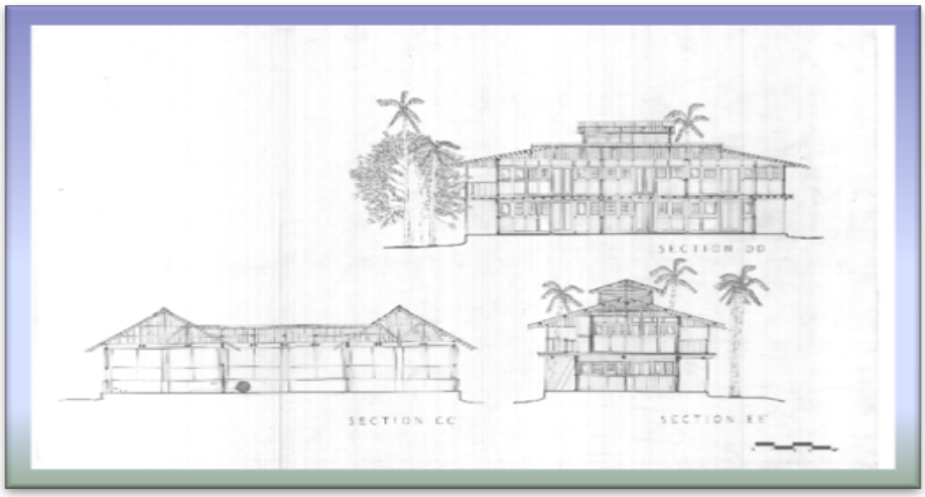
a. **Architectural Design**

Design studios help students to think about how the intervention can be deployed in a complex cultural environment. The relation between individuals and environments in terms of construction is taking place in the initial stage of the course. In the fourth and fifth year, the course engages students with practical training in the professional field.

The main concern of this course is a design studio, and it goes deeper in each stage of the course. Design studios help students to develop various methodologies to design any project by investigating their environment and experiences. In each year, students are engaged with projects to make them familiar with construction and the environment.

The syllabus also introduces study trips in each academic year to engage with practical experience. In these study trips, students get the opportunity to create

measured drawings to understand the basic parameters of architectural design. Following is an example of a measured architectural drawing.



Picture 1.14 (Measured drawing)

b. Humanities

Studies in humanities have been taken as an initiative to give a critical understanding of a deeper aspect of the subject. Students are engaged with the research process to analyse their knowledge on history, present and future plan of the society in terms of construction. Study of sociology, economics and culture are required as applicable for the design of human settlements.

Humanities subjects are also explored in a broad way in each stage of the course. Students become familiar with their cultural environment and are encouraged to learn about the history of culture, modern development, politics and socio-economic policies.

In the third year, the course teaches about the socio-economic condition of contemporary India. In the later part of the humanities course, students get the opportunity to visit and survey different communities to make them aware of environmental needs.

The subject also gives an understanding of landscape elements like trees, shrubs, plants, water, rocks and development of landscape planning and application in architectural design.

Some of the institutes took the parallel initiative to develop a Theory of Design with Humanities subject to give an idea of how to analyze contemporary cultural practices.

c. Technology

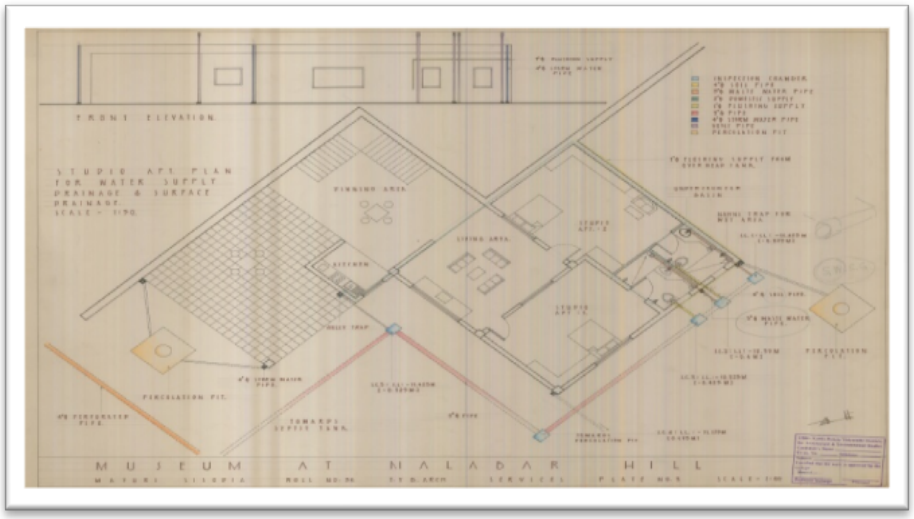
Technological subjects make students understand the structural concepts and behaviour of structural elements, simple calculations for columns, beams, frames, footings, slabs, concrete, steel and timber.

Architectural education also provides knowledge about the graphic and building techniques used in construction which plays a vital role to construct any infrastructure. Architectural technology is about engineering and construction. The syllabus involved the following area in the technology part:

> Building technology as related to construction
> Measured drawings for the structure of an infrastructure
> Services: Natural air & light condition, water supply etc.

Building construction takes care of the concept of a building structure. For example, - The criteria for an underground structure depends on the size and tallness of the buildings.

Students are taught to make some measured drawings on the structure called the blueprint of a building or any infrastructure. Following is an example of a technology drawing.



Picture 1.15

Technology Drawing

Under the technological subjects, the subject services are taught about the necessity of natural light and air conditioning and its effect on the structure and how water supply should be integrated with design in a convenient way. Also, study of design for water supply, drainage, sewage disposal, electricity supply, wiring and lighting for buildings were taught under this subject.

Apart from creating architectural drawings, the course also conducts workshops to bring the ability to make building models with various materials such as cardboard, wood, plastics, plaster and metals. It also gives the ability to make simple joints in timber, pipes and other materials.

3.6.2 Master of Architecture (M. Arch.)

Master Architecture (M. Arch.): COA made it flexible to teach the subject according to society's needs and suggested the following subjects for M. Arch. courses:

- Architectural conservation
- Urban Design
- Interior Architecture
- Landscape Architecture
- Housing
- Urban and Regional Planning
- Transportation Planning and Design
- Sustainable Human Habit

- Sustainable Architecture
- Environmental Architecture
- Computer Application
- Valuation and Arbitration
- Building Automation
- Rural Architecture
- Regional Architecture
- International Architecture
- Architecture and Construction Project Management
- Digital Architecture
- Computer Allied Architectural Design

COA suggests subjects mentioned above for both bachelor and master courses, but the institute can teach the same subjects under different names. Any institute can introduce a new subject and can develop their curriculum based on institutional requirements and educational philosophy.

3.7 ICT in Architectural Education

The software AutoCAD was released in 1982 and was implemented in Indian architectural education in early 1990, and now onwards many software were introduced in the market which fostered the architectural education system. Some of them are - Drafting software- AutoCAD, ZWCAD and Bricks etc.

Architectural model making software/tools are SketchUp, 3DCAD, parametric modelling, such as Rhino, Grasshopper etc. These kinds of enhancing software are called Building Information Management (BIM) software. Though BIM software are not mentioned in the university syllabus to teach compulsorily, learners and professionals are utilizing it to enhance their skills.

The intention of exploring architecture history and architectural education is to give an overall understanding of how the discipline of architecture has been shaped over time. As a result, architectural college libraries also changed in terms of their services, collection development and management. It observed that no previous study had been done on architecture college libraries in India.

3.8 Architecture College Library

As mentioned earlier, architectural education is peculiar, and hence the libraries also are unique in terms of collection. Architectural libraries collect books on architecture and other peripheral arts. It collects resources on modern architecture and contemporary architectural design, architectural theory, arts, graphics, architectural data, constructions, services, history interiors, landscapes, urban design, town planning, housing, technology, environment, humanities, geography, biography, law (as it relates to real estate), religion, cinema, literature, photography and philosophy etc. It also includes samples of various materials and small-scale models of sanitary fittings and fixtures in the material library section.

Architectural libraries have some peculiar features which set them apart from other academic libraries. Some important features are mentioned below:

- Architecture discipline has no specific textbooks for their learner to refer for an architectural course. Architectural teaching always takes the help of all reference books, which contain historical and modern theory and professional works related to the architecture discipline.
- Architectural library collects reading materials on many different subjects to impart knowledge on human life and the environment. Architectural students require knowledge about society to execute designs for them. Consequently, they need to engage with those subjects which give understanding about the history of human life and the development of the society, environment etc. in the initial stage of their course.
- Architecture learners need to refer to maps, development plans, and gazetteers for subjects like ‘Town and City Planning’ and ‘Conservation’, which are published by government sectors. These types of documents change over time. Hence, libraries need to update all these documents from time to time.
- Architecture college library also collects movies/cinemas for students to inculcate a better understanding of the society and culture of a nation.
- The most significant part is the material section. The library needs a material section where various samples of construction materials, sanitary fittings and interior decoration items are made available.

- It also offers other digital documents which contain institutional lecture series, workshops, exhibitions on the architecture discipline, the documentation of architectural works by students, etc. Architecture students are bound to refer to senior's and architectural professional's works to get a better understanding of the subject.

3.8.1 Collection of Architecture College Library

Architectural libraries collect various resources in many different forms. It includes books, dissertations/thesis, journals, resources report, maps and development sheets, architectural drawings, cinemas and documentaries, reports and standards related to real estate and published by the government, newspapers, question papers and the samples of the material library.

Following are the collections of architecture college libraries.

3.8.1.1 Traditional Sources

i) Books

Architectural library collects books on Architecture and other subjects which are related to the architecture subject. The Architectural institutions never follow any book as a textbook for their learners. The Architectural Institution imparts education with the help of reference books where architectural works are explained in detail.

ii) Thesis/Dissertation

The dissertations are prepared at the end semester of both the courses. Architectural students need to develop their design for their dissertation topic, which generates value-added research reports.

iii) Journals and magazines

There are many national and international periodicals on architecture, landscape, environment and humanities which subscribe to the architecture college libraries. It also subscribes some periodicals on other subjects by architectural libraries to support the administrative staff to enhance their service towards the institution. For example- periodicals on information technology (IT) to update knowledge of the IT employees who help students while making their design through the software 'AutoCAD' or graphical design software.

iv) Research reports

Architectural libraries also collect research reports which are generated during the various architectural workshops, exhibitions and studios in the institution or outside the institution.

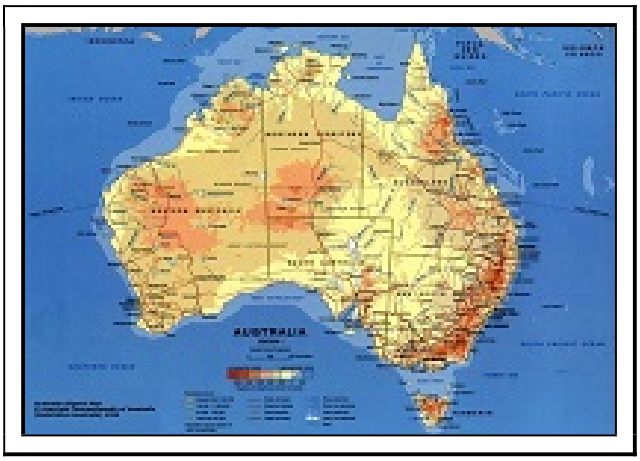
v) Maps & Plans

Many a time, architectural students need to refer to local or national maps and development plan sheets for the subjects 'Urban Design' and 'City Planning'. Hence the library needs to collect all types of maps and development plan sheets of local and national.

Architecture teaching-learning system needs to refer to various types of maps. Following are the examples:

a. General Reference Maps

This map precisely maps the landscape to assist in the finding of locations.



Above is a 20th-century general map of Australia where cities, rivers and lakes are named and coloured. Highways and railways are recognized.

b. Topographic Maps

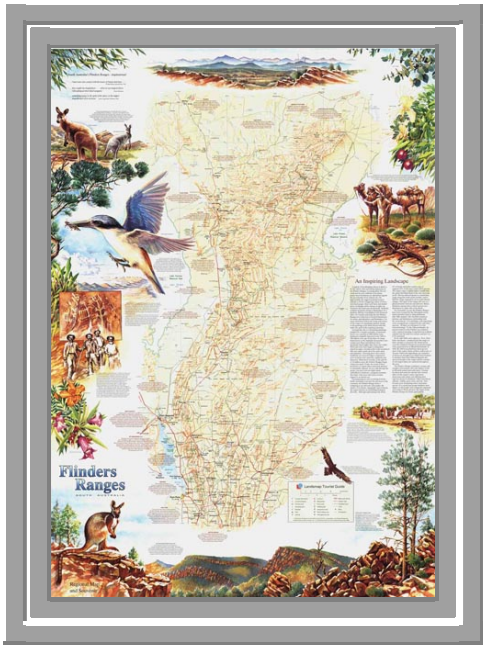
Topographic map shows elevation in detail.



The above map is a wet tropical area named 'Darwin' which is located in Northern Territory. The outlines indicate that the land is very flat. The thicker pink colour dot indicates a large number of buildings and a large city area.

c. Thematic Maps:

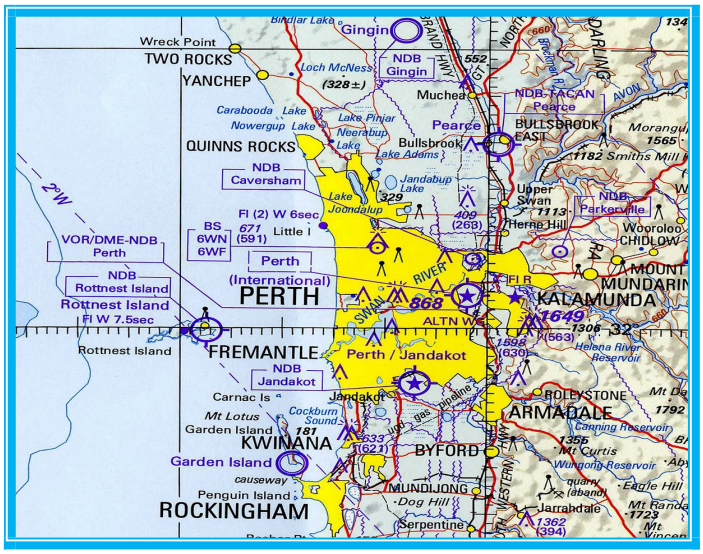
Thematic maps are enhanced with some specific features for a different purpose. Following is an example of a thematic map called 'Tourism':



Above map is a General Reference map which is fascinated with nature and animals that tourists might take interest in visiting.

d. Navigation Charts:

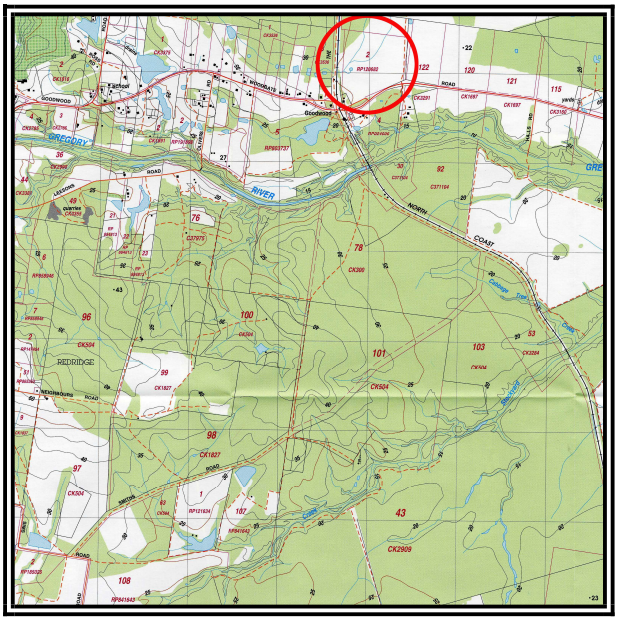
The navigation map is a combination of general reference, topographic and thematic maps, and it requires specialized knowledge to understand the map. It is specially prepared for ships, boats and aircraft.



The above map is an example of an air navigation chart from a World Aeronautical Chart 1:1

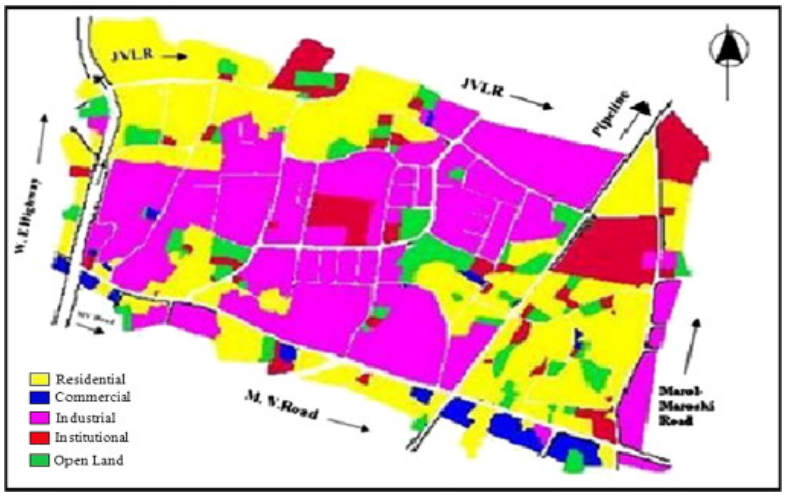
e. Cadastral Maps and Plans

The cadastral map is a land administrative tool and is created on-demand. Generally, it is used by professionals who are engaged with real estate, valuation and land management offices.



The above cadastral plan shows a large number of roads, but only a few have been built. The surveying industry or architect referred to it as the 'Planned' environment and the 'built' environment.

f. **Development Plan Sheet:** It helps to understand the complete development plan of a specific place which is approved by the Municipal Corporation.



The above DP sheet is a development plan of one of the areas of Mumbai city.

Source: https://images.app.goo.gl/FdEHrRLQWp74SZUZ6

vi) Architectural drawings

Libraries also collect architectural drawings of renowned architects or selected student's in-house and keep as reference materials.



Building Design



Architectural drawing created in software [BRAJ studio at KRVIA 'Cross section']

vii) **Films/Cinemas/Documentaries**

Architectural libraries also collect cinemas and documentaries which give knowledge about the society, human relation and environmental awareness, and it helps students to develop a design for society and environment. These movies and cinemas also open up opportunities for students to work in the production house.

viii) Rules, standards and documents

Architectural libraries also make available standards and documents which are related to real estate and are published by the government.

ix)Newspapers

The library has newspapers to update the users daily.

x) Question papers

Libraries keep institution's as well as the affiliated university's old exam question papers to help students.

xi) Syllabus, brochures & prospectus of various architectural institutes and universities

Library also keeps brochures and prospectus of other architecture schools and universities to help students to choose or make a decision for selecting an institute for higher study.

xii) Material Library

The most important part of an architectural college library is the Material library, Gallery or Museum. The material library section holds samples of all kinds of

construction materials, sanitary fittings and fixtures and architectural models which helps to impart practical knowledge to the students.

Following are the sample images of the materials library's collection:



Roof materials



Tiles

Source: https://images.app.goo.gl/AjnuokJ9pTn1LN83A



Basic Sanitary Ware And Sanitary Fittings

Source: https://images.app.goo.gl/aq5PfZ8gVL8TMEA58



Source: https://images.app.goo.gl/gwGyUzLsUi57ntcZA



Tiles and Flooring
https://contractorquotes.us/ceramic-floor-tile/



Electrical Accessories

https://www.miracle.net.in/blog/various-electrical-wiring-accessories/



Different Building Materials

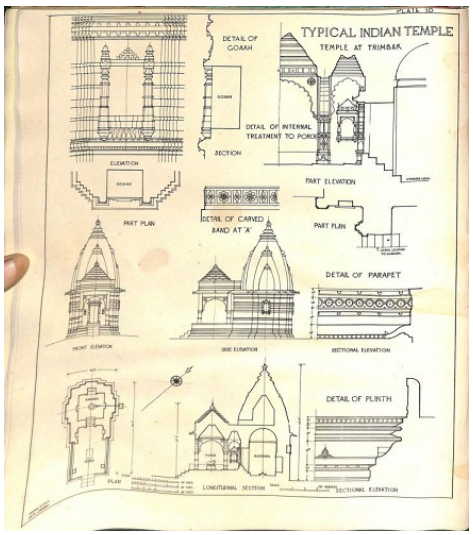
https://www.constructiontips.co.in/building-materials/

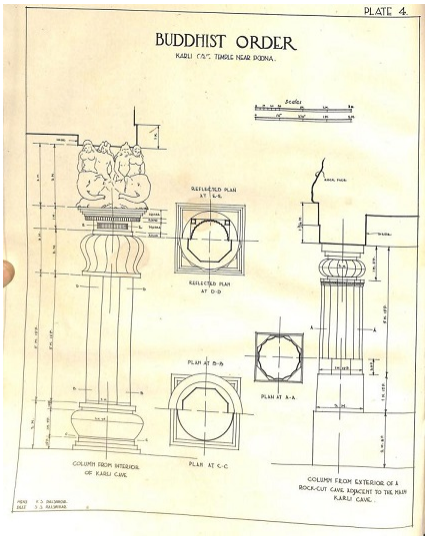
Architectural libraries are regularly used by learners and teachers and they always hunt for recent development in their area. Hence, it is necessary to manage architectural library collection in a modern and scientific way to give faster access to accurate information. Therefore, there is a need to understand the system of managing library collections to give better access.

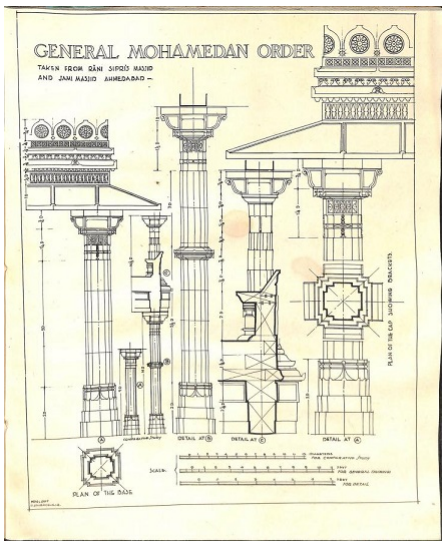
3.9 History of Collection in Architecture College Library

The collection in the architecture college library was started with Claude Batley measured drawings in the British period. The library's growth can be seen from the history of four phases of architectural education.

Making measured architectural drawings was given importance in the first phase as the course was the only 'Draftsman'. These drawings became historical and rare documents of Indian culture and history which are available in few architecture college libraries only.







Source: https://archive.org/details/TheDesignDevelopmentOfIndianArchitectureClaudeBatley/page/n23/mode/2up

Above drawings are Claude Batley's initiatives to document Indian culture of various religions. Most of the significant drawings are compiled into one document and named as "The Design and Development of Indian Architecture by Claude Batley".

Architectural libraries in India started using ICT much later compared to libraries of other disciplines as these institutions started growing after the 1990s. Libraries of Indian architectural institutes started library automation after 2010 when the institutions started growing in terms of library collection. Since 2014, architectural libraries started using open-source software, and few are using proprietary software. Some libraries maintain e-resources by joining government portals and giving access

to open-sources resources. Very few libraries are maintaining a separate library website to host their library and have created institutional repositories to archive their grey literature.

3.10 Profile of Select Architecture Colleges Libraries from India and Abroad

Indian architectural libraries are few in numbers as architectural institutes are less as compared to other academic institutes. Though most of the architecture college libraries follow the traditional format to disseminate information to their patrons, a few libraries are playing a vital role in enhancing their teaching-learning process. These libraries implement modern ICT tools and keep updating all tools from time to time. Apart from the regular facilities, architecture college libraries contained some special features like archives and Institutional Repository to cater to their patrons. Hence, these kinds of facilities were only taken as important points to select the following architecture college libraries.

The intention of presenting the details of institutes and their libraries is to give a glimpse of the present scenario of major architecture college libraries in India and abroad. Out of the following mentioned architectural libraries, some of the libraries are part of their central library. Therefore, these libraries have a good number of books in their collection.

Profiles of the colleges along with library collection and facilities are elaborated here.

3.10.1 Library of Royal Institute of British Architects (RIBA), London

RIBA is the first formal architectural institute in the world, established in 1834. It is a non-aided institute which runs with the sponsorship of their members, and charitable trading earned money. In 2009, the institute celebrated its 175th anniversary. The institute launched London's first architectural gallery in 2014 which is free and open to the public.

The RIBA library implemented the software 'BLUEcloud' for automation with the help of a private company named '**SirsiDynix'.** The collection of the RIBA library is almost two centuries old, and some of the resources are from the 15th century. Presently, the library is working on the conservation of rare documents which need further contextualising to ensure the appropriateness of the information contained in those resources.

The library has a collection of the following items:

- 150,000 books and 15,000 journals volumes
- 5000 rare books
- 1.5 million manuscripts and archive documents
- 1 million architectural drawings.
- 1.6 million photographs
- 1000 objects and artefacts
- 400 architectural models
- 500 coins and medals

The RIBA library has a collection of over four million items which are free and open to everyone. Despite not having a government grant, the library procures more than 100 books every month.

The library has some cultural outreach programmes for the development of the society. The library lends their collection to museums and galleries around the world. The institute also works with schools and universities to promote understanding architecture through a nationwide learning programme.

3.10.2 Prominent Indian architecture college libraries

Following are the prominent Indian architecture college libraries (Serial .and Code numbers are from Annexure II):

1. Sl. No. 104 (GJ02)

Name:	**Centre for Environmental Planning & Technology University (CEPT)**
Address:	K.L. campus, University Road, Navrangpura, Ahmedabad 380009
Web Site	https://cept.ac.in/library
Courses:	25 courses: B. Arch (5), M. Arch. (20), Ph.D. and M. Phil
Details:	CEPT was established in 1962. Lilavati Lilabhai Library. CEPT University library has been maintained as a standard to enhance the teaching-learning process. It has Web OPAC as well as an

25 courses across 6 streams **1.B.Arch. (5 courses)** **2. M. Arch. (20 courses)** **3. M.Phil.** **4. Ph.D. (2014)**	archive of the university. This is the only architectural University in India. The library has an archive which is full text accessible only in the campus on a request basis. In-house activities are catalogued to give bibliographical access with sample drawings through their institutional website. It offers the following courses: 1. B. Arch. (Bachelor of Architecture) (Intake 80) 2. B. Arch. (Interior Design) (Intake 60) 3. B. Des. in Building Products and System/Furniture. 4. B. of Urban Design. (Intake 40) 5. B. Construction Technology (Intake 60) 6. M. Tech. in Construction Engineering and Management. 7. M. Arch. In Architectural Design 8. M. Des. in Interior Design 9. M. Tech. in Structural Engineering Design 10. Master of Urban Planning 11. M. Des. in Furniture Design 12. M. Arch. in Conservation and Regeneration 13. International Master of Interior Architectural Design 14. Master of Urban Management 15. M. Des. in Building Products and Systems 16. Master of Urban Design 17. M. Arch. in Architectural History and Theory 18. M. Tech. in Geomatics 19. Master of Landscape Architecture 20. Master of Urban Infrastructure 21. M. Tech. in Building Energy Performance 22. Master of Urban Transport System 23. M.A. in Architectural History and Theory 24. Master of Urban Housing 25. M.A. in Conservation and Regeneration 26. Ph.D. in Architecture (2014). Intake 10 seats in each subject.

Affiliation:	UGC (CEPT University)
Collection:	60,000+ Books 156 Periodicals, 10,000 Dissertations (Studio works: less than 500) 4000 Drawings Rare books and drawings are available (No special Management) No written collection management policy
Library Software:	KOHA (Windows)
Databases Subscribed:	JSTOR, ASCE journals, ACI publications, BIS codes

2. Sl. No. 105 (TS01)

Name:	**JNAFAU School of Planning &Architecture (1940)**
Address:	Masab Tank, HYDERABAD - 500 028
Web Site:	https://www.jnafau.ac.in/spa-library/
Courses	B.Arch., M.Arch. and Ph.D.
Details:	The library was automated in 2006 with the VTLS virtual software package, which is proprietary software. In 2015, the library implemented open source software, i.e. 'NewGenLib'. OPAC is on the intranet, and e-resources are accessible through multimedia in the library. The library has 1522 e-resources, but these are accessible only in the library with the help of multimedia. The library has not initiated a digital library or institutional repository yet. Inter-library loan available
Affiliation:	UGC (Jawaharlal Nehru Architecture and Fine Arts University)
Collection:	15,409+ Books (It is a central library) 7 international and 46 national periodicals 602 CDs/DVDs 5 e-periodicals

	1683 e-books 50 Project reports 2651 Dissertations/ thesis but No e-version 131 Maps 1522 e-resources
Library Software:	NEW GEN LIBRARY SOFTWARE (Linux) and DSpace (IR)-Intranet, OPAC on Intranet
Databases Subscribed:	

3. Sl. No. 106 (UA01)

Name:	**Department of Architecture & Planning (1956)** **Indian Institute of Technology (IIT) Roorkee**
Address	ROORKEE-247 667 (Uttarakhand)
Website	http://mgcl.iitr.ac.in/
Courses	B. Arch. M. Arch. and Ph.D.
Details	The library is accessible through their central library, which caters to many different subjects. The library has an archived architectural master (M. Arch.) and Architectural Doctoral thesis in the institutional repository of the central library and is given open access. The library has not started collecting studio works and in-house project reports from the architectural department. The library does not have a written collection management policy.
Affiliation	IIT Roorkee
Collection	3Lakhs books (Including all the IIT's departments) 9585 periodicals 5 indexing and abstracting periodicals 1500 institutional publications 200 CDs/DVDs

	9500 e-periodicals 1000 e-reports 30,000 e-books 10 drawings 5 Maps 14,000 E-Dissertations/ Thesis (http://shodhbhagirathi.iitr.ac.in:8081/jspui/) Rare documents are available but no special arrangement for rare architectural documents.
Library Software	Libsys (Web OPAC), DSpace (Central library IR)
Databases Subscribed	The library has subscriptions of 25 databases (mentioned on the website) and out of which following are the related architectural databases: E Shodh Sindhu, J-Gate, EBSCO, ProQuest. Indiastat, InCites etc.

Some of the major libraries from Maharashtra are elaborated below (Serial .and Code numbers are from Annexure II):

4. Sl. No. 1 (MH01)

Name	**Sir Jamshetjee Jeejeebhoy College of Architecture (1897)**
Address	78. Dr. Dadabhai Naoroji Road CST Railway Station Area, Fort, Mumbai
Website	http://www.sirjjarchitecture.org/
Course:	B.Arch.
Details:	The J.J. College of Art was established in 1857 at Elphinstone Institute, Mumbai and the J.J. College of Architecture was initiated in the year of 1896, which is the first architectural college in India. In the year of 1913, the J.J. College of Architecture was established as an independent department under Sir J.J. School of Art. Mumbai. In the year 1854, the school of Art and Industry, Calcutta was established, and the entire pattern of education was repeated in the school of Art and Industry in Bombay (Mumbai) at J.J. School of Art

	in the year 1857. All the three beginners of the Art schools in Bombay, Calcutta and Madras laid down local policies to establish the education of Art, but the policy of Sir J.J. School of Art was taken as a base policy by the British to follow in all the parts of India. Mr. Wilkins Terry was invited from England to take classes on Craftsmanship which served to make drawings for great buildings starting in the early stage of British period where the design of architectural ornaments can be seen. During the time 1930 to 1950 (Batley time), Sir J. J. college created some measured (reconstructed) drawings of some prominent buildings from various parts of India to archive for future use, which gives an authentic glimpse of the nation's past.
Collection	A special collection of **rare books** and **architectural drawings** of British period. The most prestigious is the '**Claude Batley Gallery'**
Databases	No

4. Sl. No. 15 (MH15)

Name	**Library of Kamla Raheja Vidyanidhi Institute for Architecture and Environmental Studies (KRVIA), (1992)**
Address	Mumbai
Website	www.krvia.ac.in
Courses	B.Arch. & M. Arch.
	KRVIA library was started in 1992, and the library has initiated web OPAC in the year of 2010 and inception of digital library (Institutional Repository) was in 2012 with DSpace software. The library had a subscription of good numbers of national and international periodicals along with e-journals and access to the JSTOR database. The library has facilities such as downloading, printing along with scanning. The library also implemented ICT tools like Facebook and QR code etc. from time to time to update their learners. CCTV is implemented for security purposes. The library also has summer and winter internship programmes for

	archival purposes.
Collection	8000+ books, 27 National & International periodicals 1000+ Drawings
Software	KOHA, DSpace (Institutional Repository)
Databases Subscribed:	JSTOR (Through British Library membership) Bloomsbury Architecture Library (Trial version)

5. Sl. No. 32 (MH33)

Name:	**Library of Sinhagad College of Architecture, Pune (2000)**
Address:	STES Campus, S.No.44/1, Vadgaon (Budrak) Off. Sinhgad Road, PUNE-411 041 (Maharashtra)
Web Site:	https://sites.google.com/a/sinhgad.edu/sinhgad-college-of-architecture-library/digital-library-1/ebooks
Courses:	B.Arch. and M. Arch.
Details:	The library has a good number of collections of books and seminars and study trips reports for issue and reference. The Sinhagad architectural library made available the list of the entire library collection on their library website, which was created in a Google site. Apart from the list of the library collection, the library has also integrated a few links of free e-books which includes various subjects like architecture, fictions, non-fictions and poetry etc. The library has good numbers of national and international periodicals with a database called 'k-hub'.
Collection:	6725 Books 1766 CDs /DVDs 24 Periodicals with1372 Bound volumes 71 Study trips report. 841 Thesis /Dissertations
Library Software:	Google site, Auto library software.
Databases Subscribed:	K-Hub

1.11 Summary

The architectural education system is different as it emphasizes practical knowledge to develop learners' skills. Architectural libraries are regularly utilized by users to develop their knowledge; hence libraries play a vital role in architectural education.

Moreover, the fourth and fifth laws of library science reveal that 'Library must save the time of the users' and 'Library is a growing organism'. In connection with this, libraries must utilize ICT tools to save users time while browsing information from the library. Also, the collection must grow and must be managed in such a way that it can provide ultimate satisfaction to their users. Hence, the researcher has taken an initiative to analyse the present status of collection management of Indian architecture college libraries in the next chapter and suggest a model to manage library collection and disseminate information in a standardized way.

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CHAPTER – IV
DATA ANALYSIS AND OBSERVATIONS

4. 1 Introduction

This research was initiated to study the present system of the collection management of architecture college libraries in India. In this regard, architectural libraries spread all over India are surveyed. For this purpose, firstly, one questionnaire was designed and circulated to the targeted group for their responses. The group comprised librarians of architecture college libraries, who were expected to provide factual information about the library and its collection management. Secondly, interviews were conducted to gather opinions on best practices in architecture college libraries. Consequently, few professionals from 'Architecture' and 'Library and Information Science' backgrounds were selected for the interview. Thirdly, information was collected from websites of the selected 12 architecture college libraries, which are situated out of the Maharashtra state.

The present study intends to analyze the system of collection management of architectural college libraries in Maharashtra in addition to twelve more architecture college libraries that were established before 1970 and situated in various states of India. The main goal was to identify the best practice of collection management in architectural libraries.

4.2 Target population

Data Analysis

Table 4.1 Target Population A – From Maharashtra State

No	Target Population Status	Colleges
1	Architectural colleges registered under The Council of Architecture (COA) till 2020	118
2	Closed down colleges	15
3	Sample population available	103

Table 4.2 Target Population B – From other regions of India

1	Architectural Colleges Established Before 1970	12

Table 4.3 Target Total Population A + B

A	Maharashtra	Architecture colleges registered under The Council of Architecture (COA) till 2020	103
B	India	Architecture colleges established before 1970	12
	A + B	**Total**	**115**

Observations:

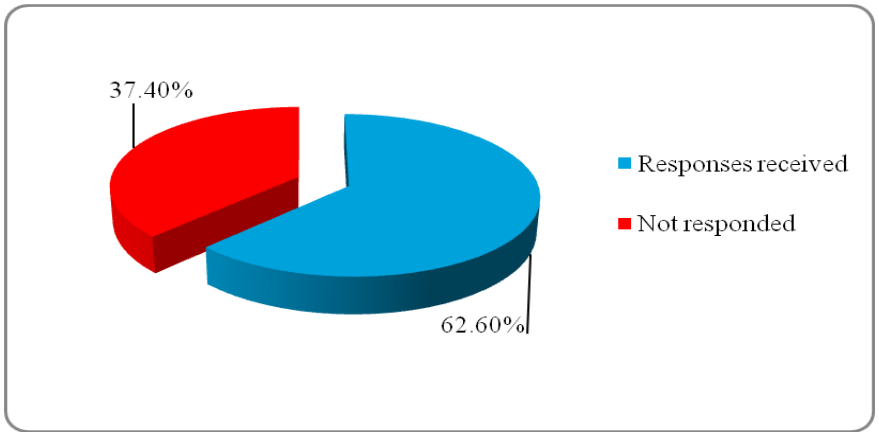
In Maharashtra, a total of 118 architectural colleges registered under The Council of Architecture (COA) till January 2020, and out of those 15 colleges were closed down. Hence, the survey covered only 103 libraries from Maharashtra as well as 12 libraries from out of Maharashtra.

Table 4.4 Target Libraries

Target Libraries	Total	Responses	Percentage
Architecture colleges registered under The Council of Architecture (COA) till 2020	103	69	66.99 %
Architecture colleges established before 1970	12	3	25.00 %
Total	**115**	**72**	**62.60**

Table 4.5 Target Libraries Responses Received

Responses Received	Total	Percentage
Responses received	72	62.60 %
Not responded	43	37.40 %
Total	115	100 %



Graph 4.1 Responses Received

Observations:

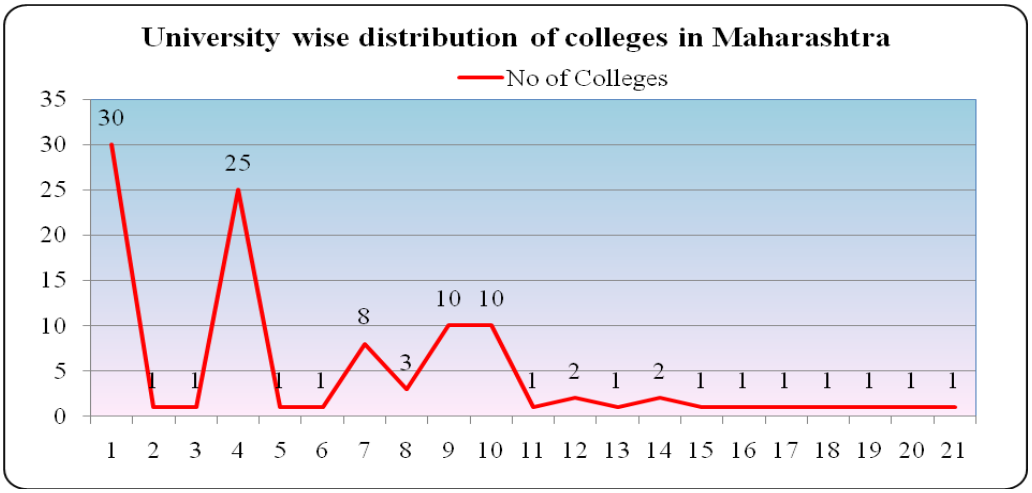
The number of colleges that responded to the study was 69 from Maharashtra and 3 from different states of India. A total of 72 college libraries responded out of 115 targeted architectural college libraries in India. Remaining 43 college libraries did not respond due to various reasons, such as some colleges did not have librarians, and few were not interested in sharing their information. The researcher also could not contact a few colleges due to the non-availability of correct contact details and websites.

The researcher sent the questionnaire in a Google form to all the targeted librarians to collect data about their libraries. 71 librarians responded by submitting the Google form, and only one library has filled the questionnaire manually.

Table 4.6 University wise distribution of architecture colleges in Maharashtra

Sl. No.	Name of the University	No of Colleges
1	University of Mumbai	30
2	SVKM's NMIMS University, Mumbai	1
3	V.N.I.T. Deemed University, Nagpur	1
4	Savitribai Phule Pune University	25
5	Chhatrapati Shivaji Maharaj University, Panvel	1
6	Vishwakarma University, Pune	1
7	Shivaji University, Kolhapur	8
8	Sant Gadgebaba Amravati University,	3
9	Dr. Babasaheb Ambedkar Technological University Vidyavihar, Lonere, Raigad.	10
10	Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur.	10
11	Bharati Vidyapeeth University, Pune	1
12	Solapur University, Solapur	2

13	North Maharashtra University, Jalgaon	1
14	Dr.B. Ambedkar Marathwada University, Aurangabad	2
15	Amity University, Mumbai	1
16	MIT Art, Design & Technology University, Pune	1
17	Symbiosis Skills and Open University, Pune	1
18	Symbiosis International University, Pune	1
19	D Y Patil Deemed to be University	1
20	Sanjay Ghodawat University, Kolhapur	1
21	Swami Ramanand Teerth Marathwada University, Nanded	1
	Total	**103**



Graph: 4.2 University wise distributions of colleges

Observations:

From the above university-wise distribution colleges in Maharashtra table, it is noticed that all 21 Universities are offering architectural education. The affiliation to Mumbai University has 30 colleges, and Savitribai Phule Pune University has 25 colleges. Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad, and Rashtrasant Tukdoji Maharaj Nagpur University has 10 colleges each. Shivaji University, Kolhapur, has 8 colleges. Sant Gadgebaba Amravati University has 3 colleges.

Also, Solapur University and Dr. B. Ambedkar Marathwada University, Aurangabad have 2 colleges each, and all other remaining universities have 1 college each.

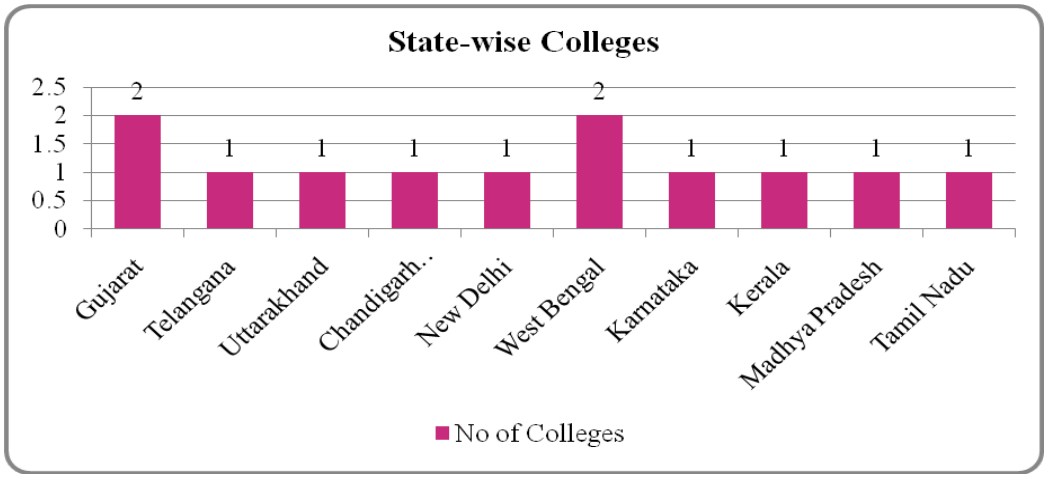
4.2.1 Architectural Institutions from other States

Data Analysis

The researcher has selected colleges that were established before 1970 and from states other than Maharashtra.

Table 4.7 State-wise Colleges

No	State	No of Colleges
1	Gujarat	2
2	Telangana	1
3	Uttarakhand	1
4	Chandigarh (Punjab + Haryana)	1
5	New Delhi	1
6	West Bengal	2
7	Karnataka	1
8	Kerala	1
9	Madhya Pradesh	1
10	Tamil Nadu	1
Total	**10 states**	**12 Colleges**



Graph: 4.3 State Wise Colleges

Observations:

The above table shows that 12 architecture colleges approved by COA have been selected from various ten states of India and were established before the year 1970. It

is also observed from the table that two colleges selected each from Gujarat and West Bengal State, and the remaining 8 colleges are from eight different states.

4.2.2 Colleges and Courses

Data Analysis

Following table presenting the introduction of all 115 architecture colleges and their intake along with courses they have been running.

Table 4.8 Courses in Colleges

Colleges	B. Arch.	M. Arch.	Doctoral
In Maharashtra	103	25	03
In 12 Select Colleges	12	12	06

Observations:

The above table shows that a total of 115 colleges run bachelor (B.Arch.) course and 25 colleges conduct master (M. Arch.) courses. Only 3 colleges in Maharashtra and out of 12 colleges, 6 colleges provide a doctoral programme.

4.2.3 Student's Approved Intake

Table 4.9 Students Approved Intake in Colleges

Colleges	B. Arch.	M. Arch.	Total
In Maharashtra	30,575	1,240	**31,815**
In select 12 colleges	4,959	1,460	**6,419**
Total	**35,534**	**2,700**	**38,234**

Observation:

The above table reflects that for bachelor courses, 30,575 capacity students are approved and 1,240 students' seats approved for master in Architecture discipline in Maharashtra. Also, 6,419 seats are approved for B.Arch. and M.Arch. courses in

select 12 colleges from other states of India. The COA has approved a total of 38,234 seats for 115 colleges.

4.2.4 Aided and Unaided colleges

The study inquired about the grant given to the colleges.

Table 4.10 Aided and Unaided Colleges

Colleges	Aided	Non-Aided
In Maharashtra	04	99
In select 12 colleges	10	02

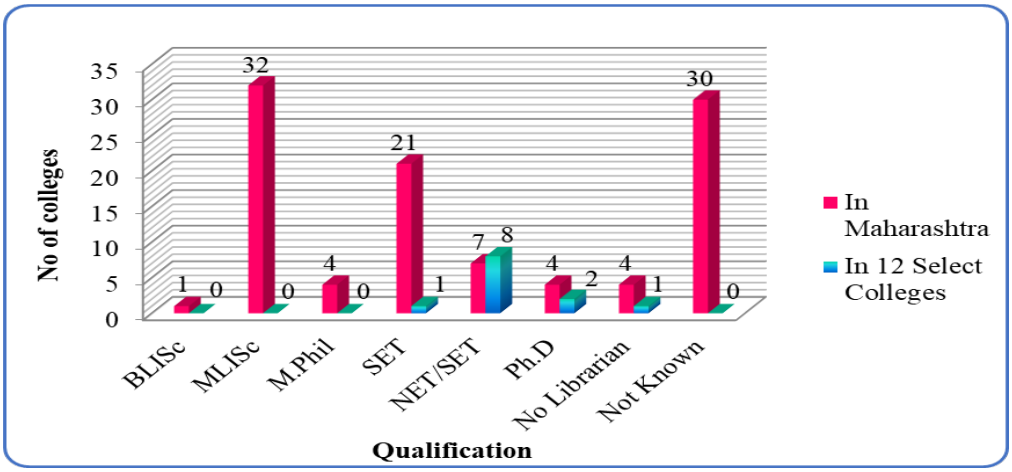
Observation:

Out of 103 architecture colleges, only four colleges are getting a grant from the government. Remaining 99 architecture colleges are private and unaided. The report also shows that out of 12 select colleges, ten colleges are aided, and two colleges are un-aided.

4.2.5 Librarian's Qualification

Table 4.11 Qualification of Librarians

Qualification	No. of Colleges		
	In Maharashtra	In Select 12 Colleges	Total Colleges
BLISc.	1	0	1
MLISc.	32	0	32
M.Phil.	4	0	4
SET	21	1	22
NET/SET	7	8	15
Ph.D.	4	2	6
No Librarian	4	1	5
Not Known	30	0	30
Total	**103**	**12**	**115**



Graph: 4.4 Qualifications of Librarians

Observations:

Table 4.11 presents the qualifications of 85 targeted architecture college librarians out of which, 72 librarians' qualification was collected from the responded questionnaire, and the remaining 13 librarians' qualification was traced from websites of the respective colleges and libraries.

It was found from the study that out of 85 libraries, one library is headed by a BLISc (Bachelor of Library and Information Science) holder person and 32 librarians are holding MLISc (Master of Library and Information Science). M.Phil. (Master of Philosophy) completed by 4 librarians. 21 librarians qualified SET (State Eligibility Test) from Maharashtra and 1 from out of Maharashtra region. NET (National Eligibility Test) completed by 7 librarians in Maharashtra and 8 librarians from out of Maharashtra regions. Ph.D. (Doctor of Philosophy) holders from Maharashtra are 4 and 2 from other states of India. It was also found that out of 85 colleges, 4 colleges are running without librarians in Maharashtra and 1 is from a different state.

4.3 Analyses of Data

The data were collected through an online Google questionnaire, observation of institutes' and libraries' websites and face to face as well as telephonic interviews and emails.

The data collection analyses aimed to explore the current status and system of collection management in architecture college libraries. Data entry was carried out in

the MS Excel sheet and used simple mathematical formulas for analysing data and prepared graphical pictures to present the statistic. Following are the details of targeted (115) architectural libraries.

4.3.1 Responses of Librarians on the library collection

The researcher framed the following questions to collect data from all targeted 115 Architecture college libraries to study the present status of their practices in their libraries:

4.3.1.1 Strength of Library (Resources)

This was to understand the nature of the collection and its volume in the library. This information helps to understand the fundamental nature of the library in the form of collection, its variety and scope for future growth.

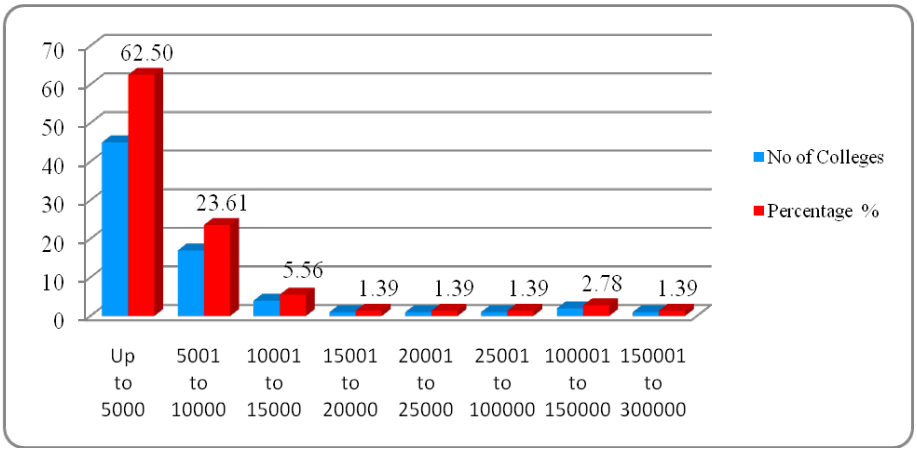
Data Analysis

a. Books

The total number of books and periodicals were enquired to know the strength of the collection of the libraries.

Table 4.12 Library Strength: Books

No of Books	No of Colleges	Percentage
Up to 5000	45	62.50
5001 to 10000	17	23.61
10001 to 15000	4	5.56
15001 to 20000	1	1.39
20001 to 25000	1	1.39
25001 to 100000	1	1.39
100001 to 150000	2	2.78
150001 to 300000	1	1.39
Grand Total	**72**	**100.00**



Graph 4.5 Library Strength: Books

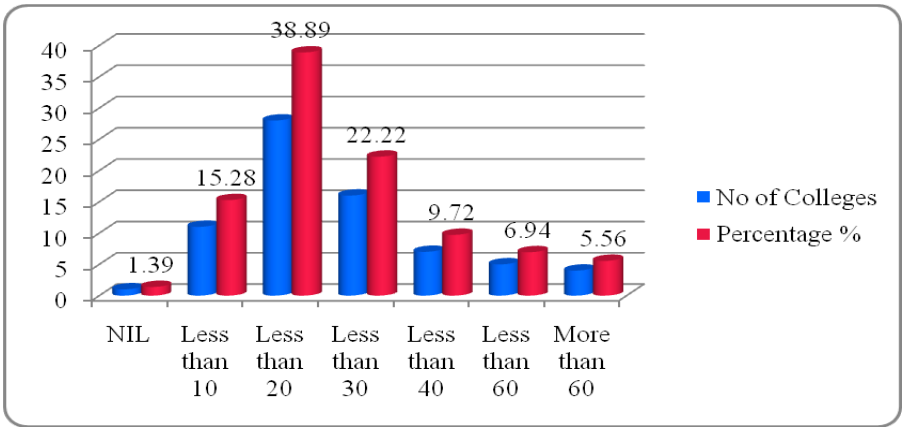
Observations:

The above graph no. 4.5 indicates that approximately 62.50% of colleges have a collection of books under 5000, 23.61% of colleges have up to 10,000 collections of books, and 5.56% of colleges have more than 1 lakh books in their collection. As per the survey data, 5.56% of libraries belonged to their central libraries, which catered to various subjects, and hence, their books collection is more than 1 lakh. Hence, it indicates that the libraries that fall under 5.56% of the collection are not entitled to more books on architecture discipline compared to the other architecture college libraries.

b. Periodicals

Table 4.13 Library Strength: Periodicals

No of Periodicals	No of Colleges	Percentage
NIL	1	1.39
Less than 10	11	15.28
Less than 20	28	38.89
Less than 30	16	22.22
Less than 40	7	9.72
Less than 60	5	6.94
More than 60	4	5.56
Grand Total	**72**	**100**



Graph 4.6 Library Strength: Periodicals

Observations:

1. Above graph 4.6 shows that 38.89% of libraries have a collection of periodicals up to 20 titles, and 22.22% of libraries subscribe up to 30 periodicals, and only 5.56% of libraries have the subscription of periodicals up to 60 titles.
2. These 5.56% of libraries are merged with their central library, which holds a collection of adequate numbers of journals for many different subjects.
3. Similar to the books collection, the periodicals subscribed through central libraries are not entitled to more architectural journals than the rest of the libraries.
4. After visiting these central library's websites, it was found that these 5.56% of libraries are facilitated with few more journals on Humanities and Town Planning, but there were no scholarly journals on architectural design.

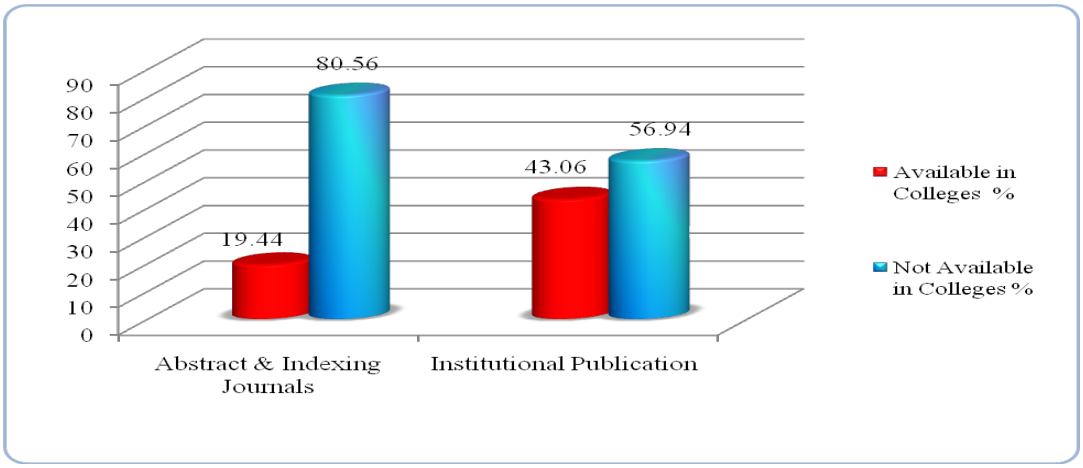
c. Library Strength: Indispensable Periodicals

These are the periodicals that play a vital role to enhance the research section by updating with latest publications in the market as well as in-house.

Data Analysis

Table 4.14 Library Strength: Indispensable Periodicals

Library strength	Available in Colleges	Not Available in Colleges
Abstract & Indexing Journals	14 (19.44%)	58 (80.56%)
Institutional Publication	31 (43.06%)	41(56.94%)



Graph 4.7 Library Strength: Indispensable Periodicals

Observations:

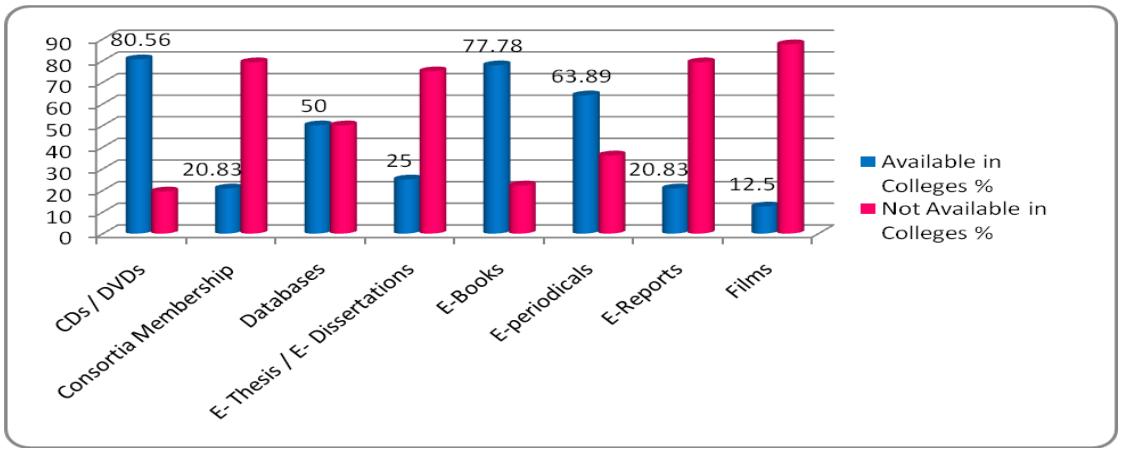
1. Only 19.44% of libraries are offering abstracting and indexing journals, which is very important to search for the content of current publications.
2. Out of 72 colleges, only 43.06% of libraries have a collection of their institutional publications. It is beneficial to have an institutional publication to know and store the footprints of institutional creativity.

d. Electronic Resources

Data Analysis

Table 4.15 Library Strength: E-Resources

Resources	Available in Colleges (%)	Not Available in Colleges (%)
CDs / DVDs	58 (80.56)	14 (19.44)
Consortia Membership	15 (20.83)	57 (79.17)
Databases	36 (50.00)	36 (50.00)
E-Thesis/Dissertations	18 (25.00)	54 (75.00)
E-Books	56 (77.78)	16 (22.22)
E-periodicals	46 (63.89)	26 (36.11)
E-Reports	15 (20.83)	57 (79.17)
Films	09 (12.50)	63 (87.50)



Graph 4.8 Library Strength: E-Resources

Observations:

1. Graph no. 4.8 indicates that out of 72 college libraries, only 25% of libraries initiated to collect e-dissertations and thesis. Rest, 75% of libraries have no collection of e-dissertation and thesis.
2. Out of 72 college libraries, only 20.83% of libraries have a collection of e-reports. These e-reports contain in-house activities as well as outside reports collected by libraries.
3. 50% of college libraries have a subscription of databases, and out of those, maximum libraries have databases that are offered by INFLIBNET and DELNET, etc. e-books and e-journals are also through these databases which are not purely on architectural discipline.
4. Some of the architectural libraries subscribe to a few databases, i.e., JSTOR, k-hub' and 'Charles Correa Archives' which are the only databases that include architectural contents.
5. From the 72 college libraries, only 77.78% of libraries have eBooks that contain purchased, subscribed, and free e-books. Mostly subscribed are through INFLIBNET and DELNET databases.
6. Out of 72 college libraries, 63.89% of libraries have e-periodicals, which are significantly less in numbers and again included both paid and free periodicals.
7. Only 20.83% of libraries were members of some consortia, which are free from INFLIBNET, DELNET, etc. and mostly serve for Arts, Science and

Commerce subjects. There is no consortia-based subscription for architectural discipline in India.

8. Out of 72 college libraries, only 12.50% of libraries have a collection of films which are very important for 'Humanity' and 'Town Planning' subjects.
9. 80.56% of libraries have a collection of CDs and DVDs which contain books, drawings, etc. but these are not managed well by any libraries to give instant remote access. Only a few libraries have catalogued CD / DVDs collections.

e. Non-Book Materials

Architecture college library contains various non-book materials like measured drawings, maps, development sheets, samples, models, Project reports, question papers, thesis dissertations and photographs etc. which help to understand subjects like 'Urban Design' and 'Construction'.

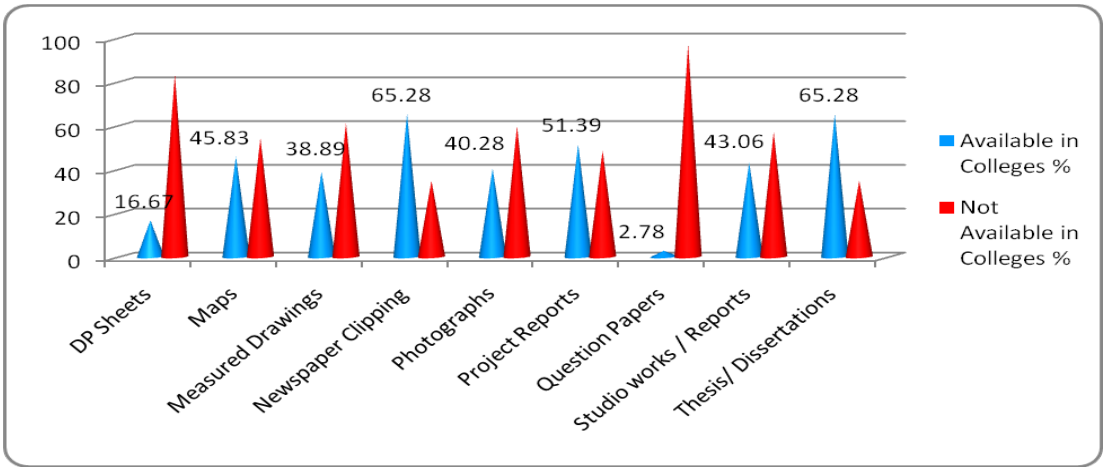
The understanding of these materials helps us to study the special nature of the libraries dedicated to the subject.

Data Analysis

Following are collection figures of targeted architecture college libraries.

Table 4.16 Library Strength: Non-book Materials

Resources	Available in Colleges (%)	Not Available in Colleges (%)
DP Sheets	12 (16.67)	60 (83.33)
Maps	33 (45.83)	39 (54.17)
Measured Drawings	28 (38.89)	44 (61.11)
Newspaper Clipping	47 (65.28)	25 (34.72)
Photographs	29 (40.28)	43 (59.72)
Project Reports	37 (51.39)	35 (48.61)
Question Papers	02 (02.78)	70 (97.22)
Studio works / Reports	31 (43.06)	41 (56.94)
Thesis/ Dissertations	47 (65.28)	25 (34.72)



Graph 4.9 Library Strength: Non-book Materials

Observations:

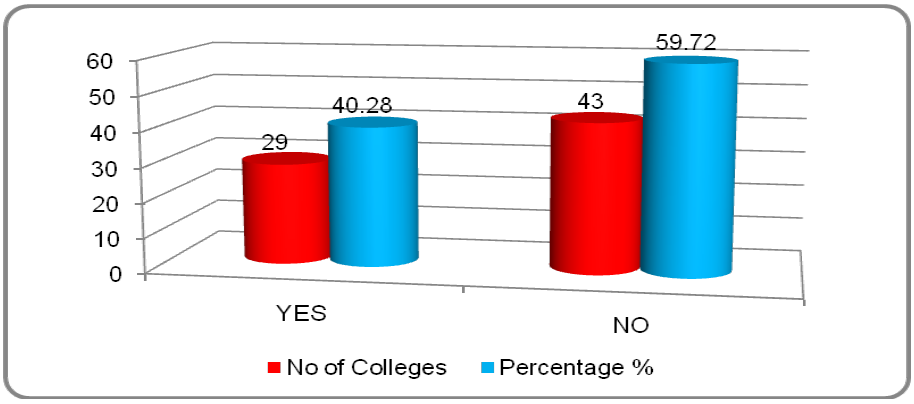
1. The above graph shows that 45.83% of libraries have a collection of maps, but only 16.67% of libraries contain development sheets, which is very important for subjects like Town Planning or Area Planning.
2. According to the analysis of data presented in graph 4.7, it was found that only 38.89% of libraries have a collection of measured hand drawing, and more than 60% of libraries have not initiated to collect architectural drawings that are created in all architectural institutions.
3. Out of 72 libraries, 43.06% of libraries have collected studio works, and 51.39% libraries have collected their institutional projects reports to add as their library collection.
4. The libraries also have other collections like newspaper clippings, photographs, and question papers, but these materials are not even catalogued in many architectural libraries.
5. Almost all the libraries except new colleges, i.e., 65.28% of libraries have good volumes of dissertation/thesis collection except 25 new colleges, which were not completed five years to collect dissertations. These are in printed form.
6. From the analysis of the above data, it can be visualized that non-book materials are available in many libraries but not managed properly to give instant access to their patrons.

4.3.1.2 Material Libraries

Material library is an essential element of architecture discipline. Fixtures, fittings, building materials, samples, and models are vital parts of the materials section of an architecture college library. Despite the availability of information online, architecture college libraries still need to house physical samples of the latest construction materials readily available in the market to impart practical knowledge to learners.

Table 4.17 Material Libraries

Separate Material Library	No of Colleges	Percentage %
YES	29	40.28
NO	43	59.72
Total	**72**	**100.00**



Graph 4.10 Material Libraries

Observations:

It was found from the survey that only 40.28 % of colleges have a separate section for a material library. However, the libraries have not catalogued the resources of their material libraries. Material Library is essential as the material section plays a vital role in an architectural library to impart knowledge about various materials used for construction.

4.3.1.3 Library Management

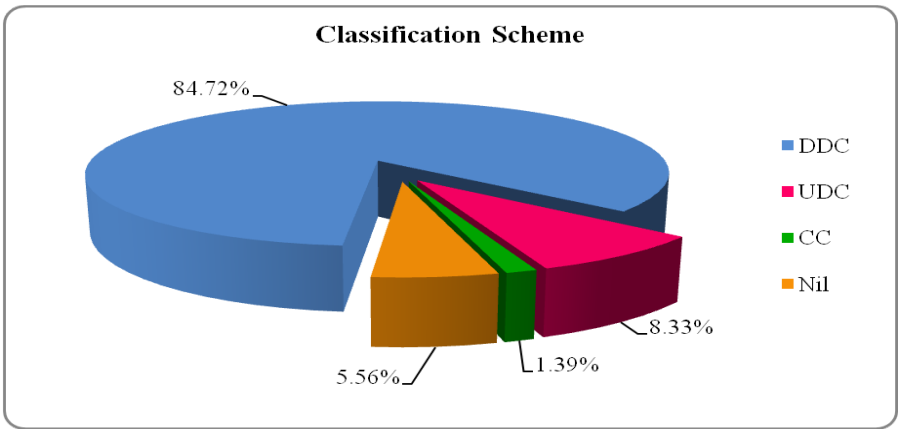
Library management is essential for users to receive immediate and prompt as well as quality services. Management includes day to day activities of the library like classification, cataloguing, indexing, acquisition and other managerial functions.

i. Classification Scheme

Data Analysis

Table 4.18 Classification Scheme

Classification Scheme	DDC	UDC	CC	Nil	Total
No of Colleges	61	6	1	4	72
Percentage	84.72	8.33	1.39	5.56	100



Graph 4.11 Classification Scheme

Observations:

1. The above graph 4.11 indicates that 84.72% of libraries used DDC (Dewey decimal classification), 8.33% of libraries used UDC (Universal Decimal Classification) and only one library used CC (Colon Classification).
2. Out of 72 libraries, 5.56% of libraries are not using any standard classification scheme.

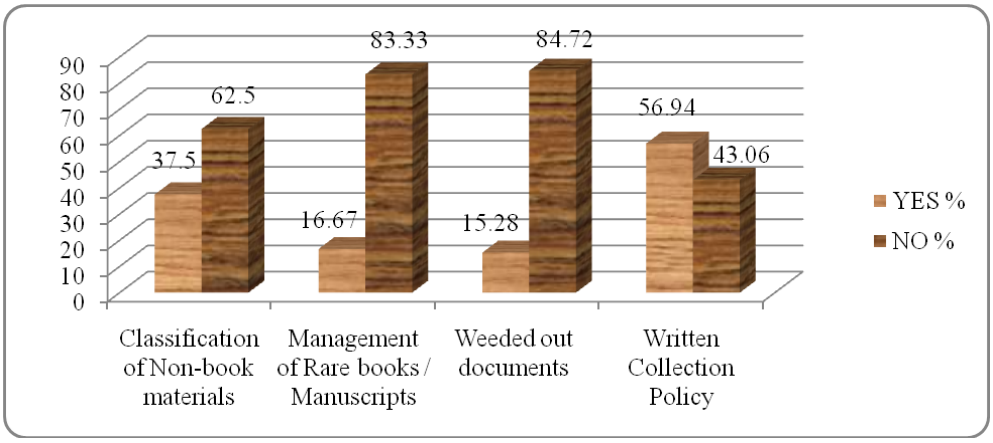
ii. Classification of Non-Book Materials

The classification of Non-book material is an essential activity to give access to the entire collection of a library. Hence the following information was sought from the targeted architecture college libraries.

Data Analysis

Table 4.19 Classification of Non-Book Materials

Library Maintenance	YES	NO
Classification of Non-book materials	27 (37.50%)	45 (62.50%)
Management of Rare books / Manuscripts	12 (16.67%)	60 (83.33%)
Weeded out documents	11 (15.28%)	61 (84.72%)
Written Collection Policy	41 (56.94%)	31 (43.06%)



Graph 4.12 Classification of Non-Book Materials

Observations:

- Out of 72 libraries, only 37.50% of libraries have classified their non-book materials for ease of access to those resources.
- Out of 72 libraries, 56.94% of libraries have written collection management policy.
- As per the data collected, only 16.67% of libraries have rare books, but there is no special management for rare books/ manuscripts.
- Out of 72 libraries, only 15.28% of libraries had initiated to weed out the old and fragile documents. It is one of the essential activities among library collection management.
- It can be drawn from the above table that most of the architectural libraries do not have a written collection management policy, which leads to neglect for non-book materials management. It is preferred to have this policy in written form which needs to be reviewed periodically as per the situations and change in environment.

- Only a few libraries have a rare book collection, and it was not appropriately managed.

4.3.1.4 Use of technology

The technology used by the architecture college libraries was inquired, and the following are the responses:

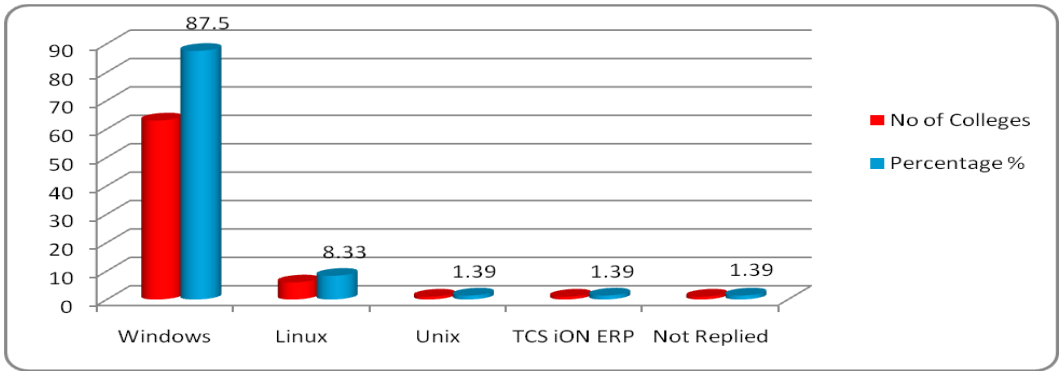
i. Operating System

Selection of operating systems is a very crucial part of starting library automation. The operating system of all targeted colleges was inquired, and following are the responses:

Data analysis:

Table 4.20 Operating System

Operating System	Windows	Linux	Unix	TCS iON ERP	Not Replied	Total
No of Colleges	63	6	1	1	1	72
Percentage	87.5	8.33	1.39	1.39	1.39	100



Graph 4.13 Operating System

Observations:

Out of these 72 libraries, 87.50% of libraries are using Windows operating systems for library automation, and only 8.33% of libraries are using a Linux System. Macintosh Operating System (Mac OS) or Unix and TCS iON ERP are used by only two libraries.

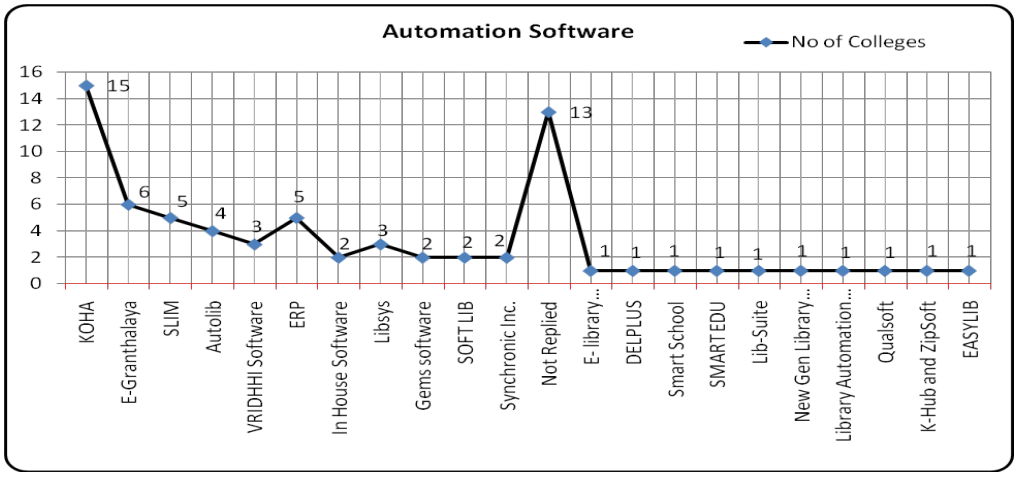
ii. Automation of Library

Nowadays, numerous library automation software are available in the market, and the following are the responded software:

Data Analysis

Table 4.21 Automation Software

Automation Software	No of Colleges
KOHA	15
E-Granthalaya	6
SLIM	5
Autolib	4
VRIDDHI Software	3
ERP	5
In House Software	2
Libsys	3
Gems software	2
SOFT LIB	2
Synchronic Inc.	2
Not Replied	13
E- library Management	1
DELPLUS	1
Smart School	1
SMART EDU	1
Lib-Suite	1
New Gen Library Software	1
Library Automation Software	1
Qualsoft	1
K-Hub and ZipSoft	1
Easylib	1
Total	**72**



Graph 4.14 Automation Software

Observations:

The above graph reflects that 15 (20.83%) libraries were using 'KOHA', and 6 libraries are using E-Granthalaya software for library automation. Five libraries are using 'ERP', four libraries are using 'Autolib' and 'VRIDDHI' Software. Five libraries used 'SLIM' software whereas the rest of the 24 libraries are using different library automation software, which is not very popular worldwide. From the total 72 libraries responded, 13 libraries are not using any automation software. Also, out of these 59 automated libraries, 8 libraries are using data management software which does not facilitate the complete library automation system.

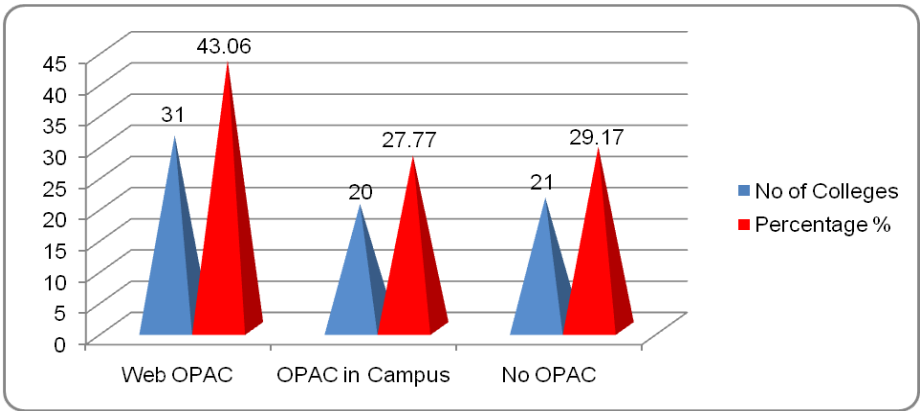
iii. OPAC of Library

Availability of OPAC is an essential feature of the library. Library users can access library resources from remote locations through OPAC.

Data Analysis

Table 4.22 Use of OPAC

Library Catalogues	Web OPAC	OPAC in Campus	No OPAC	Total
No of Colleges	31	20	21	72
Percentage	43.06	27.77	29.17	100



Graph no. 4. 15 Use of OPAC

Observations:

1. From the collected data, it is found that 43.06% of libraries were using Web OPAC, 27.77% of libraries have OPAC on the intranet, and 29.17% libraries have no OPAC.
2. The data shows that 29.17% of libraries have not done automation for their library collection.
3. 29.17% of libraries have no OPAC facilities, 8 libraries were using data management software which does not contain a catalogue browsing system (OPAC).

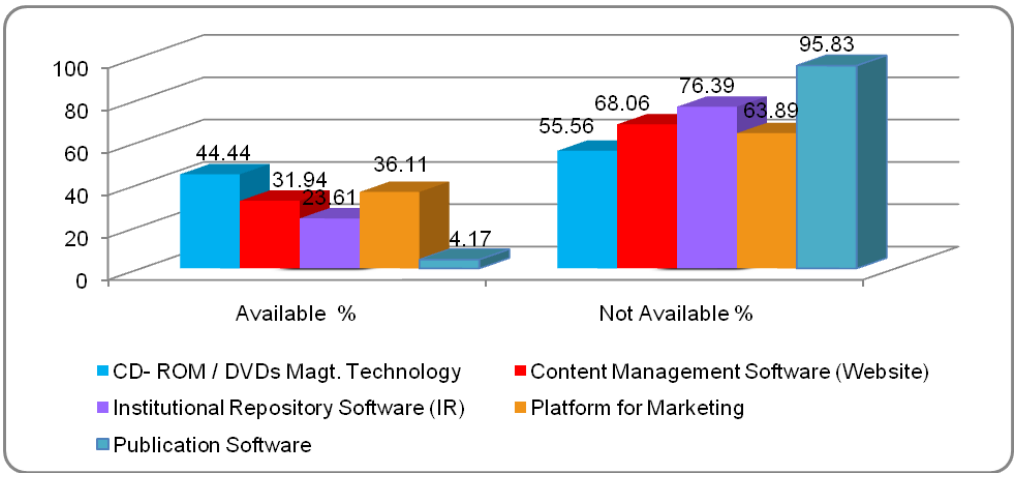
iv. Use of ICT

Use of ICT in architecture college libraries is helpful to tackle the problem of information explosion which facilitates the process of identification, collection, storing, processing and disseminating of information to the targeted users efficiently. Implementation of Information Communication Technology (ICT) tools in the targeted libraries were investigated and collected the following data. Different software and tools used for various activities were investigated. Activities like which software for automation, publication software, creating institutional repository and library websites are also investigated. What kind of tools are used for updating library users with new arrivals as well as the unique collection was surveyed.

Data Analysis

Table 4.23 Implementation of ICT Tools

Library Management Systems	Available	Not Available
CD- ROM / DVDs Management Technology	32 (44.44 %)	40 (55.56%)
Content Management Software (website)	23 (31.94%)	49 (68.06%)
Institutional Repository software (IR)	17 (23.61%)	55 (76.39%)
Platform for Marketing	26 (36.11%)	46 (63.89%)
Publication software	03 (04.17%)	69 (95.83%)



Graph no. 4.16

Observations:

1. **CDs / DVDs Management:** Only 44.44% of libraries have arranged their CDs / DVDs collection, but not a single library is managed them with a server system to give online access to their patrons.

2. **Content Management Software (Library website):** 31.94% of libraries have initiated to create their website to host their library while 68.06% of libraries have yet to undertake a library website separately.

3. **Institutional Repository:** Out of 72 libraries, only 23.61% of libraries have created Institutional Repository and 76.39% libraries were not initiated archive systems at all. These 23.61% libraries are similar to website status, it merged with their central libraries, and only e-dissertation and Ph.D. thesis were archived in their institutional repository. Only KRVIA (MH15) is the only

library that has created an institutional repository and archived all institutional grey literature.

4. **Publication software:** Only 4.17% of libraries are using open-source publication software to publish their in-house publication online.

5. **Library marketing Platform:** Out of 72 libraries, only 36.11% of libraries are using social media, library web sites as well as institutional websites, WhatsApp, email, and telegram app to advertise their library collection and send alert messages to their patrons.

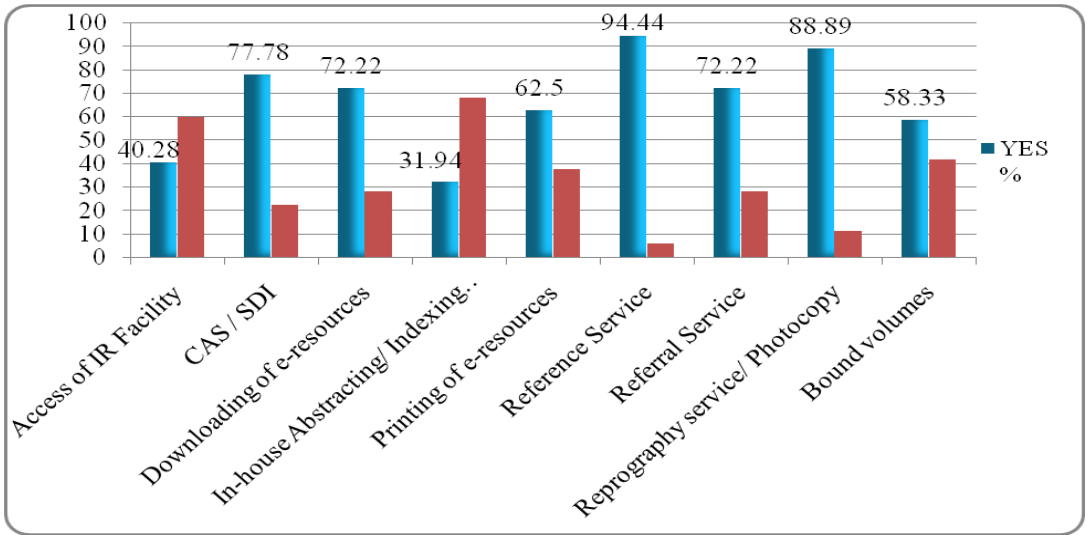
4.3.1.5 Library Services

Based on the information needs of users, students and the subjects studied in the institutions; library services have to be well planned and executed accordingly for satisfying their needs.

Data Analysis

Table 4.24 Library Services

Library Services	YES (%)	NO (%)
Access to IR Facility	29 (40.28%)	43 (59.72%)
CAS / SDI	56 (77.78%)	16 (22.22%)
Downloading of e-resources	52 (72.22%)	20 (27.78%)
In-house Abstracting/ Indexing Service	23 (31.94%)	49 (68.06%)
Printing of e-resources	45 (62.50%)	27 (37.50%)
Reference Service	68 (94.44%)	04 (05.56%)
Referral Service	52 (72.22%)	20 (27.78%)
Reprography service/ Photocopy	64 (88.89%)	08 (11.11%)
Bound volumes	42 (58.33%)	30 (41.67%)



Graph 4.17 Library Services

Observations:

1. The table shows that 88.89% of libraries and 94.44% of libraries have reprographic and reference services facilities. 72.22% of libraries are serving referral services, and 77.78% of libraries are giving CAS / SDI services. 31.94% of libraries are providing in-house abstracting and indexing services.

2. 40.28% of libraries uploaded information about their e-resources on their institutional website; however, as per their websites, the full text is accessible only in the library on a demand basis. Only 31.94% of libraries have taken the initiative to index the content of library resources. Approximately 67.36% of libraries provide facilities to print and download e-resources to their patrons.

3. All these 72 libraries do not have bound volumes of old issues of periodicals. Out of 72 libraries, only 58.33% of libraries were bound by their past issues of periodicals to maintain proper way and the remaining 41.67% of libraries store their old issues of periodicals as it is.

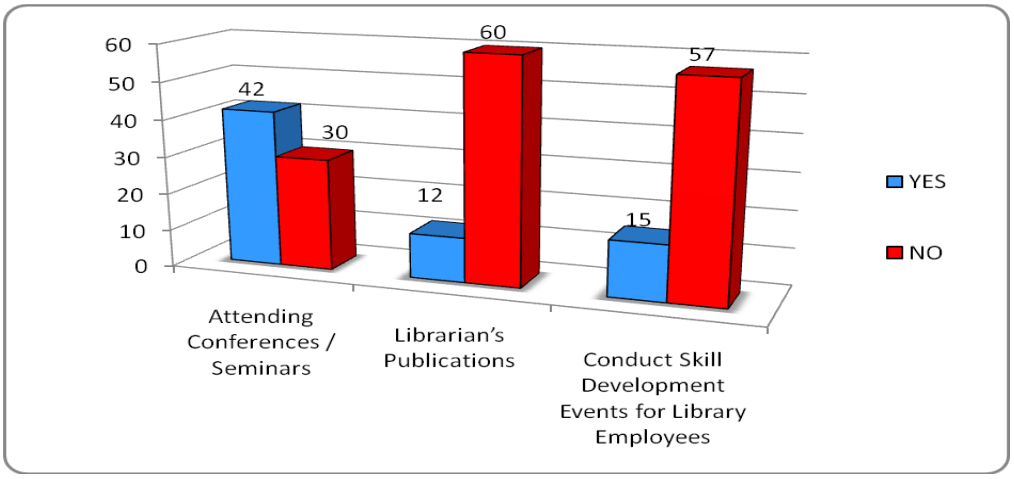
4. It can be drawn that almost all libraries are giving the above-mentioned essential and traditional services to their patrons.

4.3.1.6 Academic Events Attend and conduct by library and library professionals:

Libraries and librarian's activity for skill development by attending and conducting events was inquired.

Table 4.25 Events attended / conducted by library professionals

Academic Events	YES	NO
Attending Conferences / Seminars	42	30
Librarian's Publications	12	60
Conduct Skill Development Events for Library Employees	15	57



Graph 4.18 Events attended / conducted by library professionals

Observation:

As on the above table, out of 72 librarians, only 42 librarians attended conferences and seminars, and 12 librarians have published articles. Data also presents that only 15 libraries took the initiative to conduct skill development programmes for library users and professionals.

4.3.1.7 Library Security

Table 4.26 Library Security

Security of library resources	Report
Preservation & Conservation of Rare Documents	6 Libraries have separate shelves and No conservation facility.
Backup of e-resources	4 Libraries take backup of IR in hard disk & 35 libraries (store e-books in hard disk)

Action against lost books and misuse of library resources	72 libraries recover the book cost
CCTV / RFID installation	42 CCTV & 4 RFID

Observation:

The table presents the following points:

- Out of 72 librarians, only 6 libraries have separate shelves to preserve rare and old documents, and no libraries have conservation facilities.
- Only 4 libraries take backup of their IR regularly.
- Only 35 libraries store their free e-books on their hard disk.
- 42 libraries have installed CCTV for security purposes.
- 4 libraries implemented an RFID system for overall library security purposes.
- All 72 libraries recover the cost of the book lost or damaged by users.

4.3.1.8 Librarian's Opinion

The researcher has sought opinions on the use of various library resources, grey literature, and subscription of consortia.

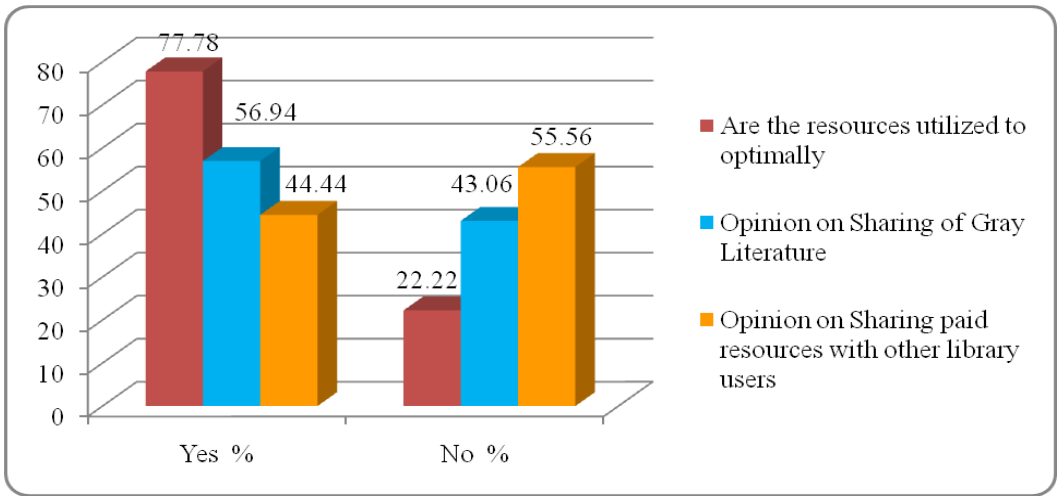
Data Analysis

Table 4.27 Librarian's Opinion

Utilization of Resources	Yes	No	Total
Are the resources utilized to optimally	56 (77.78%)	16 (22.22 %)	72 (100 %)

Sharing of Grey Literature	Yes	No	Total
Do you want to share Grey Literature with other architectural college libraries?	41 (56.94%)	31 (43.06 %)	72 (100 %)

Consortia-based Subscription	Yes	No	Total
Would you like to join a consortia-based subscription with the community libraries?	32 (44.44%)	40 (55.56%)	72 (100 %)



Graph 4.19 Librarian's Opinion

Observations:

1. Graph no. 4.19 specifies that out of 72 responded libraries, 56.94% of libraries showed interest in sharing their grey literature, and 44.44% of libraries showed interest in joining consortia-based subscription with architectural libraries.
2. 77.78% of libraries expressed optimism for the ultimate utilization of their collection and also expressed that they did not have enough collection.

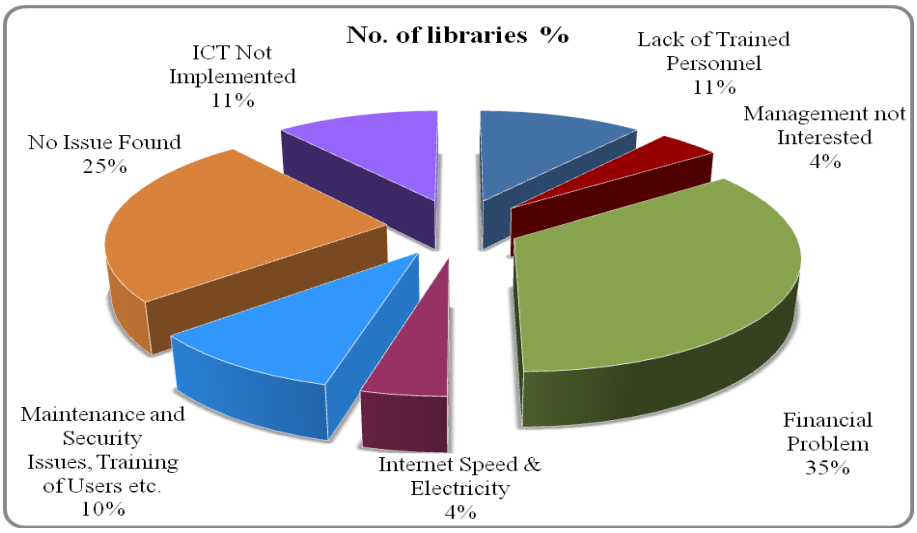
4.3.1.9 Problems faced while implementing ICT in the libraries

Most of the libraries have no trained persons to look after their technology and e-resources. Some mentioned a budget issue to implement ICT in their Library. It was also found that the libraries which are located in rural areas face internet issues and lack of trained personnel for IT support.

Table 4.28 Problems faced while implementing ICT

Difficulties / barriers faced while Implementing ICT in library	No. of libraries	Percentage
Lack of Trained Personnel	8	11.11%
Management not Interested	3	04.17%
Financial Problem	25	34.72%

Internet Speed & Electricity	3	04.17%
Maintenance and Security Issues, Training of Users	7	09.72%
No Issue Found	18	25.00%
ICT Not Implemented	8	11.11%
Total	72	100%



Graph 4.18 Problems faced while implementing ICT

Observation:

The graph no. 4.18 presents that out of 72 libraries, 35% of libraries expressed having a financial problem. 11% of libraries have no trained persons to maintain technology implemented in their libraries and train users. 4% of libraries mentioned about not getting support from college management or authority. 4% of libraries are facing problems like slow internet and electricity. 11% of libraries have not found any problem implementing ICT in their libraries. 25% of libraries have mentioned not implemented ICT yet.

4.4 Survey of Library Websites

For the present study, the researcher has selected all COA approved colleges from Maharashtra however, since no other study was found at a national level and also to suggest the model for other libraries in the same field, the researcher intended to study libraries which are at a national level. Accordingly, the researcher has selected 12

architectural colleges from different states which were established before 1970 along with the colleges from Maharashtra. Out of these 12 libraries, only 3 libraries responded to the questionnaire, and remaining were surveyed by visiting their library websites. The details are only of the collection on architectural discipline that the libraries contain. The libraries are divided by central libraries and individual libraries.

Following are the reports gathered from websites of those targeted libraries which have not responded (9 libraries) to the questionnaire:
(Serial numbers are mentioned in the list attached in **Appendix-II)**

4.4.1 Central Libraries

1. **Sl. No. 115 (WB01)**

Name	**Dept. of Architecture, Town and Regional Planning, (1950)**
Address	Indian Institute of Engineering Science and Technology, HOWRAH-711 103
Web Site	https://www.iiests.ac.in/IIEST/Library (Institute website) https://library.iiests.ac.in:30000/dqpas/ (Library website)
Courses:	B. Arch. M. Arch and Ph.D.
Details:	The library was established in April 1857, and the architectural collection was started in 1950 when the department was started. The department is a part of the 'Indian Institute of Engineering Science and Technology', Shibpur. The library is a part of the central library, which is known as 'Ramanujan Central Library' and the only introduction is available on the website.
Affiliation	Indian Institute of Engineering Science and Technology, Shibpur (West Bengal)
Collection	(Central Library) The library has a collection of 1.50 lakhs books with 40 thousand bound volumes. The collection of 1.50 lakhs books comprises 16 Engineering departments including the Architecture department. E-journals: ➢ American Society of Civil Engineers (ASCE) Journals**:** It gives

	full-text access to 35 civil engineering journals, transactions and magazines with archives since 1995. ➢ Economic and Political Weekly (EPW) ➢ Wiley online journals online journals. ➢ Taylor & Francis, online journals.
Library Software	LIBSYS-7 with Web OPAC. Institutional Repository (URL not accessible on the internet)
Databases Subscribed	JSTOR, AICTE-INDEST, UGC-INFONET digital library consortium and Elsevier ScienceDirect. **Wiley online books** for Architecture and Planning. **McGraw-Hill (India)** for Humanities and very little on Cities and Urban culture **Springer:** Environmental Management, Human Geography and Philosophy subject. **Wiley databases:** Architecture & Planning and Humanities subjects **Taylor & Francis database:** Architecture Design, Humanities and Environment

2. Sl. No. 110 (WB02)

Name	**Faculty of Architecture & Regional Planning, IIT Kharagpur (1951)**
Address	KHARAGPUR-721 302, West Bengal
Web Site	http://www.library.iitkgp.ac.in/
Courses	B.Arch. M. Arch. and Ph.D.
Details	The central library collection is in 19 different departments including Architecture and Regional Planning. The architectural department uploaded their architectural Ph.D. thesis in their institutional repository, but outside users need to obtain prior permission to download the full text.
Affiliation	I.I.T. Kharagpur, (West Bengal)
Collection	(Central Library) ➢ collection of more than 3.5 Lakh documents, subscribing about

	100+ print journals and providing access to over 26,000+ online full- text journals and several abstracting databases. Besides, there are **1,35,000+ e-books**. ➢ JCPDS, Bloomberg, ProwessIQ & "Spoken English Tutorial" are the offline database services present in Digital Library IIT Kharagpur.
Library Software	LIBSYS 7 9web OPAC), DSpace (IR)
Databases Subscribed	J-Gate, JSTOR, ProQuest, IEEE journals, IndiaStat, GeoScienceWorld and GeoRef Database, Emerald Insight etc. (These are having contents on architectural discipline)

The architectural department library is a part of the Central Library of IIT Kharagpur. The Central Library has an Institutional Repository (IR) where architectural Ph.D. these were uploaded, but outside users need to take prior permission to download the full text. Archiving in-house architectural contents are not initiated yet, though the architectural department was founded in 1951.

Apart from the IR, the library has a separate digital library for public, i.e. National Digital Library of India (NDLI) which was initiated in 2006. The NDLI covers subjects like Humanities, History and Geography, which is related to architectural discipline.

3. Sl. No. 109 (GJ01)

Name	**Department of Architecture M. S. University of Baroda (1954)**
Address	Pratapgunj, VADODARA - 390 002
Web Site	https://www.msubaroda.ac.in/
Course	B.Arch. M. Arch. and Diploma
Details	The library is a part of the university central, i.e. Shrimati Hansa Mehta Library which was established in the year of 1950. As a government institution, the library is using 'SOUL 2.0' software with web OPAC facility. The library gives open access to their Ph.D. thesis. The library also gives the facility of using anti-plagiarism software 'Urkund and

	Guide' and links of open source resources. The Central Library has an Institutional Repository (IR) with DSpace software, which is openly accessible, but architectural contents are nil.
Affiliation	M.S. University of Baroda, Vadodara
Collection	Collections are on 19 Engineering disciplines including the Architecture department
Library Software	SOUL 2.0, DSpace
Databases Subscribed	No information on the website

4. **Sl. No. 113 (MP01)**

Name	**Department of Architecture Maulana Azad National Institute of Technology (1963)**
Address	BHOPAL-462 007
Web Site	http://www.manit.ac.in/about-central-library
Courses	B.Arch. and M. Arch.
Details:	The library is merged with the central library of the university. The central library collection is on following disciplines: • Architecture and Planning • 8 Engineering departments • Humanities • 3 Science departments • Management studies
Affiliation	M.A.N.I.T. BHOPAL
Collection	(Central Library) The library has a collection of 1,14,694 books and out of these 26,025 books are kept in the book bank section. These books contain all the subjects of their various departments. The central library also has 9 periodicals with 12,100 back volumes. It

	has 2044 CDs and 15 printed newspapers. ➢ ESS IOP Science e-Journals Collection (76 Journals) on a perpetual basis ➢ Emerald e- Shodhsindhu Special Package e-Journals Collection, 310 Journals ➢ Pearson ebooks Package for Humanities & Social Science ➢ TMH eBooks Package for Humanities
Library Software	They are not mentioned on the site.
Databases Subscribed:	➢ **JSTOR**: Architecture and Architectural History, Garden & Landscape and Humanities. ➢ E-Shodhsindhu ➢ ScienceDirect ➢ Bloomsbury's e-books ➢ Elsevier's e-books ➢ Taylor & Francis ebooks ➢ DELNET consortium

5. Sl. No. 112 (KL01)

Name	**Department of Architecture College of Engineering (1964)**
Address	THIRUVANANTHAPURAM-685 016, Kerala
Courses	B.Arch. and M. Arch.
Web Site	https://www.cet.ac.in/technical-library/ (Library) https://www.cet.ac.in/architecture/ (Institute)
Details:	The library was merged with the central library of the university. The libraries collect resources on the following disciplines: ❖ 1 Architecture department ❖ 6 Engineering departments
Affiliation	Kerala University
Collection	(Central Library) The library has a collection of 3 lakhs 9 thousand which divided into four (4) sections as follows:

	Lending section : 42740 Reference section : 23000 Book bank section : 24013 The library has 43 magazines and 138 journals with 11,216 back volumes. Apart from printed books and periodicals, the library also has 172 e-books and 2500 e-journals. The 'Book bank' facilitates SC/ST and OBC students who fall under the low-income category.
Library Software	They are not mentioned on the site.
Databases Subscribed	ScienceDirect Publications, ASME, ASCE, IEEE etc. An EPABX for the intercom facility of the college is also housed here.

6. **Sl. No. 111 (KA01)**

Name:	**School of Architecture University Visvesvaraya College of Engineering, (1967)**
Address:	Jnana Bharathi, BANGALORE - 560 056
Web Site:	https://uvce.ac.in/library_hostel.php
Courses:	B. Arch. and M. Arch.
Details:	The architecture school has been offering the B.Arch. course since 1976 and two M. Arch courses. The website has mentioned that it has a separate library in the department, and the library is well equipped which has been serving as a resource centre to the department.
Affiliation:	Bangalore University
Collection:	1.55 lakhs books and journals are covering various branches of engineering and architectural books.
Library Software:	
Databases Subscribed:	IEEE ASME, ASCE and Springer Publication and e-books.

From the libraries mentioned above, it can be drawn that the collection of all these central libraries are mostly based on engineering-based subjects, and very few subscriptions are related to architectural discipline. Less number of periodicals and databases are related to Humanities and Architecture discipline. Similarly, out of 6 central libraries, only three libraries have archived in their institutional repositories, and only architectural dissertation and thesis are available. It reveals that these central libraries did not initiate extra efforts for their architectural department.

4.4.2 Individual libraries

1. **Sl. No. 108 (DL01)**

Name:	**School of Planning and Architecture (1952)**
Address:	NEW DELHI-110 002
Web Site:	http://spa.ac.in/User_Panel/UserView.aspx?TypeID=1489
Courses:	B.Arch. M. Arch. Ph. D. and Online programmes.
Details:	The school maintains two libraries for Planning and Architecture. The 'LibSys' software was used for automation. One advisory committee was formed that looked after both the libraries. SPAS, Delhi who have 83,091 books, 98 periodicals, and out of those, 28 were printed, and 69 were e-journals. The library subscribed to the JSTOR database. No digital library or institutional repository was initiated. The library has an inter-library loan through the DELNET membership.
Affiliation:	School of Planning and Architecture (SPA)
Collection:	➢ 83091 books on Area Planning and Architecture, Management, social science and related subjects ➢ 98 periodicals.
Library Software:	LIBSYS software
Databases Subscribed:	JSTOR

2. **Sl. No. 114 (TN01)**

Name	**School of Architecture & Planning (SPA), (1957)**
Address	Sardar Patel Road, CHENNAI-600 025
Web Site	https://www.annauniv.edu/Architecture/facilities.php
Courses:	B. Arch, M. Arch and Ph.D.
Details:	The institute conducts Bachelor, Master and Ph.D. courses. The library gets a fair amount of funding as the institution is a government institute. The speciality of this architectural department is the 'Materials Museum' which contains various traditional as well as modern building materials to impart practical knowledge to their students.
Affiliation:	Anna University
Collection:	The library has 13,000 collections of books.
Library Software:	Not mentioned on the site.
Databases Subscribed:	Not mentioned on the site.

3. **Sl. No. 107 (CH01)**

Name	**Chandigarh College of Architecture (1961)**
Address	Sector 12, CHANDIGARH – 160 012
Web Site	http://cca.edu.in/#Academic%20Infrastructure
Courses	B. Arch and M. Arch.
Details	The library has 26,165 books and 53 national and international journals. The library was automated with 'Lease' software and given the facility of web OPAC. The unique part of this library had a museum on building materials which exhibits a good number of student's work like models, samples of building materials, many fixtures and furniture, etc.
Affiliation	Punjab University
Collection	26,165 titles books and 53 periodicals

Library Software	Lsease software with web OPAC
Databases Subscribed	Information not available

It can be assumed that the above mentioned 3 libraries were founded immediately after independence and hence, good numbers of the collection along with valuable rare books are available. However not a single library has initiated conservation, archive and enough scholarly subscription facilities despite having Master, Doctoral and Research programmes.

4.5 Addendum

Few ideas based on the questionnaire were distributed among a few personnel to get their opinions and suggestions. Some of them were interviewed face to face, few over a telephone call and a few over emails.

The idea of a networking and resource sharing system was proposed to these professionals in a sense to know their views.

4.6 Feedback of Interviews

Following personnel who have expressed their views on architectural library network and resource sharing system:

Name	**Designation**
Mr. Khan Habeeb Ahmad	**The Chairman of the Council of Architecture (COA).**
Points Mentioned during Interview 1. The chairman of COA appreciated the idea of digitizing institutional grey literature as well as published literature and networking between Indian architecture college libraries. 2. He also added that the COA would start the project as early as possible. 3. He opined on a consortia-based subscription that COA will initiate shortly to facilitate the researcher of the architectural discipline.	

Name	Designation
Mr. Vijay Garg	**Former Acting Chairman of COA**
1. Mr. Garg expressed his view that COA can ask all the architectural institutions to digitize all grey literature as well as all research publications and create an institutional repository that can help to initiate the networking and resource sharing system. 2. He also mentioned the Research and Training Centre (RTC) of COA, which is located in Pune, Maharashtra and is the hub to start the system. 3. Mr. Garg appreciated the idea of a consortia-based subscription. He stated that COA had explored the option and did some casework which can be a significant step forward. 4. He also noted that COA could use the model developed by the researcher as a test case.	

Name	Designation
Mr. Rajiv Mishra	**Director of Sir J.J. College of Architecture, Mumbai**
Mr. Mishra also liked the idea of sharing and networking among architecture college libraries, and he suggested alike Mr. Habeeb and Mr. Garg start the system through the Research and Training Centre of COA, Pune.	

Name	Designation
Mr. Aneerudha Paul	**Director of KRVIA, Mumbai**
1. Mr. Aneerudha Paul mentioned that architecture college organizes study and documentation exercises for students which document the social and architectural characteristics of places that are of immense cultural significance. However, these are unknown to many architecture students and faculties due to the vast diversity. This information can be shared through this common platform which could help students and faculty from all colleges to conduct their research or inform their project. 2. He also expressed that architectural thesis / dissertation done by students all over the country can be shared so that it can inform students to frame their	

research by adding to existing knowledge that has been created on a specific subject. 3. Lastly, he opined that this platform could be used to control plagiarism too.

Name	**Designation**
Ms. Tejaswini Joshi	**Librarian CEPT**
1. The librarian of CEPT informed that CEPT has an archiving facility, but it is only accessible to in-house users. 2. She also expressed that CEPT is planning to embark on a project on a digital library with DSpace. 3. With this initiative, CEPT can become an excellent contributor to enormous grey literature to the community through a networking system.	

The opinions expressed by stalwarts in the area of LIS and architecture discipline showed a need to manage library collections of architecture college libraries with the latest technology to start networking to share grey literature as well as library resources with the community libraries to give ultimate satisfaction to patrons.

All of them agreed and appreciated the idea of networking and resource sharing among the architectural libraries in India. They also express their view on framing an apex body to develop and connect Indian architecture college libraries.

4.7 Summary

In this chapter, data collected through questionnaire, survey and interview methods have been analysed and presented in five parts. The first part has analysed data on the introductory part of the institutions, libraries and librarians. It is observed that maximum colleges are un-aided, which affects the library budget.

The second part is on the strength of the library's collection. The presented data revealed that books collection is fulfilling the COA norms, but journal subscriptions cannot reach the course's requirement.

The third part presents the services provided to disseminate library information, and it was found that all architecture college libraries from Maharashtra are following

traditional patterns to disseminate information to their library users. However, out of 12 selected libraries, few libraries provide facilities like web-OPAC, remote access of thesis and dissertations etc.

The fourth part is on the implementation of ICT in the libraries. In this section, it was found that very few libraries are implementing software to create a library website and digital library, and not a single library is using modern services which are required in today's library.

The last part represents the librarian's opinion on uses of library resources, willingness to join consortia-based subscription and networking between architecture college libraries. The data states that users utilise maximum resources from the entire collection. Maximum librarians showed their willingness to join consortia and resource sharing through networking systems as the architectural publications are very expensive. The ultimate observation was, the libraries from out of Maharashtra are providing a better facility to some extent compared to the architecture college libraries from Maharashtra.

After analysing data, it gives an understanding that many architecture college libraries are not updated nor use modern technology to serve their patrons. Architecture college libraries of India lacking in managing and disseminating library information compared to the libraries of other disciplines.

It was noticed that the number of students and faculty members is increasing day by day, and hence library users are also growing. These growing library users need more attention to fulfil their information desires. Though architecture education in India was started in the British era, the libraries of those institutes are still functioning with the traditional system. They have not upgraded with advanced technology and facilities. The researcher realised a need to have a better system for architecture college libraries to work efficiently. Hence, an attempt has been made to develop a model and further details about the data analysis and recommendations elaborated in the next chapter.

CHAPTER – V
FINDINGS, SUGGESTION AND CONCLUSION

5.1 Introduction

This chapter summarizes the current collection management practice in architecture college libraries. It suggests some points to improve the collection management in architectural libraries in Maharashtra and other states of India.

A total of 103 colleges from Maharashtra and 12 other architectural institutes from different states of India which were established before 1970 were surveyed. Out of those twelve libraries, only three responded. The researcher visited websites of those nine institutes which did not respond to the questionnaire to inquire about their library's facilities and services. In the end, the hypothesis testing and future research scope have been presented.

5.2 Conclusion of Literature Study

The researcher has analyzed the right amount of literature worldwide on library collection management, ICT, and architectural libraries. Only a few resources were found on architecture college libraries, as publications on the particular subject are limited. Websites of all prominent architectural institutes in India were visited to inquire about their library details.

Related literature was reviewed on collection management guidelines of Library of Congress, Roger Williams University collection management policy, 2015, guidelines of American Library Association (ALA) to know the world-standard system of library collection management.

The researcher has interviewed some Libraries and Information Science and Architecture professionals to know about the present scenario and their future expectations.

5.3 Findings

Two separate surveys were conducted to collect data. Survey one was for librarians to know the present status of collection management of architecture college libraries in India.

The second survey was to collect the personal opinion of a few academicians of architecture and library science background. Also, information was gathered from targeted architecture college and library websites.

Following are the findings on survey one:

5.3.1 Finding Based on Questionnaire (Survey One)

Data were received from 72 libraries out of 115 libraries for the study. However, the remaining libraries were not interested in sharing their information despite several reminders and calls.

5.3.1.1 University wise distribution of colleges in Maharashtra

Out of 115 architecture colleges, it is found that 30 colleges are situated in Mumbai, and 25 are in Pune regions totalling 55 numbers which are more than 50% of architecture colleges registered in Maharashtra. Hence, both cities can take the initiative to create a system of resources sharing and networking. The Second preferred regions are Raigad and Nagpur.

5.3.1.2 Courses and student's Intake

From the data analyses, it is drawn that out of 115 architecture colleges, only 25 colleges conduct M. Arch. and 9 organizations offer Doctoral degrees.

It is also observed that COA approved 38,234 seats to conduct architecture bachelor and master courses for 115 colleges which could be considered as enough numbers to start a consortia system to streamline the research sector. Apart from these, Doctoral programmes are also offered by 9 colleges.

5.3.1.3 Aided and unaided colleges

Out of 103 architecture colleges, only 4 colleges are getting a grant from the government. The remaining 99 architecture colleges are private and unaided in Maharashtra. The report also shows that out of 12 select colleges, 10 colleges are aided, and 2 colleges are un-Aided. The survey data presents that 87.83% of architecture college libraries are un-aided, and only 13.86% of architecture college libraries are getting government grants.

5.3.1.4 Qualifications of the LIS Professionals

It is found from the survey, out of surveyed 85 (72 responded + 13 collected from websites) colleges, only 36 libraries are handled by qualified (as per UGC rules) librarians, including 4 research degree holders in Maharashtra. In 12 select libraries, all are qualified librarians, including 2 research degree holders. However, 5 libraries are running without librarians.

5.3.1.5 Library Strength on Book Collection

There are 62.50% of architecture college libraries have below 5000 books in their collection as these were established after the 1990s. Though, as per the COA norms, the collection of books is enough for those libraries. However, it needs more collection of reference books to enhance learners' skills. It is found from the survey that only 5.5% of libraries have more than 1 lakh collection of books because they are part of their central library which includes various subjects.

5.3.1.6 Library Strength on Periodicals

In all, 38.89% of libraries have 20 periodicals, and 22.22% of libraries have 30 periodicals. Out of these periodicals, mostly are magazines on architecture and other subjects. Only 5.5% of libraries have periodicals up to 60 titles which are a collection of adequate journals for many different disciplines as these are the collection of central libraries. However, out of these 60 titles, only two or three titles are on the subject of Humanities and Town Planning. It indicates that this 5.5% of libraries are not facilitated with more periodicals despite having decent numbers of periodical subscriptions.

5.3.1.7 Library Strength on Non-Book Materials

Non-book material plays a vital role in an architectural teaching-learning process. Non-book materials include maps, development sheets (area wise planning), topographical maps, measured drawings, photographs, project report and dissertation/thesis, which help students understand the subject better.

The survey data showed that less than 50% of libraries have a collection of maps, and only 16.67% of libraries have a collection of development sheets. These kinds of non-book resources are a must for a subject like Town and Area Planning.

Almost 60% of libraries have not initiated collecting architectural drawings and in-house reports that are created in all architectural institutions.

Apart from the materials mentioned above, an architectural library also contains materials like photographs, newspapers, question papers and a sample of sanitary fittings that are not even catalogued by any of the responded architecture college libraries. Therefore, a physical visit is needed to refer to those resources.

5.3.1.8 Library Strength on E-Resources

E-resources are very important for any library to give instant access to its patrons. An architectural library also contains e-resources of periodicals, books and many other resources. Dissertations and in-house reports are especially important to maintain in e-version to give online access.

The survey data revealed that only 25% of architecture college libraries had collected e-version of dissertations, and 4.1% of libraries gave online access to those e-dissertations. Out of these 72 architectural libraries, only 20.83% have initiated to collect e-version of in-house reports.

Only 50% of libraries have subscriptions of databases offered by INFLIBNET and DELNET, which mainly contain e-books and e-journals on multi-disciplinary subjects. Architectural contents are very little in these databases. Very few libraries are subscribing to architectural databases like J-Gate (Arts and Humanities) and ‘Charles Correa Archives’.

Though 63.89% of libraries have e-periodicals, scholarly journals subscriptions are very few. Again, out of the 72 architecture college libraries, only 20% of libraries have consortia subscriptions which INFLIBNET and DELNET offer. INFLIBNET and DELNET primarily provide data on Arts, Science and Commerce subjects.

Architectural learners constantly research to develop their knowledge. Though maximum Indian architecture institutes have master programmes, and some have a doctoral programme, none of these libraries subscribe to enough scholarly journals on architectural discipline. Subscriptions of academic peer-reviewed journals in Indian architectural libraries are almost nil due to the high cost compared to other subject domain journals. Most of the architectural scholarly journals are published in foreign countries, and they are high in price. The only way is to opt for a consortia-based subscription, which is not initiated in India yet.

The Indian government has taken the initiative for a consortia-based subscription and networking system for arts, commerce and science colleges to maximize the accessibility of scholarly publications at an affordable cost. For example, Indian universities and college libraries are interconnected through the INFLIBNET networking system, which gives consortia base subscription, and many resource sharing programmes to arts, commerce and science sectors, but architectural contents are very less compared to the other subjects. Apart from this, the subscription cost to the N-List programme, which provides scholarly e-resources, is high for non-aided colleges. Hence, maximum architectural libraries are unable to afford the price as approximately 88% of Indian architecture colleges are un-aided.

Architecture college libraries also collect movies and documentary films which help to understand the subject like ‘Humanities’ and ‘Town Planning’ but only 12.50% of libraries have a collection of films. Architectural libraries also have extensive CDs and DVDs on architectural data, but these are not well-managed by 80.56% of architecture college libraries.

It was found from the data analysis on a collection of e-resources that most of the libraries have e-books, but few libraries have e-dissertation / thesis to archive and give online access. Nearly all of the libraries have not started collecting e-version of dissertation/ thesis, any other intellectual resources and publications of their institute to start a digital archive. Only a few architectural libraries merged with their central libraries have a digital archive, but these digital archives or institutional repositories have not much content on the architectural subject.

Architecture colleges produce a large number of grey literature; among them, measured drawing plays a significant role in architectural education. Architectural measured drawing generates from their study trips, research fellow and studio projects. However, except KRVIA (MH15) and CEPT (MH02), not a single library has archived those reports and drawings to provide instant access to their patrons. In situations like the lockdown period of pandemic COVID-19, it has become necessary to have online access to those resources.

5.3.1.9 Application of Information Technology (IT)

Information technology in all targeted colleges was inquired to know the status of services provided by those libraries for disseminating library information. Following are the points that were investigated:

a. Operating System

The survey shows that 87.50% of architecture college libraries use a Windows system, and only 8.33% of libraries use a Linux system. Using open-source software in Linux is more user-friendly than a Windows system. IT experts will be required to utilize open-source software on Windows.

b. Automation

The survey data presented that out of 72 libraries, only 21 libraries use open-source software (OSS), and 38 libraries use proprietary and in-house software for library automation. The most used automation software are 'KOHA', 'e-Granthalaya', 'SLIM', 'ERP' and 'Autolib'. 13 libraries have not taken the initiative to automate their library. Out of these 59 automated libraries, 8 libraries use data management software like 'ERP', which do not facilitate complete library automation systems.

Out of 72 targeted libraries, only 43.06% of libraries have a web OPAC facility, and 27.78% of libraries are have OPAC on the intranet. 29.17% of libraries have no OPAC facility as 18.06% of libraries are not using any software, and 11.11% of libraries use some other software which does not have an OPAC facility.

It shows that maximum libraries of architectural institutes still have not initiated open-source software, which is economical and could help to create a common platform to share resources.

Most of the libraries have no internet facility to mail and browse relevant resources from their library as well as outsource.

5.3.1.10 Implementation of ICT

After analysing collected data, it is found that maximum libraries are not utilising multimedia-based resources to cater to their library users. Architectural learners need to watch some movies or documentary films to get knowledge about the history and culture of the society. Movies and CDs/DVDs are available only in a few libraries. Only 44.44% of libraries were collected and not catalogued CDs/DVDs; hence they needed a physical visit to the library to access these resources.

Out of 72 targeted libraries, only 31.94% of libraries have created an individual website for their libraries. The rest of the libraries are hosting information on their institutional website. 23.61% of libraries have facilitated 'Institutional Repository (IR), which are part of their central library. Out of 23.61% of libraries, only one library (MH15) created an IR and archived institutional grey literature. The remaining libraries are merged with their central library's repository, which contains only dissertations and doctoral thesis of their architectural department.

An architecture college library needs to archive all publications of their institute, which can improve the learning capacity of architectural students. The study reveals that architectural libraries have not taken the initiative to collect and archive their grey literature as well as the scholarly publications of their teachers and research fellows. Also, collected data shows that only 4.17% of libraries use publication software (OJS) to manage their in-house publications.

Out of the targeted 72 libraries, only 36.11% of libraries use social media and apps like telegram and WhatsApp to send an alert message to their patrons.

In the new paradigm, the advent of information technology and the internet has accompanied libraries of other disciplines that have gone through sea changes compared to architectural libraries. Open-source software is mostly applied in all kinds of libraries to manage their resources for various reasons like cost-effective and standard metadata structures.

5.3.1.11 Library Services

Libraries can give many different services to their end-users by making little effort to update themselves and keeping good intention towards their duty. Various library services can enhance the teaching-learning system. Some examples are New Arrival display, Current Awareness Service (CAS), Selective Dissemination of Information (SDI), reprographic service, Interlibrary loan, Document delivery service, Library orientation programme, reference and referral services. Most of the library services can offer online and offline mode to their patrons.

It was observed from the analyzed data that all responding libraries have open access systems to their books and periodical sections.

It is observed from analyzed data that more than 91.66% of libraries have reprographic and reference services. More than 75% of libraries serve referral and CAS / SDI services.

It can be inferred that access to e-resources in the targeted architecture college libraries are offline except subscribed databases and e-periodicals as the service providers are publishers or vendors. 40.28% of libraries keep the information about the availability of e-resources on their institutional or library website, but the full text is accessible only in the library.

Only 31.94% of libraries have taken the initiative to index the content of library resources.

Approximately 67.36% of libraries provide facilities to print and download e-resources to their patrons.

It can be summarized that half of the responded libraries are giving the above mentioned essential and traditional services to their patrons. Still, another half of the targeted architecture college libraries are not initiating the essential services to disseminate their library information.

5.3.1.12 Library Maintenance

A well-maintained library can serve patrons in a better way. To maintain a standard, a library needs to frame some kinds of policy to follow regularly. Collection analysis, preservation policy, weeding-out policy, maintaining accession register, stock verification, barcode labelling, etc., are the most necessary and primary activities to maintain any library collection. These activities must be included in the collection management policy.

After data analyses, it is found that 56.94% of libraries have framed collection management policy, and 43.06% of libraries have yet to frame written collection management policy.

It specifies that architectural libraries need to frame collection management policy in written form to adhere to it strictly for deciding to manage their library collection as they collect various kinds of materials.

It can be concluded that though activities, as mentioned above, have taken place entirely or partially but not happening regularly due to the non-availability of written collection management policy. Especially material sections of architectural libraries are not getting considerable attention.

5.3.1.13 Human Resource Management

Library employees are most important for a library to serve with ultimate satisfaction to its users. Hence, they must update their knowledge from time to time by attending various seminars, workshops and lecture series. Even non-professional employees also must be trained with technology and soft skills to give instant and standard service to their end-users.

The survey data illustrate that out of 72 librarians, only 42 librarians attended conferences, seminars and workshops, and 12 librarians have published their articles. Again, only 58.33% of librarians prefer to update their knowledge and skill by attending academic events and further education. However, remaining library professionals rarely or never go for any activities or further studies.

5.3.1.14 Library Security

The architectural libraries established before the 1990s have collected old and rare valuable architectural documents, such as architectural drawings, maps and other resources. However, they have not yet taken the initiative to preserve with special care and conserve them. Backup of e-resources are essential, which are taken care of by very few architectural libraries, but any of the libraries does not initiate restoration or conservation of rare documents.

Accordingly, e-resources also need utmost care for keeping them functional and surviving. After data analysis, it was also found that 77.78% of architecture college libraries have e-books collection purchased, subscribed and free download. The 50% of libraries that subscribe to e-books and e-journals are mostly from INFLIBNET and DELNET databases. However, the security of e-books and e-journals subscribed through INFLIBNET and DELNET is not required as these are online resources and managed by respective publishers.

The survey divulged that 85.85% of architectural libraries have CD/DVDs, and these are shelved in separate almirahs, and there is no security to save the contents for a long time. It is also identified that 4 (5.55%) libraries take back-up of their Institutional Repository (IR), and 35 (48.61%) libraries e-books and articles are stored on external hard disk or desktop computers. As we are aware, data on hard disk and desktop are not safe since they may crash at any moment. Consequently, the security of e-books/articles are not planned by most of the libraries.

Action against lost books and journals of a library must be maintained. Maximum libraries are practicing collecting the cost of the document for lost or damaged books and journals by users. As the researcher has ten years of experience in an architecture college library, it was observed that sometimes, the original cost of out-of-print books increases by 20 to 30 times or more due to vendors' strategy. Subsequently, it became inconvenient for a librarian to recover such a huge amount from a student. Hence, libraries can frame special conditions according to an institutional need for lost, damaged and misused library resources as architectural books and periodicals are expensive compared to the Arts and Commerce disciplines.

The data also revealed that only 42 libraries have CCTV facilities, and 4 libraries implemented an RFID system to security library resources.

5.3.1.15 Problems faced while implementing ICT in the libraries

It is identified in the survey that most of the architecture colleges are private and unaided. Hence, 34% of libraries do not receive enough funds to implement ICT and their management neglects 4.1% of libraries.

11.11% of architecture college libraries do not have trained and skilled personnel to implement ICT. However, 25% of libraries are not finding any issue while implementing ICT. Again, the libraries located in rural areas face electricity, the internet, and a lack of trained personnel for IT support.

5.3.1.16 Miscellaneous

The researcher also inquired the librarian's opinion on sharing institutional grey literature and participation in a consortia-based subscription. 56.94% of librarians liked the idea of sharing grey literature, and 44.44% agreed about the requirement of a consortia-based subscription to support the research sector.

5.3.2 Summary of findings from the questionnaire

After the analyses and interpretation of data collected through the survey found the following points:

Questionnaire: Investigation was done on the strength of library collection, services, implementation of ICT, the system of disseminating information and librarian's opinion on uses of resources, the willingness to share grey literature and joining consortia-based subscription.

- 62.50% of architecture college libraries have a collection of books under 5000, which fulfils the norms of the COA to run their courses considering their student's capacity and year of establishment. It indicates that 37.50% of libraries are unable to collect a minimum quantity of books to help their learners.
- Approximately 61.11% of libraries subscribe between 20 and 30 numbers of periodicals. The remaining libraries are not able to subscribe to enough

periodicals. The number of magazine subscriptions is more than journals, which is not very useful for master and research study.

- 45.83% of libraries have maps, and only 16.67% of libraries have development sheets. Maps and DP sheets are essential for Town and Area planning subjects; however, maximum libraries are not fulfilled.
- Less than 40% of libraries have a collection of measured architectural drawings. Measured drawings of professional architects and exemplary projects and student's architectural drawings generated during the course works are essential to add to the collection of an architecture college library.
- Only 43.06% of libraries have a collection of resources or study materials produced in the studio projects, and these kinds of resources are needed by students to develop their skills.
- A minimum number of architecture college libraries (25%) initiated to collect e-dissertations. Only 4.1% of libraries initiated for disseminating dissertations and thesis online.
- E-resources are not facilitated with remote access.
- Only 12.5% of libraries have a collection of movies and films.
- Lack of updated ICT implementation.
- Library services like photocopy, scanning, CAS/SDI, reference services are available in all the architecture college libraries.
- 77.78% of libraries responded as to the good utilization of their resources. It indicates that architecture college library users are actively using library resources. Hence, it inspires libraries to collect useful and more resources to enhance the research sector.

It is observed that advanced technology has not been implemented in architecture college libraries. The primary functions like acquisition, circulation and serial control are not being automated in many architecture college libraries. In addition, none of the libraries catalogued material library resources.

NAAC and AICTE have developed well-structured guidelines to maintain library standards which the COA does not lay down. The COA has not framed a standard policy for architecture college libraries.

5.3.3 Findings Met the Objectives of the Research

The study framed four objectives to collect data to complete the research task. The findings fulfilled the objectives.

The survey revealed that architecture college libraries have books, periodicals, grey literature, and non-book materials. Such as various kinds of maps, models, photographs and construction materials, etc**., fulfil the first objective of the research study, i.e. "To find out the nature of collection in architecture college libraries".**

It was found through the survey that architecture college libraries have not catalogued non-book materials, which made it difficult for users to refer as well as hampered the circulation system. The e-resources of targeted libraries are offline access which needs a physical visit to the library. Most of the architectural libraries did not implement ICT to disseminate library resources. Library services like in-housing indexing and abstracting are not initiated by maximum libraries. The observation presents that the responding architecture college libraries disseminate their library information in an old traditional way. **These fulfil the second objective, i.e. "To find out the existing facilities for accessing library resources in architecture college libraries."**

Library OPAC in mobile 'KOHA OPAC' app, library website, digital library, publication software for an institute, browsing tools like 'VuFind' and e-marketing of library resources in social media or alerting tools like 'Telegram Messenger', QR code, RFID, user tracking software and email are not encouraged by almost all the architecture college libraries. **This study and findings met the third objective of the study, i.e. "To examine the potential of information technology as a tool for the successful access to the library resource in architecture colleges in India."**

After analyses and interpretation of data, the researcher found that only the library of KRVIA has taken the initiative to archived architectural grey literature as the researcher is working as a librarian in the same library. The study also found that The Department of Architecture in IIT Roorkee and IIT Kharagpur also archived their dissertation and doctoral thesis in their central library repository. Also, Sinhagad College of Architecture, Pune, has integrated good numbers of URLs of free architectural data into their library website, which is found as a unique service among all targeted architectural libraries. These services became an ideal step in the COVID-19 pandemic period. **These findings**

satisfy the fourth objective of the study, "To depict the best practices of management of the collection of architecture college libraries".

5.3.4 Finding based on visiting library websites (Survey Two)

The researcher explored the websites of 9 selected architecture institutes and libraries from other regions that have not responded to the questionnaire. Out of these 9 libraries, 6 libraries are merged with their central library, and 3 libraries are individual architectural libraries. The collection of 6 central libraries are mainly in the engineering discipline as all the institutes have between 7 and 19 engineering branches.

Following are the findings for 9 libraries:

- Central Libraries collection of books is between 1and 3 lakhs and individual architectural libraries have between 13,000 and 83,000 books.
- All 9 libraries have numbers of periodicals ranging from 35 to 138 titles.
- Subscriptions of databases in all 6 central libraries are JSTOR, E-Shodhsindhu, ScienceDirect, Bloomsbury, Elsevier's e-books, Taylor & Francis e-books, AICTE-INDEST, DELNET and UGC-INFONET. Out of 3 individual libraries, only one library mentioned the subscription of JSTOR, and the other two libraries had not mentioned any information about databases.
- Out of 9 libraries, only 5 libraries using LIBSIS and SOUL software for library automation.
- Out of 9 libraries, only 3 libraries have mentioned about Institutional Repository (IR)
- Some libraries have a museum to display materials available in the organization's collection, which is an ideal service towards their users.

In conclusion, being a part of a central library, architectural libraries have some advantages as well as disadvantages:

- Advantages are that books are catalogued in a world standard manner and facilitated a good number of periodical subscriptions, which enhanced the teaching-learning system, especially for Humanities.

- ❖ The disadvantage is that the architectural libraries contain many more resources apart from books and periodicals, which are not initiated to catalogue and give access through central libraries.

- ❖ These libraries represent a vast collection but have less architectural contents, as these are part of central libraries that serve numerous subjects.

5.3.5 Findings based on interviews

The researchers conducted telephonic and face to face interviews with some of the prominent personnel from LIS and academicians of the architecture discipline. Chairman of COA, Former acting chairman of COA, Director of Sir J.J College of Architecture and KRVIA, Mumbai, and Librarian of CEPT and IIT Roorkee were interviewed.

All the stalwarts in the area of LIS and architecture discipline appreciated the idea of networking and resource sharing among the architecture college libraries in India. They also expressed their views on the taking initiative to frame an apex body to develop and connect Indian architecture college libraries with the intention of sharing grey literature as well as library resources with the community libraries to give ultimate satisfaction to entire architecture learners and architects.

Former acting chairman Mr. Vjay Garg opined that COA could test the model developed by the researcher to start the system of networking and sharing grey literature among the Indian architecture college libraries.

5.4 Testing Hypothesis

The study aimed to explore that Indian architecture college libraries do not have enough resources and infrastructure to satisfy their library users.

Testing: During analysis of data, it is found that-

- 62.50% of architecture college libraries have a collection of books under 5000, which fulfils the norms of the COA to run their courses considering their student's capacity and year of establishment. It indicates that 37.50% of libraries are unable to collect a minimum quantity of books to help their learners.

- 45.83% of libraries have maps, and only 16.67% of libraries have development sheets. Maps and DP sheets are essential for Town and Area planning subject; however, maximum libraries are not fulfilled.
- Only 25% of libraries initiated to collect e-dissertations. Only 4.1% of libraries initiated for disseminating dissertations and thesis online.
- Only 43.06% of libraries have a web OPAC facility, and 18.06% of libraries are not using any software.
- Only 31.94% of libraries have created an individual website, and 23.61% of libraries have facilitated 'Institutional Repository (IR).

After data analysis, review of related literature, and few individual interviews, it is established that Indian architecture college libraries need to develop enough resources and infrastructure and not be updated as per the modern technology development. Hence, the hypothesis is proved to correct.

> "Most of the college libraries do not have adequate resources and enough infrastructures to support the needs of the readers."

5.5 Suggestions

The study has revealed that the collection of architecture college libraries and managing archiving is more peculiar than the other discipline libraries. They need extra care to arrange and disseminate architectural library resources. In addition to this, architectural libraries need to be more active as they have various types of collections.

1. The libraries of architectural institutes need to frame their collection management policy and update it from time to time to adjust to the current trends. Furthermore, a policy must be framed for lost and misused books and periodicals as architectural materials are expensive compared to arts and commerce resources.
2. Architectural libraries must initiate for web OPAC with standard metadata to make catalogues accessible globally as well as incorporate the latest technology to serve in a better way.

3. Architectural libraries can start a collaborative collection and interlibrary loan (ILL) system within the city or local college libraries as architectural books are expensive, and most are foreign publications.

4. Preservation and conservation of old and rare architectural documents are essential, and they must be taken care of by a professional or conservationists. A particular retrieval system could be applied to save the life of the original document.

5. The study reveals that most colleges have not created a material library, which is a vital part of an architectural library. The architectural library must catalogue all materials collected for the material section and give access to the learners.

6. Architecture college libraries must opt for open-source software rather than proprietary software for all kinds of activities. Such as library automation, creating a digital library and website, gives the standard world system and an opportunity to customize according to institutional needs. Besides it is economical, which is the most concerning part of Indian architecture college libraries as the study found that 96.13% of architecture colleges are unaided.

7. Library staff must be trained to manage and update technologies used by the library to serve its users.

8. An architectural library must have a digital library with an archive of grey literature. It will be more beneficial if they are openly accessible to the community.

   An architectural library can archive e-versions of dissertation and thesis, which can be easy to share with other architectural libraries to streamline the research sector.

   Architectural drawings and in-house reports can be archived and give access to students. The library can conduct a library internship programme to compile those drawings into a complete report to archive.

9. Under the umbrella of a digital library, digital journals can be a part of an architectural institute's networking. Scholarly journals can be accessible at a reasonable cost by negotiating with publishers on consortia-based subscription. Architectural institutes can come up with an apex body to take the initiative for networking and resource sharing among the community institutes to enhance the teaching-learning system by giving remote access to library e-resources.

10. The architecture Institute must encourage the library to have an e-resources section separately, which will be maintained by trained library professionals or IT professionals who will handle backup, server failure and restoration.

11. Architecture departments of prominent institutes like IITs and University, must take the initiative or coordinate with their central libraries to develop and manage their collection.

12. An architectural library can use a separate space as a gallery to display students' and faculty's best works.

13. The Council of Architecture (COA) may set some additional norms for the development of Architecture College libraries, such as a certain amount of college budget must be spent on library development, ICT implementation and resources sharing.

14. It will be beneficial if architecture college libraries can organize skill development workshops for library employees from time to time.

5.6 Model of an Architecture College Library for Collection Management

The model presents the steps of managing all kinds of resources in any architectural library.

5.6.1 Library Collection Management

Management of collection is an essential task for architecture college librarians. This process can be divided into the following phases for its effective implementation and successful operation.

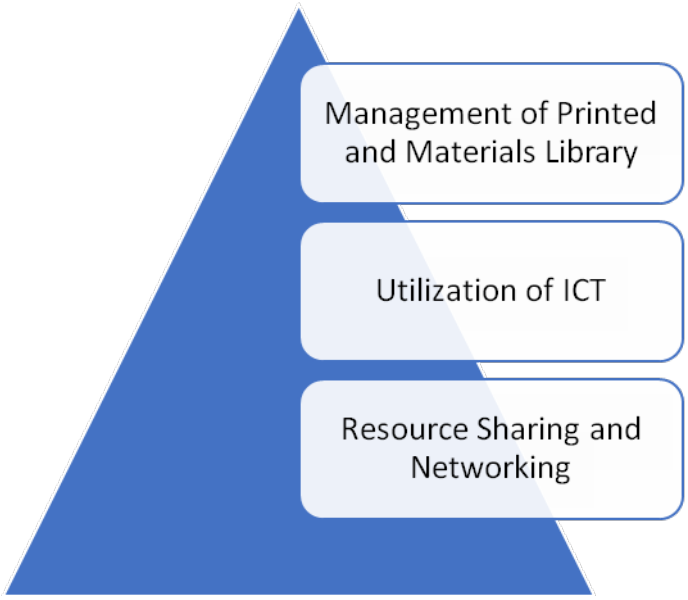
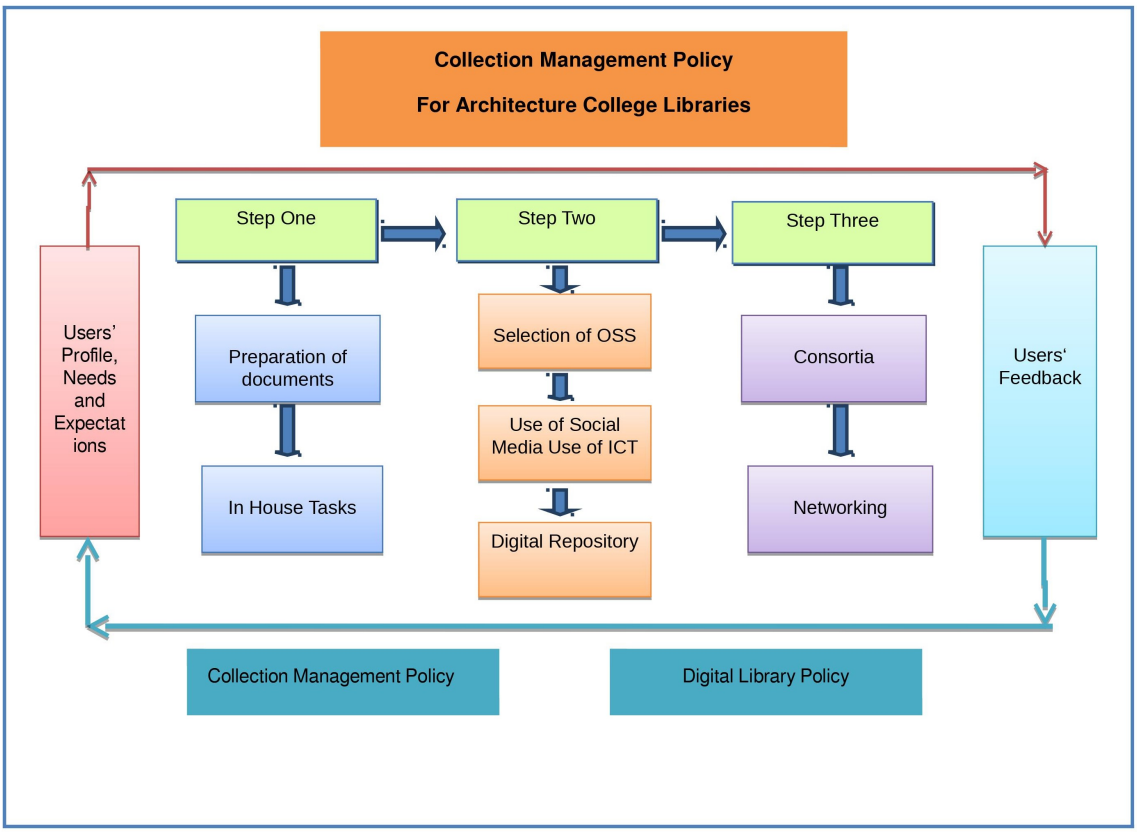


Figure 5.1 Three Steps of Collection Management for Architectural Libraries

The model has three mandatory steps which have some further phases, and the same are elaborated below:

Step I: Management of printed and material library resources:
Step II: Utilization of ICT
Step III: Resource sharing and Networking

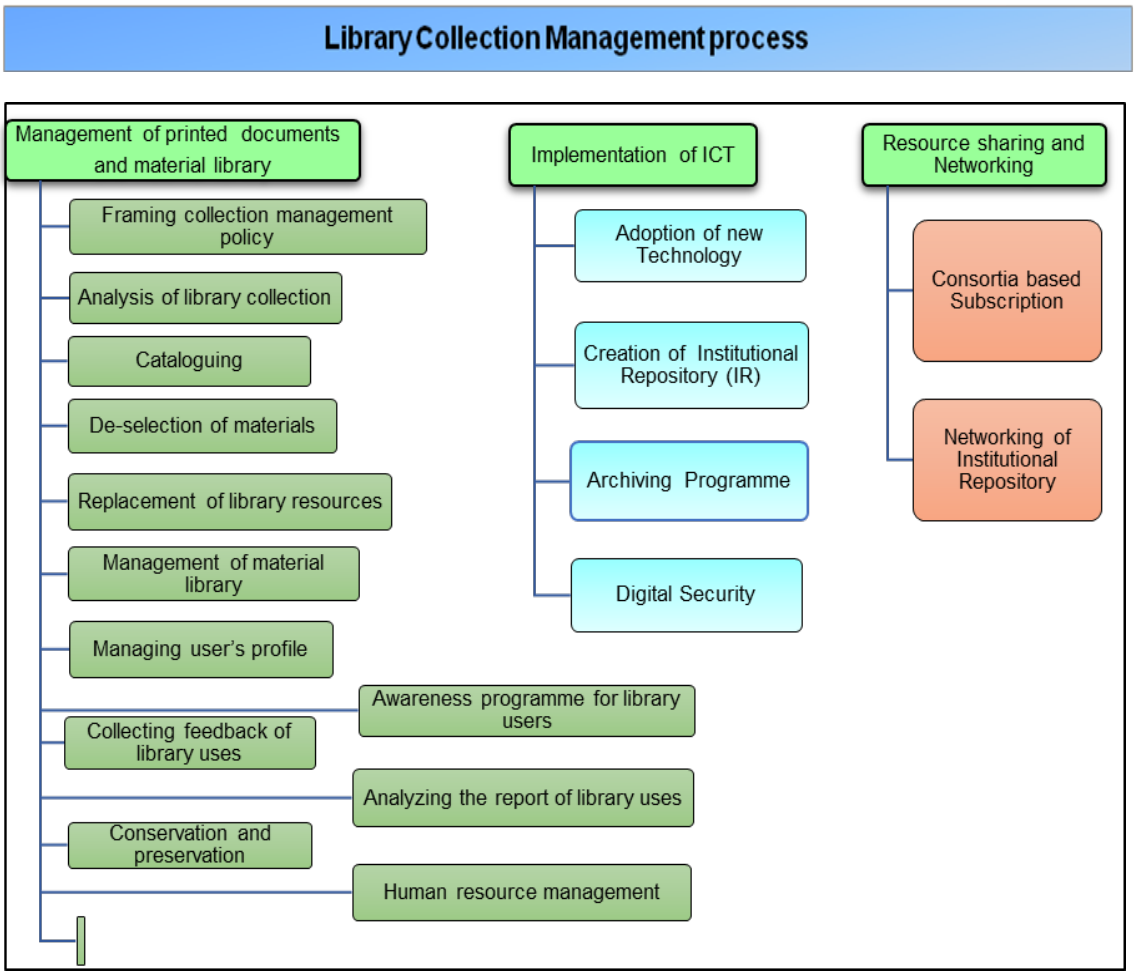
5.6.2 Model of an Architecture College Library for Collection Management:



The above diagram presents two layers, and out of them, one is the static process, and another one is a dynamic process. The outer layer is a dynamic process that needs updates from time to time. The three steps mentioned inside can be considered a static process as they need to start once, and it goes for a long time.

The researchers presented the steps of archiving architectural data in a national webinar which was conducted by COA on 30th May 2020. The COA and approximately 500+ members, including Faculty members, Directors and Architects, appreciated the innovative idea of the archival system of architectural data in a digital repository.

The steps are elaborated with all the necessary points to give a better understanding.



The process is divided into three phases, and all the steps are necessary to follow to make a standard system in an architecture college library. Among all the steps, the researcher would like to emphasize a few significant steps. They are:

- Create a collection management policy and update from time to time and adhere to that strictly.
- Cataloguing of non-book materials and made available for users.
- Archiving grey literature.
- Security of e-resources needs regular maintenance.

Step One
Management of Printed and Materials Library

5.6.3 Phase I: Preparation for Collection Management

This phase is a preparatory phase. It is essential to have some approvals and documents ready in hand before any library executes a collection management plan.

a. Collection Management Policy

The policy must be a written document. It gives a legal stand for any action done with a specific purpose. A librarian must draft a collection management policy based on his experience and depend upon the user's needs. Every library will have some unique needs for the users. In addition, there will be a specific culture of the libraries, and that librarian should observe and keep in mind while drafting the collection management policy of their library.

After drafting the policy, it should be approved by the management body of the college, either the principal, executive body or library committee.

b. Awareness programme for library users

Libraries collect and process resources for library users. However, library users must be well acquainted with a way of effective use of library resources. In this context, a library must plan orientation programmes according to the needs of library users. Information literate users can use a library more effectively and efficiently.

The librarian can enhance the current studios/classes by alerting the users about the availability of resources on that particular topic. The librarians also can take the initiative to know the user's needs to explore the library collection.

c. Preparing User's Profile

A library must follow a standard form to collect the user's profile and keep it confidential. These data can help to alert them about the new arrival and exclusive collection on their interest areas. A user profile is essential for providing individual services. It records the user's specific interest area, study area and specific information needs.

d. Design for feedback of library use

A librarian can get a better idea to manage their collection when the report of library use is available. It can be generated from library automation software and the entry register, and by interviewing library users. Therefore, it is necessary to have a specific design for receiving user's feedback for library use. A librarian can prepare a well thought out plan and formats to receive and analyze user's feedback for library use.

5.6.4 Phase II In-house Preparation

Libraries possess various printed books, journals and other resources. The special materials required by the architecture libraries are also kept in the library as Materials Collection. For its effective use by users, it needs to be maintained and managed.

a. Analysis of present collection

The librarian should analyze the library collection regarding what those are and how the library patrons can utilize them. The outdated and non-relevant resources should be withdrawn to make extra space for new resources.

b. Cataloguing of library resources

Library resources must be catalogued with a standard classification scheme and arrange accordingly for smooth access. An architectural library contains a material section where various samples of materials are store and use in the construction and design of any infrastructure. A library can catalogue all those materials and give access to the users. Images of those materials can be archived in a digital library to enhance access.

c. Deselection of Materials

Withdrawing library materials is a traditional and universal system that needs to follow and add more criteria to deselect library resources according to the library users' needs. Most of the architectural libraries have some old cassettes, slides (used in the projector), university and college brochures, which have become outdated.

d. Replacement of library resources

The library should replace missing books if it is high on demand. Old and fragile materials should also be replaced with a new edition or version. Old cassettes' materials should be restored in DVD or the cloud.

e. Conservation and preservation

Many libraries contain rare books and other media which need care to survive. Architectural libraries can go for conservation and preservation of those resources which are useful as a design institute. For example- Old measured drawings can be cleaned and laminated, old books can be bound, fragile books can be scanned and archived (Out of copyright). Old cassettes and slides can be converted into DVD or hard disk to access.

f. Human resource management

Library staff play a vital role in collection management as well as efficiently serving the patrons. As the present society becomes technology savvy, the library staff must be updated from time to time. Libraries can conduct seminars and hands-on training for library professionals as well as for paraprofessionals and non-professionals to help the library users access any collection instantly.

Step Two
Utilizing of ICT

5.6.5 Adoption of New Technology

In this electronic era, libraries are influenced by modern technology. Architectural libraries also started implementing multi-media to serve their users, but most colleges in rural areas are still unaware of the new ICT. Architecture college libraries can implement free open source software for automation, digital library and content management purposes without spending a considerable amount.

Here are some examples of free software which can be utilized to give instant access to the entire library collection:

Table 5.2 Availability of OSS

Sl. No.	Management Category	Software
1	Library automation:	KOHA or e-Granthalaya
2	Digital library	DSpace, Greenstone and Google site etc.
3	Library website	Drupal, Joomla and Google site etc.
4	E-book Management	Calibri or Epubor
5	Reference management software	Mendeley and Zotero
6	Book review (Blogs)	WordPress.com, Blogspot.

These are the most famous and globally used software and used by all kinds of libraries. Library professionals can handle it by doing digital library courses or getting hands-on training in workshops conduct from time to time in many different organizations.

1. **Use of Social Media**

   A librarian should use various Social Media like Blogs, Facebook, WhatsApp groups to reach out to the users. It will be helpful to have effective communication between users and the librarian. It is useful for communicating day to day activities of the library, new arrival, getting feedback and sharing views and opinions about library activities.

   Library OPAC should have a mobile application to use the library any time and from anywhere.

2. **Use of ICT Tools**

   A Library should use various tools like barcode, QR code, RFID system, User Tracking and email, which can lead to the library to give service easy, accurate and more towards perfection.

3. Creation of Digital Library or Institutional Repository (IR)

An Institutional Repository (IR) can augment the teaching-learning system by providing additional resources apart from the traditional collection of a library. Architecture college libraries must have an IR to archive institutional grey literature and miscellaneous library resources like project reports, dissertation and thesis, question papers, syllabus and lecture notes. Architecture college libraries can adopt open-source software to create a digital library or IR as it is cost-effective. All architecture college libraries can implement the open-source digital library software 'DSpace' as it is popular worldwide and mostly used by higher institutions like IITs, IIMs and INFLIBNET (Shodhganga). The researcher has developed an IR in the KRVIA library (MH15) and archived institutional grey literature by developing library internship programmes mentioned in this model.

3.1 Advantages of Digital Library in an organization

- Enriching library collection with in-house research reports
- Able to use and share unpublished data
- Enhancing the teaching-learning system by supplementing institutional grey literature
- Data can be cited from anywhere at any time
- Ensure data validation
- Reduce duplication of research
- Streamline research process
- Getting remote access to maximum library resources
- Able to provide one platform for all kinds of e-resources of a library.
- Can be able to create a networking system to share resources among the community libraries
- Preservation and secure data for future

3.2 Culture of Digitization in an Architecture College Library

Architect and architecture students need to coordinate with other experts like structural engineers, civil engineers, plumber consultants, and light consultants. These interactions generate a lot of educational materials that need to be referred

to and preserved in any architectural library. Hence, it is a necessity to create an IR in any architectural library.

Table 5.3 Culture of Digitizing

Institutionalization of the system	Internalization of the system
Creating a digital library • **Selecting software and Hardware** • **Technology requirement** • **Installing and customization of the software** • **Data Collection** • **Structure of Contents or Communities** • **Security of Data**	**Archiving process {Standard Operating Process (SOP)}** • Selection of Data • Process of data • Converting files to PDF • Creating metadata • Uploading & testing

Institutionalization of the system of Digital Library

3.3 Selection of Software and Hardware

The selection of software for a library is a crucial decision. It needs to be a well thought out and planned decision. Factors like finances, hardware, availability of maintenance, technical qualification of library staff, availability of training, frequency of updates must be considered before selecting any software.

There are good numbers of open-source digital library software on the internet like DSpace, EPrint, Fedora and Greenstone. However, DSpace is the preferable software as top institutions of higher education use it.

The selection of hardware can be decided after the selection of the software. It can be decided according to the needs of the selected software and the institutional requirement. For example- DSpace software can be installed in windows and Linux, but Linux system installation is much easier than windows.

Also, the Linux operating system has more advantages than windows. Linux can be preferred for the operating system.

3.4 Installation and Customization of Software

Installation can be performed in a Linex system as it is easier to install and free of cost. An architectural library can utilize a Linux system to install the DSpace software as it has many advantages, like Linux is widely used for creating a network system.

Open-source software has many features to customize according to an institution's requirement. A digital library or IR must be designed on the software home page with a short introduction about the institution and collection. The following points need to care while customizing DSpace software:

- Creating e-submitters and provide authorities accordingly
- Customize access facility and keep restriction community wise

3.5 Data Collection

The architectural institutes always generate research reports or grey literature from various academic activities during their courses. Those reports contain drawings, videos, workshop reports, design dissertations, in-house publications. These reports can be archived in an Institutional Repository. A library must frame a policy to collect data for archive purposes. An architectural library can collect data from the following sources:

- Studio reports
- Dissertations and thesis
- Architectural drawings
- Study trips reports
- Report on exchange programmes
- Report on co-curricular activities
- Institutional publications & faculty members' scholarly publications
- Annual programmes
- Student's portfolio
- Maps and development sheets

- Posters of various programmes
- Syllabus and question papers

3.6 Structure of Contents or Communities

Structuring contents or creating communities with proper content structure is vital while creating an IR which can be decided with the consultancy of library committee members and subject experts according to the institution's requirement. This structure will present the map of entire archived data, and it must be understandable to students and the general public.

3.6.1 Internalization of the system of Digital Library

An archiving process needs to follow some systematic ways, which are elaborated below:

- Selection of Data
- Checking of physical condition
- Process of data
- Converting files to PDF
- Creating metadata
- Uploading & testing

1. Selection of documents

The selection of data for archiving is another critical parameter that needs utmost care. Architecture institute generates useful numbers reports every day, but it is unnecessary to archive all that data. The library committee must scrutinize collected data and subject experts to recognize the essential data for archiving, which can be helpful in the future. The selection criteria must include some essential parameters like the depth of the document's content, usefulness and copyright issue. The selection of data can make an IR more interesting and attractive as well as it can save the space of the server or cloud.

2. Checking of Physical Condition

Checking the physical status of a document is essential to start scanning. The most important thing is checking the completeness of the document. Sometimes pages or portions of pages are missing in old documents, which must be noted with the document for users. Architectural measured drawings are made in many sheets and

portions which need to be checked before processing for an archive. It is necessary to make sure about collecting all the parts of drawings of the particular project. An archivist must check copyright issues and duplicity of documents.

3. **Dusting of Documents**

Dusting and cleaning of print documents are indispensable before scanning. Dust may create a problem for a scanner; it can also affect the scanned image, which may give another meaning to architectural or engineering drawings.

4. **Technical Requirement**

The technical requirement consists of hardware and software, which need to be selected as per the institution's requirement and popularity in the market. It must be well planned to start the archiving process. A scanner, which facilitates fragile repair pages, captures text and image near the spine and high-resolution capability. OCR software needs to select carefully as many software does not give the necessary quantity of OCR scanning, which affects the retrieval of the document. The selection of accurate digital library software is essential for an institution.

5. **Technical process**

Archiving or digitizing architectural data needs extra care in the technical process as data are mostly drawings based.

5.1 Scanning documents

Scanning is the first and vital stage of a technical process. Hence, while scanning, an archivist must be more vigilant to ensure the excellent quality of the scanned image or document. Some parameters need to be noticed while scanning a document, like capturing spine or faded area and avoiding unnecessary area by using features like crop option.

An archivist must take care of the following parameters to enhance the quality of a scanned document or image:

- Resolution of Images
- Bit Depth
- Image Enhancement
- Compression of file
- OCR and Converting Files

- Value addition to PDF file
- Metadata Creation
- Upload files and Test
- Backup of Archive
- Preservation of Original files

i. **Resolution of images**

At the time of scanning an image, the resolution is another critical factor for archiving. Architectural and engineering drawings are recommended scanning in high resolution like 300dpi for an image and 2400X1600px for a text document. Resolution helps to bring clarity to the scanned document.

ii. **Bit depth**

Bit depth counts in numbers to adjust colour in a scanned document, and a higher number of bit depths give more clarity to images and text. Scanned documents can be categorized into three options like black and white, grey and coloured documents. An Archivist must take care of the colour of images while and after scanning.

iii. **Image enhancement**

Old faded documents and images can be enhanced by adjusting colour, size, and brightness to the document. However, it is recommended that the originality of a document or image must not be lost while enhancing the faded or damaged images.

iv. **Removal of Noise**

Removal of noise from a scanned document is significant when the image carries extra spots or lines. Noise can be removed using software like Photoshop, Scan Tailor and Paper Port. Architectural and civil engineering drawings may give another meaning to noise.

v. **Metadata Creation**

Archived data needs to be assigned with accurate and enough metadata to give a better retrieval facility. Graphic and image data especially need metadata for ease of retrieval.

vi. **Compression of file**

The high-resolution scanned file needs to be compressed to reduce the size in bytes to save server space as well as save time while uploading and downloading files.

vii. **OCR and Converting files**

Optical Character Recognition (OCR) is a must to give a full-text retrieval facility. Files must be converted to a proper type of file according to the document's requirement. For example, image or graphic and text files are suggested to make a PDF file for security purposes.

viii. **Value addition to PDF file**

Value addition to a PDF file refers to enhancing the file with a user id and password, watermark, removal of print and download option for security purpose. Archived grey literature must be secured to refrain from falling plagiarism.

ix. **Uploading file:**

Files must be uploaded to the digital library after completing the technical process. An archiving or digitization process can be more effective when the uploaded files go through all the technical processes. The copyright status must be adhered to while uploading files on a digital library.

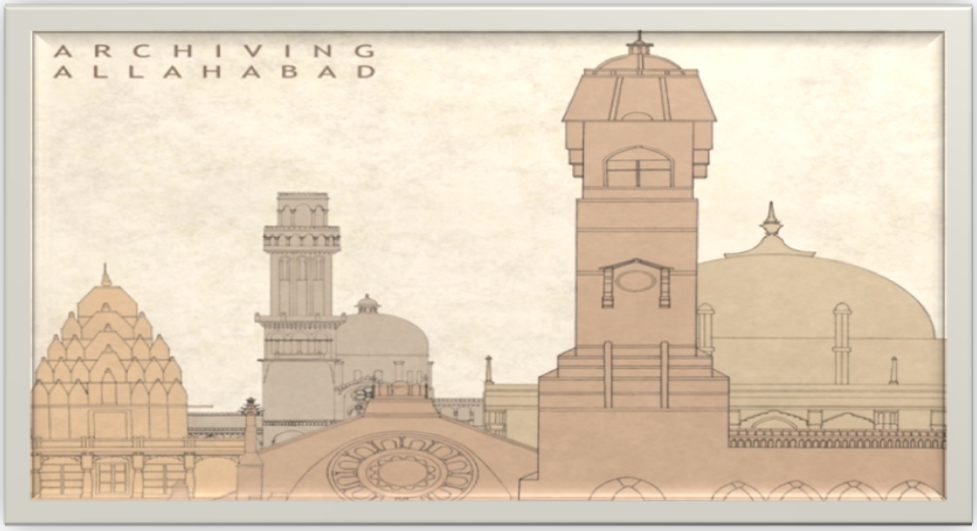
x. **Preservation of Files**

Preserving original scanned files with high-resolution is a must as archived files are compressed files. It can help students to use in a future programme like an exhibition of architectural drawings. Hence, the preservation of high-resolution files can give another service to architecture learners.

5.6.6 Archive or Digitization program

Architectural discipline teaches and expresses their knowledge in drawings. Hence, the reports generated in architectural college are drawings or portfolios of drawings. Archiving architectural drawings need compilation to make a standard report.

Archiving architectural data needs basic knowledge of the subject when the collection is only drawings. These architectural drawings can be compiled into a complete report and archived in an Institutional Repository (IR). An architectural library can involve students and faculty members to compile their work by conducting a library internship programme. These drawings can be made more understandable and presentable by adding text to elaborate the details about the project. The process has been executed in the library of KRVIA (MH15) by developing library internship programmes. The KRVIA library conducts two types of library internship programmes, one is long-term (summer vacation internship), and another is short-term (Diwali vacation internship) to compile architectural data for archive purposes. Some of the examples of compiled architectural data which was done in the library internship programmes in the KRVIA library are presented here.



Picture No. 5.7.3

The above picture is a cover page of a study trip report completed in a library summer internship programme. It is a combination of four different architectural drawings which were generated in a study trip.

The study trip was conducted by KRVIA (MH15) at Allahabad to study the city and create measured drawings. A group of 80 students conducted the study on Allahabad and created vast numbers of architectural hand drawings. The drawings were collected and scanned in higher resolution. The library conducted an internship programme to compile

the drawings. The work was assigned to four students under the guidance of concerned faculty members. The librarian did the administration part to complete the task on time. Drawings were cleaned, merged and added text to make a book format report. After compilation of the report, students submitted a print and bound copy along with the soft copy to the library for archiving. The report was archived in the KRVIA Institutional repository.



Picture No. 5.7.4

The above report was compiled on a Diwali vacation. The report is a collection of pictures that were captured during a workshop, and students added text to those pictures to frame a readable report.

5.7 Security of Data

Appropriate methods and measures for the security of data should be taken. User login passwords, password verification, firewalls, data on a cloud, regular backup, the security of original files are some of the techniques.

- Access authentication
- Back up
- Storing original files

- Cyber protection

Backup of archived data or digital library is necessary to prevent any disaster. The backup of archived data must be taken from time to time and kept in a secure place.

An archivist must follow the systematic path of digitization to give maximum sensations and a web-enabling retrieval facility. A digital repository facilitates full-text retrieval and preserves documents for an extended period. Updating the software from time to time is essential to give smooth service for an extended period.

Since the researcher is working as a librarian at KRVIA (MH15), the above-mentioned archiving system was implemented and succeeded to archive architectural grey literature. The repository of KRVIA library was accessible on the intranet till March 2020. In the pandemic COVID-19 lockdown period, the library facilitated remote access to the repository by creating a user ID and password system. The students and faculty were highly satisfied to have those additional resources to enhance their research work.

The KRVIA Institutional Repository (IR) is an accomplishment for the institute where it archived in-house grey literature along with faculty's publications. The contents of the IR are searchable in Google, which helps to access the bibliographical data globally. The archive process followed to initiate the KRVIA IR is the first example of its kind in architecture college libraries, and it could not be found in any of the targeted libraries.

Step Three
Resource sharing and Networking

5.8 Consortia based Subscription

The flow of architectural scholarly publication is less compared to other subjects, but they are mostly high in cost compared to arts and commerce. Hence, architectural libraries can have a consortia-based subscription to uplift the research sector. Most of the research journals are foreign publications and identically expensive. Hence, consortia-based subscriptions can be helpful to get access at a reasonable price.

5.9 Networking of Institutional Repository

An architectural institute can enhance its teaching-learning system by sharing its institutional repository among its community institutes. Digital libraries or IR and networking systems can be a phenomenal source for architectural students to enrich their knowledge on the subject. Teachers of an architectural institute need to inculcate different skills within students to develop their intellectual capacity to design infrastructure according to society's needs. Consequently, the architectural library becomes imperative to provide more resources for their references.

5.10 Discussion

Almost all college libraries of Maharashtra are following the traditional system for disseminating information to their users. A few libraries that are old colleges and integrated with their central libraries have taken the initiative to implement ICT tools. Though their central libraries are well established with the latest technologies, their architectural department's non-book resources and archives are not fully initiated. The archives only have masters and doctoral theses in their central library's Institutional Repository (IR).

A well-managed library of an architecture college can play a significant role in the teaching and learning system. The process, as mentioned above, could be a way to adhere to creating a better system in an architecture college library. Architecture colleges can create an archival system that can lead to developing a networking system among the community libraries in the country. The role of the COA will be a crucial part to initiate the process to develop the country's architecture college libraries. It has to be encouragement and formation of admiring conditions, which needs a comprehensible policy focused on an ideal structure, operational in the architecture college libraries to enhance the teaching and learning system. Archive and remote access are significant aspects of developing a system in architecture college libraries. Due to the availability of various open-source software, the archiving and remote access of library resources can be created with ease and cost-effectively, but it can be possible under an environment of encouragement from management and at least minimum financial support.

5.11 Conclusion

After analyzing and interpreting the data of all the targeted architecture college libraries and telephonic interviews with a few Directors of architecture colleges and the Chairman of COA and librarians, it was felt that architectural libraries need to revise their policy for collection management. An in-depth study was done on the present system of collection management for 72 architecture college libraries in Maharashtra as well as some other regions. Out of these 72, the twelve (12) architectural libraries from various regions of India have standard facilities as they are merged with their central library. However, they are not well managed and developed on an architectural content basis. Therefore, looking at the present status, the following suggestions can be considered.

1. The researcher has suggested the model for the improvement of an architecture library collection. It can be implemented and recognized.

2. The model plan presented by the researcher may be considered as a guideline for the same.

3. A library must have at least one library professional with minimum qualification (as per UGC rules) to maintain the library.

4. All architecture college libraries and librarians should be connected through a network system.

5. Standard training programmes, seminars, conferences should be arranged for specific functions of architectural college libraries.

6. Librarians should study how collection is managed in libraries of the same discipline in developed countries.

7. Librarians should initiate and insist their management committee frame a library committee and engage faculty members to build and manage the library collection and services.

8. Architecture college librarians should keep a written and approved collection management policy to manage all kinds of resources, including non-book materials, for better access.

9. Librarians should get themselves acquainted with the latest ICT tools and gadgets to solve troubleshooting.

10. Librarians may need helping hands or training on ICT utilization and maintenance of e-resources.

11. Librarians should develop a proper library orientation programme to use library collection by staff, users and students.

12. A marketing strategy must be adopted to update library users about library collection and facilities.

13. There should be a digital archival system for preserving various library materials.

14. The Council of Architecture (COA) may prepare a policy framework that will include “Best practices” for services to be imparted by the architecture college libraries. The model plan presented by the researcher may be considered as a guideline for the accreditation of architecture colleges.

The final part of the research took place in the COVID-19 pandemic period, and it was found that people were working from home all over the world; even libraries were very active in facilitating remote access to e-resources for users and conducting webinars to update employees. Hence, it can be understood how important it is to maintain and disseminate remote access to e-resources of a library.

5.12 Future Research

The researcher has drawn a model on collection management of an architecture college library and found that there are some more areas which can enhance this research by doing an in-depth study. For future research, a vast scope exists on the following topics:

1. Study on networking and resource sharing systems for architectural libraries in India will help the architectural learners to increase their accessibility of more resources.
2. Different publishers for scholarly journals and databases can be studied to frame consortia-based subscription.
3. The use of unique materials in architectural libraries, studies related to in-house grey literature, material library and government reports related to real-estate will be an additional enhancement to the research work initiated in this study.

APPENDIX- I

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A P P E N D I X - II

LIST OF ARCHITECTURE INSTITUTIONS

Sl. No.	COA Code	Name and Address of the Colleges
1	MH01	Sir J.J. College of Architecture. MUMBAI-400 001
2	MH02	L.S. Raheja School of Architecture. Raheja Education Complex Kher Nagar, Bandra (E) MUMBAI-400 051
3	MH03	Academy of Architecture. 278, Shankar Ghanekar Marg Prabhadevi, MUMBAI-400 025
4	MH04	Department of Architecture and Planning Visvesvaraya National Institute of Technology (Deemed University), South Ambhazari Road, NAGPUR-440 010
5	MH05	BKPS College of Architecture 2043, Sadashiv Peth, Tilak Road, PUNE-411 030
6	MH06	School of Architecture College of Engineering & Technology AKOLA -444 001
7	MH07	School of Architecture D.Y.Patil College of Engineering & Technology KOLHAPUR- 416 006
8	MH08	School of Architecture G.S. Mandal's Marathwada Institute of Technology, AURANGABAD -431028
9	MH09	Shri Prince Shivaji Maratha Boarding House's. College of Architecture, KOLHAPUR-416 012
10	MH10	Marathwada Mitra Mandal's College of Architecture, PUNE-411 004
11	MH11	School of Architecture Manoharbhai Patel Institute of Engineering & Technology, GONDIA-441 614
12	MH12	School of Architecture Jawahar Lal Nehru Engineering College AURANGABAD-431 003
13	MH13	MVP Samaj's College of Architecture NASHIK-422 002
14	MH14	Bharati Vidyapeeth's College of Architecture NAVI MUMBAI-400 614
15	MH15	Kamla Raheja Vidyanidhi Institute for Architecture & Environmental Studies, Juhu Scheme, MUMBAI-400 049
16	MH16	D.Y. Patil School of Architecture Nerul, NAVI MUMBAI-400 706
17	MH17	Mahatma Education Society's Pillais' College of Architecture, Sector 16, NEW PANVEL-410 206
18	MH18	Rizvi College of Architecture. Bandra (w), MUMBAI-400 050
19	MH19	Bharati Vidyapeeth University's College of Architecture, Pune Satara Road, Pune-411043
20	MH20	Women's Education Society's Smt. Manoramabai Mundle, College of Architecture, NAGPUR-440 006
21	MH21	Maharshi Karve Stree Shikshan Samstha's Dr.Bhanuben Nanavati College of Architecture for Women, PUNE-411 052.

22	MH23	Shri Siddeshwar Shikshan Mandal's College of Architecture, SOLAPUR-413 003
23	MH24	ShriV.B.Patil Trust's Appasaheb Birnale College of Architecture, SANGLI-416 416
24	MH25	School of Architecture Kavikulguru Institute of Technology & Science, NAGPUR-441 106
25	MH26	Priyadarshini Institute of Architecture & Design Studies, NAGPUR-440 019
26	MH27	Indian Education Society's College of Architecture,Bandra (w), MUMBAI-400 050
27	MH28	Dr.Baliram Hiray College of Architecture, Bandra, MUMBAI-400 051
28	MH29	Pravara Rural College of Architecture, AHMEDNAGAR-413 736
29	MH30	Vivekanand Institute of Technology's Padmabhushan Dr.Vasantdada Patil College of Architecture, PUNE-412115
30	MH31	M.C.E.Society's Allana College of Architecture, PUNE-411 001
31	MH32	Padmashree Dr.D.Y. Patil College of Architecture, PUNE-411 044
32	MH33	Sinhgad College of Architecture, PUNE-411041
33	MH34	Late Shri Bapuraoji Deshmukh Degree College of Architecture, WARDHA-442102
34	MH39	Asmita College of Architecture, Mira Road, THANE-401 107
35	MH42	Balwant Sheth School of Architecture, Vile Parle (w), Mumbai-400 056
36	MH44	Shrikrishna Educational & Cultural Mandal's College of Architecture, Jalgaon-425 001
37	MH45	Samyak Sankalpa College of Architecture, Kalyan (E), Thane-421 306
38	MH47	IDEAS-Institute of Design Education & Architecture Studies, Nagpur-440034
39	MH48	Vidya Vardhan's Institute of Design Environment and Architecture, Nashik-422013
40	MH49	Vidya Pratishthan's School of Architecture, Pune-413 133
41	MH50	ADA's Minerva College of Architecture, Talegaon MIDC Road, Pune-410 507
42	MH51	P.R.Patil College of Architecture, Amravati-444602,
43	MH52	Radhikatai Pandav Institute of Architecture, Nagpur-411204
44	MH53	VIVA School of Architecture, Shirgaon, VirarI, Dist.Palghar-401305
45	MH54	Mahatma Education Society's Pillai's HOC College of Architecture, Raigad-410207

46	MH55	School of Architecture Anjuman-I-Islam's Kalsekar Technical Campus, Navi Mumbai-410206
47	MH56	Dr.DY Patil School of Architecture, Pune-412 105
48	MH57	Lokmanya Tilak Institute of Architecture & Design Studies, Navi Mumbai-400 709
49	MH58	Tulsiramji Gaikwad-Patil College of Architecture, Nagpur-441108
50	MH59	Oyster College of Architecture, Aurangabad-431201
51	MH61	St.Wilfred's Institute of Architecture, Raigad-410206
52	MH62	Aayojan School of Architecture and Design, Pune-412 301
53	MH66	Satish Misal Educational Foundation's BRICK School of Architecture, Pune-411028
54	MH67	Aditya College of Architecture, Mumbai-400 092
55	MH68	Pravara Rural Education Society's College of Architecture, Chincholi, Tal:Sinnar, District- Nashik
56	MH70	Smt.Premalati Chavan College of Architecture, Wagheri,Tal.Karad, Satara
57	MH71	Akhil Bharatiya Maratha Shikshan Parishad's Anantrao Pawar College of Architecture, Pune-411009
58	MH72	IDEAL Institute of Architecture, Palghar, Thane-421303
59	MH73	Thakur School of Architecture & Planning, Kndivali, Mumbai-400 101
60	MH74	S.B.Patil College of Architecture & Design, Pune-411 044,
61	MH75	D.Y.Patil School of Architecture, Talegaon, Pune-410506
62	MH76	School of Environment and Architecture, Borivali (w) , Mumbai-400 091
63	MH77	C.T.E.S.College of Architecture, Chembur, Mumbai-400 071
64	MH78	Shree Chanakya Education Society's Indira College of Architecture and Design, Pune-411033
65	MH79	Trinity College of Architecture, Bopdev Ghat, Pune-411 048
66	MH80	Jai Shri Siddhivinayak Foundation Trust's B. R. Harne College of Architecture, Vangani (w), Dist. Thane
67	MH81	Jhulelal Institute of Architecture, Nagpur-441 111
68	MH82	Ideal College of Architecture, Ichalkaranji-416103 Distt- Kolhapur
69	MH83	Shri Datta Meghe College of Architecture, Nagpur – 441110

70	MH84	Yashoda College of Architecture, Satara-415011
71	MH85	Amity School of Architecture and Planning, Raigad, Panvel-410 206
72	MH86	Smt.Kashibai Navale College of Architecture, Ambegaon (Bk), Pune-411 041
73	MH88	MET's School of Architecture and Interior Design, Nashik-422222
74	MH89	Vishwaniketan's College of Architecture, Khalapur, Raigad-410202
75	MH90	BharatratnaDr.A.P.J.Abdul Kalam College of Architecture, Aurangabad-431007,
76	MH91	Shri Shivaji Maratha Society's college of Architecture, Pune-411009,
77	MH92	Vidya Pratisthan's Indapur College of Architecture, Indiapur, District-Pune-413106
78	MH93	Shri S.D.Patil College of Architecture, Distt. Sangli, Islampur-415409
79	MH94	Smt.K.L.Tiwari College of Architecture, Nallasopara (W) Tal.Vasai, District Palghar-401203
80	MH95	MIT Art, Design & Technology University Pune's School of Architecture, Pune-412201
81	MH96	Pune District Education Association's College of Architecture, Akurdi, Pune-411044
82	MH97	Flora College of Architecture, Pune-412205
83	MH98	Aditya College of Architecture, Beed-431122
84	MH99	Ramesh Phirodia College of Architecture, Ahmednagar – 414001
85	MH100	Marathwada Mitra Mandals Institute of Environmental & Designs College of Architecture, Lohgaon, Pune -411047,
86	MH101	School of Architecture Symbiosis Skills and Open University, Tal.-Haveli, Pune – 412101,
87	MH102	Vivekanand Education Society College of Architecture, Chembur,Mumbai-400074
88	MH103	D. Y. Patil College of Architecture, Kolhapur-416112,
89	MH104	Vasantdada Patil Pratishthans's Manohar Phalke College of Architecture Sion, Chunabhatti, Mumbai 400022
90	MH105	D.Y. Patil School of Architecture, Nerul, Navi Mumbai-400706
91	MH106	School of Architecture, Sanjay Ghodawat University, Hatkanangale, Dist-Kolhapur-416118
92	MH107	Solapur Education Society's College of Architecture, Solapur-413002
93	MH108	Dayanand College of Architecture, Latur-413512

94	MH109	Dr Manoj A Shete College of Architecture, Shahpur, Dist Thane 421302
95	MH110	Siddant College of Architecture, Tal-Maval, Dist-Pune- 412109
96	MH111	Symbiosis School of Planning, Architecture and Design, Nagpur – 440008
97	MH112	Ashokrao Mane College of Architecture, Hatkanangale, Kolhapur-416112
98	MH113	Tatyaasaheb Kore College of Architecture, Panhala, Kolhapur-416113
99	MH114	Sipna School of Planning and Architecture. Amravati -444701
100	MH115	Indala School of Architecture, Kalyan, Thane -421301
101	MH116	Dr.J.J.Magdum College of Architecture, Kolhapur, Jaysingpur-416101
102	MH117	Vishwakarma University School of Architecture and Planning, Kondhwa Bk, Pune-411048
103	MH118	School of Architecture Chhatrapati Shivaji Maharaj University, Shedung, Panvel -410206
104	GJ02	Centre for Environmental Planning & Technology University (CEPT), Navrangpura, AHMEDABAD-380 009
105	TS01	School of Planning &Architecture Jawaharlal Nehru Architecture and Fine Arts University, Masab Tank, HYDERABAD - 500 028
106	UA01	Department of Architecture& Planning Indian Institute of Technology ROORKEE-247 667
107	CH01	Chandigarh College of Architecture Sector 12, CHANDIGARH - 160 012
108	DL01	School of Planning and Architecture, NEW DELHI-110 002
109	GJ01	Department of Architecture M. S. University of Baroda, Pratapgunj, VADODARA - 390 002
110	WB02	Faculty of Architecture &Regional Planning Indian Institute of Technology KHARAGPUR-721 302
111	KA01	School of Architecture University Visvesvaraya College of Engineering, Jnana Bharathi, BANGALORE - 560 056
112	KL01	Department of Architecture College of Engineering, THIRUVANANTHAPURAM-685 016
113	MP01	Department of Architecture Maulana Azad National Institute of Technology BHOPAL-462 007
114	TN01	School of Architecture & Planning Sardar Patel Road, CHENNAI-600 025
115	WB01	Dept. of Architecture, Town and Regional Planning, Indian Institute of Engineering Science and Technology HOWRAH-711 103

APPENDIX- III

Questionnaire

1. **Introduction to the Library:**

1.1 Name of the Institution: _____

Name of the Librarian: _____

Address: _____

_____

_____

Telephone No. _____ E-mail: _____

1.2 Courses being run by the college and student's intake:

i. B.Arch._____ ii. M.Arch. _____ iii. Ph.D._____ iv. Any other:_____

1.3 Aided ☐ Non-Aided ☐ (Tick)

1.3 Subject cover under

B.Arch……

M.Arch……...

Ph.D……

1.4 Do you have your website for the library? YES \ NO

If yes, kindly give the URL & the software…….....

1.5 Do you have a written library collection and management policy? YES / NO

2. Library Collections:

i) Total Number of books in the Library: _____

ii) Total Number of periodicals the library subscribes to: _____

iii) No. of Journals & Magazines:

a) Indian: _____ b) Foreign: _____

iv) Bound volumes of Journals / Magazines: _____

v) Abstracting / indexing journals / Magazines: _____

vi) Institutional Publications: _____

2.1 Collection of E-resources (please specify number of collection):

e-Resources	Number of resources
CD-ROM	
e-thesis	
e-Journals	
e-Reports	
e-Books	
e-database	
e-clippings	
Movies/Films	
Others	

2.2 Number of Non-Book materials**:** _____

a) Reports (Institutional/ Outside) _____

b) Drawings _____

c) Thesis _____

d) Maps _____

e) Development Sheets _____

f) Photographs _____

g) Clippings _____

h) Any others _____

2.3 Does the Library have any Manuscripts / Rare Books: YES / NO

(If yes, kindly specify the number and their type, e.g. historical documents)

_____

_____

3. Has special arrangement been made for shelving the rare books such as provision of Pamphlet boxes? YES / NO (If yes, please indicate)

_____

_____

4. Does the library have an independent material section?

(If yes, please specify numbers and materials. Exp. Roofing, Plumbing materials)

_____

_____

_____

5. **Organization of Resources**:

5.1 Which classification Scheme do you follow? (Tick)

a. DDC ☐

b. UDC ☐

c. CC ☐

d. Any other: ☐ Specify_____

5.2 Do you classify & catalogue the non-book materials? YES / NO

5.3 Do you circulate Non-book materials? YES / NO

If 'yes' How?

i. Computer [ ]

ii. Manually [ ]

6. Technology use in the library:

6.1 What kind of operating system do you use in computers?

a. Windows [ ]

b. Linux [ ]

c. Apple Macintosh [ ]

d. Unix [ ]

e. DOS [ ]

f. Others……

6.2 Do you use any library automation package? YES / NO

If yes, please specify the software_____

6.3 Do you have OPAC on the web?

i. Yes (Global access of catalogue) [ ]

ii. OPAC in campus [ ]

iii. No OPAC [ ]

iv. Other……. ……..……

6.4 How do you organize a CD-ROM collection?

Please specify: _____

6.5 Do you have an Institutional Repository? YES / NO

a) If yes, please specify the software ……...

b) Whether the access is on the Intranet or the internet?

……..

6.6 Do you have any publication software for the institution?

(eg. Open journal system) YES/ NO

If yes, please specify: _____

6.7 Is the library a member of any consortia initiatives? YES / NO

If yes, Specify: _____

7. Library Services:

7.1 Mention the information services provided by your library [Please tick]:

i. Reprographic Service (Photocopy) [ ]

ii. Reference Service [ ]

iii. Referral Service [ ]

iv. Inter-library-loan service [ ]

v. Newspaper Clipping Service [ ]

vi. Any other ……

7.2 Do you have any reference services in your library?

i. CAS (Current Awareness Service) [ ]

ii. SDI (Selective Dissemination Service) [ ]

iii. Indexing & Abstracting Service [ ]

7.3 Do you provide print services? YES / NO

7.4 Do you permit downloading of data? YES / NO

7.5 Is your digital collection linked to your library & institution's website? YES / NO

8. **Maintenance and Security of Library Resources:**

8.1 Where do you store e-resources? [ ]

a. Server with remote access [ ]

b. External hard disk [ ]

c. Office PC [ ]

d. Cloud [ ]

8.2 Do you take backup of e-resources?

If yes. Where do you store the backup?

a. External hard disk [ ]

b. Personal Computer [ ]

c. Google drive [ ]

8.3 What is the penalty for lost books and misuse of library resources?

……..

8.4 CCTV / RFID installation? YES/ NO.

9. Do you want to share your resources with other architecture college libraries? YES/NO

10. Are you ready to join consortia based-subscription? YES / NO

11. What are the difficulties / barriers faced by you for applying the information technology in your library? (Please specify) ----------

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11. Has the library discarded any reading material since its inception YES / NO

If yes, what was the material discarded and what were the reasons?

_____

_____

12. Are the resources utilized to the maximum extent? YES / NO

If no, what are the reasons for the non-utilization of the resources?

I. Lack of proper collections [ ]

II. Poor maintenance of library collection [ ]

III. Lack of awareness [ ]

IV. Lack of user orientation [ ]

V. Non-cooperation of library staff [ ]

VI. Neglect of the library by the authorities [ ]

VII. Financial restrictions [ ]

VIII. Unawareness of new technology [ ]

IX. Lack of support from teaching staff [ ]

X. Any other …….……..

13. Did you attend academic events? (conference & seminar) Yes / NO

13.1 Do you have individual publications? Yes / NO

14. Do you conduct library events for users and library professionals? YES / NO

15. Any other suggestions?

_____

_____

_____

Signature & Date