

**CURRENT TRENDS IN INFORMATION  
COMMUNICATION TECHNOLOGY APPLICATIONS IN  
THE CENTRAL LIBRARIES OF INDIAN INSTITUTES  
OF TECHNOLOGY IN INDIA: A COMPARATIVE  
STUDY BETWEEN OLD AND NEW IITs**

**Abstract  
of  
Thesis**

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## **INTRODUCTION**

The development and growth of modern society is based on Information communication technology. It has now become vital part of our day to day activities in the working environment which has changed the face of academic institutions or organizations. In these institutions, Library is playing vital role to support the aims and objectives of the parent organisations. The libraries store, organise various kinds of collection of resources for their users. Library is a collection of written, printed, or digital reading material organised to provide different services to the users with the help of trained staff.

The Indian Institutes of Technology (IITs) are autonomous institutes of higher education. These are governed by the Institutes of Technology Act, 1961 which has been declared as institutions of national importance and lays down their powers, duties, and framework for governance etc. The Institutes of Technology Act, 1961 lists twenty-three institutes located at Bhilai, Chennai, Delhi, Dhanbad, Dharwad, Goa, Guwahati, Jammu, Kanpur, Kharagpur, Mumbai, Roorkee, Gandhinagar, Hyderabad, Indore, Jodhpur, Mandi, Palghat, Patna, Ropar, Tirupati and Varanasi. Each IIT is an autonomous institution linked to the others through a common IIT Council, which oversees their administration.

The Central Libraries of IITs are one of the central support services. The duty of central libraries of IITs is to provide information services and access to bibliographic and full text digital and printed resources to support the scholarly and informational needs of the students, faculty and staff. The library offers books, book bank of textbooks for those users who cannot afford the expenses of books. The library sustains inter-library loan relations with member of institutions and libraries.

The technology involves with the transmission and storage of information especially in the development, installation and management of universities and other organizations. Information technology is the use of computer and telecommunication equipment to store, retrieve, transmit and manipulate the data. The term is commonly used as the synonyms for the computer and computer network. It encompasses other information distribution technologies such as television and telephone.

Information communication technology has transformed the institutions or organizations. Libraries are also utilising modern technology for improvement of existing library services and creation of new services which shows the impact on the shape and size of the existing libraries and proving the existence in the organisations. Information communication technology is used in various sectors like education, transportation, health, business, industries etc. Advancement of information communication technology and electronic publishing has ample opportunities in libraries for information science professionals to modernize library activities and services to fulfil the diverse information needs of the users. Many libraries are utilizing information communication technology to provide efficient and effective library services to their users.

Information and Communication Technology (ICT) has also changed the trends of libraries and brought extraordinary transformation in academic library and information services, such as bibliographic services, users services, interlibrary loan, OPAC, reference services, current awareness services, document delivery and audio visual services can be provided more proficiently by using ICT, as they offer expedient time, place, cost effectiveness and up-to-date spreading of information to the users which facilitate the end users involvement in the library and information services.

## **OBJECTIVES OF THE STUDY**

Study set up the following objectives-

1. To identify best practices based on Information Communication Technology Applications in the central libraries of old and new IITs in India.
2. To find out the use of emerging ICT applications in development of library collection, activities and services.
3. To find out the infrastructure required for the implementation of ICT applications in the libraries.
4. To find out the usage of open and commercial software for library management.
5. To investigate the usage of social networking sites for sharing and communicating information.
6. To find out the major problems and issues in implementation of ICT in libraries.

## **SCOPE AND LIMITATIONS OF THE STUDY**

The term scope refers to limitations or extent of the study. It mainly involves the coverage area of the study. The study is confined to the central libraries of Indian Institutes of Technology in India. In this study, IITs established from 1952 to 2012 have been taken. These are as follows:

### **Old Indian Institutes of Technology**

1. Central Library, Indian Institute of Technology, Kharagpur (IITKGP), West Bengal.
2. Central Library, Indian Institute of Technology, Bombay (IITB), Maharashtra.

3. Central Library, Indian Institute of Technology, Kanpur (IITK), Uttar Pradesh.
4. Central Library, Indian Institute of Technology, Madras (IITM), Tamil Nadu.
5. Central Library, Indian Institute of Technology, New Delhi (IITD), Delhi.
6. Central Library, Indian Institute of Technology, Guwahati (IITG), Assam.
7. Central Library, Indian Institute of Technology, Rorkee (IITR), Uttarakhand.

#### **New Indian Institutes of Technology**

1. Central Library, Indian Institute of Technology, Hyderabad (IITH), Andhra Pradesh.
2. Central Library, Indian Institute of Technology, Patna (IITP), Bihar.
3. Central Library, Indian Institute of Technology, Gandhinagar (IITGN), Gujarat.
4. Central Library, Indian Institute of Technology, Bhubneswar (IITBBS), Odisha.
5. Central Library, Indian Institute of Technology, Ropar (IITRPR), Punjab.
6. Central Library, Indian Institute of Technology, Jodhpur (IITJ), Rajasthan.
7. Central Library, Indian Institute of Technology, Indore (IITI), Madhya Pradesh.
8. Central Library, Indian Institute of Technology, Mandi (IIT Mandi), Himachal Pradesh.
9. Central Library, Indian Institute of Technology, (BHU) Varanasi (IITBHU), Uttar Pradesh.

## **HYPOTHESES OF THE STUDY**

A hypothesis is an assumption or some supposition to be proved or disproved. It can be an uncertain generalization of the problem under the study. Following are the probable hypothesis of the study:

- Old Central Libraries of IITs have state-of-art infrastructure and resources to support modern library services based on ICT.
- Most of Central Libraries of IITs are utilizing ICT in development and management of library collection.
- Some of the Central Libraries are utilizing open source software for various purpose like Institutional repositories, content management etc.
- Most of the old Central Libraries are utilizing emerging technology for the library activities and services.

## **METHODOLOGY**

The present study focuses on Current Trends in Information Communication Technology Applications in the Central Libraries of Indian Institutes of Technology in India: A Comparative Study between Old and New IITs. The survey research method has been adopted for the collection of data. Questionnaires were used as a tool for data collection. Two questionnaires were prepared, one for librarians of the IITs and other for the users of IITs. Before sending questionnaire to all the librarians of Indian Institutes of Technology, pilot study was conducted. For pilot study, questionnaires were sent to the Librarian of Indian Institute of Technology Madras and Indian Institute of Technology Hyderabad. After getting questionnaire from there, suggestions and modifications were incorporated. After that, one questionnaire was distributed to each respective librarian of the 16 Indian Institutes of Technology by personal visit, E-mail as well as speed posts. All the 16 questionnaires were received

from there. After receiving questionnaires, simply data were analysed and findings and conclusion were written.

### **Questionnaire Survey**

Two questionnaires were prepared, one for librarians of the IITs and other for the users of IITs. Structured questionnaires were prepared and distributed to librarians or library in-charge of the libraries. The purpose of questionnaire was to obtain the data regarding the state-of-the-art information and communication technology infrastructure and contemporary applications of ICT, to identify and analyse the specific factors that promoted or hindered application of information and communication technologies.

### **Observation of Libraries**

Observation is a technique of collecting data by observing behaviour or activities, events, etc. of the respondents. For the present study, observations were also conducted in a library to collect information about current state-of-the-art infrastructure, ICT facilities, resources, and functions and examined its application in information handling process.

### **Sample Size**

The present study was conducted on sixteen librarians and nine hundred sixty users of the Indian Institutes of Technology. A random sample was drawn for the selection of the respondents (users of libraries) from each of the sixteen IITs. The purpose of drawing a random sample was to take a representative population of users per IIT. Sixteen filled questionnaires were received from librarians of IITs.

Sixty questionnaires were distributed to users of the library of each IITs for collecting some basic information for doing broad comparison between the users opinions regarding what libraries having and what do users think about these library

services. That's why some basic questions were prepared and data were collected through structured questionnaire. In this study, simple random sampling was adopted for taking sample size of the users. On the basis of this, 60 questionnaires were circulated to the 60 users of each IITs. The sixteen librarian's questionnaire and eight hundred ninety nine questionnaires were received from there via personal visit as well as online questionnaire.

## **SIGNIFICANCE OF THE STUDY**

The present study is useful for the working as well as budding Library and Information Science Professionals for awareness about Current Trends in Information Communication Technology Applications in the Libraries. This study highlights the implementation of information communication technology applications among the old and newly established IITs. It explores the weak and strong area of their libraries by which librarian can re-change their ICT applications policy for the betterment of libraries. It also helps to other institutions those who want to apply ICT in their libraries. It may be used as a road map for the other institutions to implement information technology in their libraries.

## **MAJOR FINDINGS**

### **ICT based best practices**

In old IITs, all the central libraries are using email alerts, 4 (57.14%) are using e-referencing, 3 (42.86%) are using instant messaging and only 2 (58.27%) libraries are using SMS services.

In new IITs, all the Central libraries are using email alerts, 4 (44.44%) are using e-referencing, 3 (33.33%) are using online SMS and instant messaging and only 2 (22.22%) libraries are using SMS services.

### **Listservs for Collection Development**

In old IITs, only IIT Delhi uses the Listservs for the collection development while IIT Kharagpur and IIT Roorkee don't use it.

In new IITs, IIT Gandhinagar, IIT Bhubaneswar and IIT Roapar use the Listserve for the collection development while six IITs (IIT Patna, IIT Hyderabad, IIT Jodhpur, IIT Indore, IIT Mandi and IIT BHU) don't use it.

### **Automation in the Library and Automated Modules of Acquisition System**

All the central libraries of Indian Institutes of Technology are automated. In old IITs, all the libraries (IIT Kharagpur, IIT Bombay, IIT Madras, IIT Kanpur, IIT Delhi, IIT Guwahati and IIT Roorkee) are using processing, ordering and receiving of acquisition module while 6 (85.71%) central libraries of old IITs (IIT Kharagpur, IIT Bombay, IIT Kanpur, IIT Delhi and IIT Roorkee) are using recommendation and only 2 (28.57%) libraries (IIT Bombay and IIT Kanpur) are using other type of things like book exhibitions and Sending pamphlets to vendors.

In new IITs, 5 (55.55%) Central Libraries (IIT Gandhinagar, IIT Bhubaneswar, IIT Ropar, IIT Jodhpur and IIT Mandi) are using recommendations while 4 (44.44%) central libraries (IIT Gandhinagar, IIT Bhubaneswar, IIT Jodhpur and IIT Mandi) use processing, ordering and receiving of acquisition section. And only IIT Ropar uses the processing of acquisition section.

### **Automated Modules of Circulation System**

In old IITs, all (100%) the libraries (IIT Kharagpur, IIT Bombay, IIT Madras, IIT Kanpur, IIT Delhi, IIT Guwahati and IIT Roorkee) are using Issue Return, Fine Collection, Membership Procedure and Overdue Notice of circulation section whereas 6 (85.71%) central libraries of IITs (IIT Kharagpur, IIT Bombay, IIT Madras, IIT Kanpur, IIT Delhi, IIT Guwahati and IIT Roorkee) are using reservation for the users.

In new IITs, all (100%) the Central Libraries (IIT Kharagpur, IIT Bombay, IIT Madras, IIT Kanpur, IIT Delhi, IIT Guwahati and IIT Roorkee) are using issue and return, overdue notice service while 8 (88.89%) central libraries are using fine collection, 7 (77.78%) are using reservation service and only 4 (44.44%) central libraries are using membership procedure service.

#### **Automated Modules of Cataloguing System**

In old IITs, 6 (85.71%) central libraries do data entry through books, 3 (42.86%) central libraries do through accession register whereas 2 (28.57%) do direct recommendation, direct through forms and data entry through cards.

In new IITs, 8 (88.89%) central libraries do data entry through books while 5 (55.55%) do through accession register, 2 (22.22%) do direct recommendation and 1 (11.11%) do direct through forms and data entry through cards.

#### **Automated Modules of Web OPAC System**

In old IITs, it is found that 6 (85.71%) central libraries do edit profile using OPAC, 3 (42.86%) do Book Recommendation and 2 (28.57%) do Bulletin Board and suggestions.

In new IITs, 6 (66.67%) central libraries do edit profile and suggestions using OPAC while 5 (55.55%) central libraries use Book Recommendation and 2 (28.57%) Bulletin Board.

#### **Automated Modules of Serial Control System**

In old IITs, 6 (85.71%) use receiving service, 5 (71.43%) use processing, receiving request, indexing service, 4 (57.14%) central libraries do ordering and only 2 (28.57%) do abstracting service with the help of serial control module.

In new IITs, 5 (55.55%) central libraries use processing service, 4 (44.44%) libraries do indexing and receiving service, 2 (22.22%) libraries use ordering service while only 1 (11.11%) receiving request service.

### **Technology used by the Library**

In old IITs, 6 (85.71%) librarians use barcode technology in their libraries while 5 (71.43%) use RFID technology, 4 (57.14%) respondents use smart cards, 2 (28.57) use cloud computing and only 1 (14.28%) that is IIT Guwahati is using QR code technology in the library.

In new IITs, 8 (88.89%) librarians are using barcode technology while 6 (66.67%) librarians are using smartcards, 3 (33.33%) libraries are using RFID technology and QR Code technology and merely 2 (22.22%) libraries are using cloud computing.

### **Mobile based Application**

In old IITs, only 1 (14.28%) that is IIT Guwahati is using mobile based library service for the library users while in new IITs, 3 (33.33) central libraries are using mobile based library services. IIT Gandhinagar is using Beta Version mobile based library service while IIT Jodhpur is using NGL Carbon.

### **Need of Technical Training to manage ICT Applications**

In old IITs, 3 (42.86%) librarians say that there is need of technical training to manage ICT applications while in new IITs, 6 (66.67%) librarians say that there is need of technical training to manage ICT applications.

### **Security System in the Library**

In old IITs, 6 (85.71%) libraries are using CCTV while 4 (57.14%) libraries use RFID, 3 (42.86%) use smart cards and 2 (28.57%) use biometrics. IIT Bombay is using 3M System CCTV.

In new IITs, 8 (88.89%) libraries use CCTV while 5 (55.55%) libraries are using smart cards and 4 (44.44%) libraries that are IIT Patna, IIT Bhubaneswar, IIT Ropar and IIT Mandi are using RFID.

### **Network System Software in the Library**

In old IITs, 5 (71.43%) libraries of old IITs are using LINUX while only 1 (14.28%) library is using windows NT. IIT Kanpur librarian did not give response of it.

In new IITs, 8 (88.89%) libraries are using LINUX while only 6 (66.67%) libraries are using Windows NT. No one library is using UNIX operating system.

### **Library Network**

In old IITs, 7 (100%) libraries are using Local Area Network while IIT Delhi is also using Metropolitan Area Network, IIT Kanpur and IIT Delhi are also utilising Wide Area Network.

In new IITs, 6 (66.67%) central libraries that are IIT Patna, IIT Hyderabad, IIT Gandhinagar, IIT Bhubaneswar, IIT Ropar and IIT Jodhpur are using Local Area Network. The librarian of IIT Indore, IIT Mandi and IIT BHU did not give response of this. (Table 5.1.27)

### **Internet Connectivity in the Library**

In old IITs, 5 (71.43%) libraries are using Broad Band while 5 (71.43%) libraries are using Wi-Fi and only IIT Kharagpur is using Li-Fi Internet connectivity that is NKN Connectivity.

In new IITs, 6 (66.67%) libraries are using Broad Band while 7 (77.78%) libraries are using Wi-Fi and no one library is using Li-Fi Internet connectivity. (Table 5.1.28)

### **Library Collection**

#### **Print Books**

In old IITs, highest 275000 number of books are provided by IIT Kanpur, 263864 books are provided by IIT Kharagpur, 257208 books are provided by IIT Madras, 233304 number of books are provided by IIT Bombay, 200000 number of books are

provided by IIT Delhi and IIT Roorkee while lowest 125396 print books are provided by IIT Guwahati.

In new IITs, highest 114275 number of books are provided by IIT BHU followed by IIT Indore 29000, IIT Gandhinagar 25000, IIT Bhubaneswar and IIT Hyderabad 16000, IIT Mandi 15900, IIT Jodhpur 15000, IIT Ropar 14500 and lowest (14421) books prints are provided by IIT Patna.

### **E-books**

In old IITs, highest 100000 E-books are provided by IIT Kharagpur, followed by IIT Roorkee 35000, IIT Kanpur 16000, IIT Madras 6117, lowest 5120 E-books are provided by IIT Bombay while IIT Delhi and IIT Guwahati did not respond to it. In new IITs, highest 50000 E-books are provided by IIT BHU followed by IIT Mandi 11400, IIT Bhubaneswar 2000, IIT Indore 728, IIT Ropar 500, IIT Jodhpur 50. Lowest 1 in IIT Gandhinagar and IIT Patna and IIT Hyderabad did not respond to it.

### **CD-ROM**

In old IITs, highest 5801 CD-ROM are provided by IIT Guwahati followed by IIT Kanpur 2000, IIT Bombay 1370, IIT Madras 356 and IIT Roorkee, IIT Delhi and IIT Kharagpur did not respond to it. In new IITs, highest 1477 CD-ROM are provided by IIT Gandhinagar followed by IIT Ropar 750, IIT Jodhpur 500 and IIT Hyderabad, IIT Patna, IIT Bhubaneswar, IIT Indore, IIT Mnadi and IITBHU did not respond to it.

### **Print Periodicals**

Highest number of print periodicals are provided by IIT Bombay followed by IIT Roorkee 91, IIT Guwahati 90, IIT Kharagpur 80, and IIT Madras 30 and IIT Delhi and IIT Kanpur did not give response to it. In new IITs highest 132 print periodicals are provided by IIT Gandhinagar 132 followed by IITBHU 35, IIT Bhubaneswar 26,

IIT Ropar 15, IIT Mnadi 5, IIT Indore 3, while IIT Patna IIT Hyderabad, IIT Jodhpur did not give response to it.

### **Electronic Periodicals**

In old IITs, IIT Kharagpur has 25262 electronic periodicals followed by IIT Guwahati 24100, IIT Bombay 20029, and IIT Madras 704 whereas IIT Delhi and IIT Kanpur did not respond to it. In new IITs, highest 14000 electronic periodicals are provided by IITBHU followed by IIT Bhubaneswar 8500, IIT Ropar 7000, IIT Indore 6000, IIT Mnadi 237 and lowest 36 are provided by IIT Hyderabad. IIT Patna, IIT Gandhinagar, IIT Jodhpur did not respond to it.

### **Bound Volumes**

IIT Kanpur has highest, 28000 bound volumes followed by IIT Kharagpur 132916, IIT Bombay 119265, IIT Madras 113919, IIT Delhi 100000, IIT Roorkee 60000 and lowest no. of bound volumes are provided by IIT Guwahati i.e 35505. In new IITs highest 17738 bound volumes are provided by IITBHU, followed by IIT Hyderabad 2284, IIT Jodhpur 100, and lowest bound volume has been provided by IIT Mnadi i.e 28 and IIT Patna, IIT Bhubaneswar, IIT Ropar, IIT Indore and IIT Gandhinagar did not respond to it.

### **Theses/Dissertations**

IIT Bombay has highest 37154 theses/dissertation followed by IIT Kanpur 17000, IIT Roorkee 15000, IIT Madras 6689, IIT Delhi 6000, IIT Kharagpur 5697 and lowest 1510 in IIT Guwahati. In new IITs IITBHU has highest 269 theses/dissertation followed by IIT Indore 218, IIT Patna 200, IIT Gandhinagar 187, and lowest 50 IIT Ropar. IIT Hyderabad, IIT Bhubaneswar, IIT Jodhpur, IIT Mandi did not respond to it.

### **Standards/Patents**

In old IITs, IIT Bombay has the highest 67835 Standards/ Patents in the Central Library followed by IIT Kanpur 3000, IIT Madras 1199, IIT Guwahati 524, , IIT Roorkee 5 and IIT Kharagpur and IIT Delhi, did not give response of it. In new IITs, IITBHU has the highest 80000 Standards/ Patents followed by IIT Gandhinagar 1707, IIT Indore 405, IIT Hyderabad 4 while IIT Patna, IIT Bhubaneswar, IIT Ropar, IIT Jodhpur, IIT Mandi did not give response of it.

### **Full Text Databases**

Highest no. of full text databases are provided by IIT Kharagpur 58, IIT Delhi 50, IIT Madras 10 and IIT Kharagpur, IIT Roorkee and IIT Guwahati did not give response of it. In new IITs, highest 50 full text databases available in the central library of IIT Gandhinagar followed by IIT Bhubaneswar 46, IIT Jodhpur 32, IIT Indore 17, IIT Mandi 15, IITBHU 13, while responses were not given by IIT Ropar and IIT Hyderabad.

### **Bibliographic Databases**

In old IITs, highest 14 bibliographic database are provided by IIT Madras followed by IIT Delhi 8, IIT Bombay 7, IIT Kharagpur 3, while IIT Guwahati, , IIT Roorkee, IIT Kanpur did not give response of it. In new IITs, highest 10 bibliographic databases are provided by IIT Gandhinagar followed by IIT Indore 5, IIT Bhubaneswar, IIT Mandi, IIT Jodhpur provided 4 and 3 bibliographic database are provided by IIT Ropar, IIT Patna, IIT Hyderabad, IITBHU did not give response of it.

### **Services offered by the Library**

In old IITs, 7 (100%) central libraries offer lending services, reference service, CAS, reprographic service, web OPAC, user education, ILL, alerting service, online database search, CD-ROM database service and Document Delivery Service while 6

(85.71%) Digital library service, I R Service, Ask librarian and only 5 (71.43%) central libraries of old IITs offer remote access to e resources.

In new IITs, 9 (100%) central libraries offer web OPAC, online database search, CD-ROM database service, digital library service, I R Service and remote access to e resources while 8 (88.89%) libraries provide reference service, CAS, user education and alerting service, 7 (77.78%) libraries offer reprographic service, ILL and CAS, 6 (66.67%) provide lending service and only 5 (55.55%) libraries offer ask librarian service.

### **Current Awareness Services**

In old IITs, 7 (100%) libraries offer monthly book addition and new arrivals service to their users while 6 (85.71%) libraries provide email alert service, 3 (42.86%) provide SMS alerting service and 2 (28.57%) libraries provide Bulletin Board Service and Newspaper clipping.

In new IITs, 9 (100%) libraries provide email alert service while 8 (88.89%) libraries offer new arrivals service, 7 (77.77%) offer Newspaper clipping service to their users, 6 (66.67%) libraries offer monthly book addition, 4 (44.44%) libraries provide bulletin board service and 3 (33.33%) provide SMS alerting service.

### **Add-on Services**

In old IITs, 7 (100%) libraries provide Library Web-blog Portal 6 (85.71%) offer Wi-Fi Services and 5 (71.43%) offer Mobile based Services to their users. In old IITs IIT Bombay is also providing other type of add-on service that is shelf-checkout.

In new IITs, 9 (100%) central libraries offer Wi-Fi Services to their users while 7 (77.78%) libraries provide Library Web-blog Portal and 3 (33.33%) provide Mobile based Services.

### **Computers availability in the Library**

In old IITs, IIT Kharagpur has the highest numbers of computers that is 160 followed by IIT Madras (150), IIT Bombay (70), IIT Delhi (70), IIT Roorkee (70), while in new IITs, 70 are provided by IIT Bhubaneswar, 60 by IIT BHU, 30 by IIT Jodhpur, 24 by IIT Indore, 23 by IIT Gandhinagar, 14 by IIT Mandi and lowest no. of computers are provided by IIT Hyderabad and IIT Ropar that is 10.

### **Server Machines availability in the Library**

In old IITs, highest (12) numbers of server machines are provided by IIT Bombay followed by IIT Roorkee (7), IIT Guwahati and IIT Kanpur (5), IIT Kharagpur (3) and IIT Madras (2) while in new IITs, IIT Bhubaneswar (6) followed by IIT Hyderabad and IIT Gandhinagar (3) and lowest numbers of server machines are provided by IIT Patna, IIT Indore and IIT Mandi that is 1.

### **Photocopy Machines**

In old IITs, IIT Kanpur and IIT Delhi are providing 4 photocopy machines for the users followed by IIT Kharagpur that is 3, IIT Bombay, IIT Madras, IIT Guwahati, are providing 2 photocopy machines and only IIT Roorkee is providing only 1 photocopy machine for their library users. In new IITs, IIT Bhubaneswar is providing 3, IIT Hyderabad, IIT Indore and IIT BHU are providing 2 while IIT Patna, IIT Gandhinagar, IIT Ropar, IIT Jodhpur and IIT Indore are providing only 1 photocopy machine for the library users. Only IIT Mandi Central Library is not providing the photocopy machine for their users.

### **Flatbed Scanners**

In old IITs, IIT Bombay and IIT Roorkee are providing 5 flatbed scanners followed by IIT Kharagpur that is 3, IIT Madras that is 2, while IIT Kanpur, IIT IIT Delhi, IIT Guwahati have no facility of flatbed scanner. In new IITs, IIT Patna, IIT

Gandhinagar, IIT Jodhpur and IIT Mandi are providing only 1. IIT Hyderabad, IIT Bhubaneswar, IIT Ropar, IIT Indore and IIT BHU have no facility of flatbed scanner.

### **Overhead Scanners**

It is analysed that in old IITs, IIT Madras, IIT Kanpur, IIT Delhi, IIT Roorkee have 2 overhead scanners whereas IIT Kharagpur, IIT Guwahati have only 1. In the new IITs, IIT Hyderabad and IIT Indore are providing 4 overhead scanners while IIT Bhubaneswar has 3 Whereas IIT Patna, IIT Gandhinagar, IIT Ropar and IIT Mandi have only 1. Only IIT Bombay and IIT Jodhpur have not the overhead scanner.

### **Barcode Scanners**

In old IITs, IIT Kanpur has the highest (15) numbers of barcode Scanners followed by IIT Delhi (10), IIT Kharagpur and IIT Guwahati, IIT Bombay (4), IIT Madras (2) and IIT Roorkee doesn't have barcode scanner. While in new IITs, IIT Bhubaneswar (6), IIT Gandhinagar, IIT BHU (5), IIT Hyderabad, IIT Jodhpur, IIT Indore (3), IIT Mandi (2) while IIT Ropar has only one barcode scanner. IIT Patna doesn't have barcode scanner.

### **Handheld Scanners**

In old IITs, IIT Kanpur and IIT Delhi have the highest (10) no. of handheld scanners followed by IIT Madras, IIT Guwahati (2) while IIT Kharagpur, have only 1 handheld scanners. IIT Bombay, IIT Roorkee don't have handheld scanners.

In new IITs, IIT Bhubaneswar has the highest (5), IIT Ropar, IIT Indore have only 1 handheld scanners. IIT Patna, IIT Hyderabad, IIT Gandhinagar, IIT Jodhpur, IIT Mandi and IIT BHU don't have handheld scanners.

### **Laser Printers**

In old IITs, IIT Bombay has the highest (14) numbers of laser printers followed by IIT Delhi (10), IIT Kharagpur (8), IIT Madras (6), IIT Roorkee (5) while IIT Kanpur has 2 laser printers. IIT Guwahati central library doesn't have laser printers.

In new IITs, IIT BHU (10), IIT Kharagpur (8), IIT Bhubaneswar (7), IIT Gandhinagar (6), IIT Mandi (4), IIT Indore (3) while IIT Hyderabad, IIT Ropar, IIT Jodhpur have 2 laser printers. IIT Patna central library doesn't have laser printers.

### **LCD/Projectors**

In old IITs, IIT Kharagpur, IIT Madras, IIT Kanpur, IIT Delhi, IIT Roorkee have 2 LCD/Projector while IIT Bombay, IIT Guwahati have 1.

In New IITs, IIT BHU have 2 LCD/Projector while IIT Patna, IIT Hyderabad and IIT Mandi have 1. IIT Gandhinagar, IIT Bhubaneswar, IIT Ropar, IIT Jodhpur, IIT Indore don't have LCD/Projector in their library.

### **Library Management Software**

All the IITs are using library management software. (Table and Figure 5.1.22) In old IITs, 5 (71.43%) central libraries that are IIT Kharagpur, IIT Kanpur, IIT Delhi, IIT Guwahati and IIT Roorkee are using Libsys software while IIT Bombay is using Koha and Libsult Software and IIT Madras is using VTLS.

In new IITs, 5 (55.55%) central libraries that are IIT Hyderabad, IIT Gandhinagar, IIT Bhubaneswar, IIT Mandi and IIT BHU are using Koha library management software while IIT Patna, IIT Ropar and IIT Indore are using Libsys library management software and IIT Jodhpur is using NewGenLib Library management software.

### **Digital/Institutional Repository Software**

All the IITs are using digital/institutional repository software. In old IITs, all the central libraries are using DSpace digital/institutional repository software while IIT Madras is also using E-Print Archive.

In new IITs, all the central libraries are using DSpace digital/institutional repository software.

### **Use of Social Networking Sites**

2 old central libraries of IITs are using social networking sites while in new, 4 central libraries are using Social Networking Sites. 2 (28.58%) old central libraries are using Facebook while only one (14.27%) is using YouTube and one (14.27) is using Blog. In new IITs, 4 (44.44%) are using Facebook, 2 (22.22%) are using YouTube, blog and 3 (33.33%) are using Twitter.

### **Purpose of Using Social Networking Sites**

In old IITs, 3 (42.86%) central libraries are using for linking with library users, for promotional activities and user education programme, and 3 (42.86%) central libraries are also using for creating awareness about library collection and services while only 2 (28.57%) central library are using for getting feedback/sharing the problems to the users.

In new IITs, 4 (44.44%) central libraries are using for linking with library users, 4 (44.44%) central libraries are using for creating awareness about library collection and services whereas 2 (22.22%) are using for the promotional activities and users education programme and 3 (33.34%) for getting feedback/sharing the problems to the users.

### **Problems during Implementation of ICT Applications**

In old IITs, Librarians (28.57%) of IIT Madras and IIT Guwahati face the problem at the time of implementation of ICT Applications while five (71.43%) old IIT Librarians (IIT Kharagpur, IIT Bombay, IIT Kanpur, IIT Delhi and IIT Madras) say that there is no problem while implementing the ICT Applications.

In new IITs, 5 (55.55%) respondents (IIT Patna, IIT Hyderabad, IIT Gandhinagar, IIT Mandi and IIT BHU) are facing problems during Implementation of ICT Applications in the Central Libraries of Indian Institutes of Technology while

four respondents say that there is no problem while implementing the ICT Applications.

### **Different Problems during Implementation of ICT Applications**

In old IITs, one respondent says that facing problem due to scarcity/paucity of funds, two respondent say that because of increasing cost of hardware and software, non-availability of consultancy services and in selection of open vs. commercial software.

In new IITs, four respondents say that facing problems due to increasing cost of hardware and software while only one respondent say that facing problem because of scarcity/paucity of funds, non-availability of consultancy services, selection of open vs. commercial software, lack of ICT infrastructure, inadequate trained professionals, implementation of latest device and gadgets, lack of co-operation and co-ordination among staff, lack of support from higher authority and server vs. cloud computing technology.

### **CONCLUSION**

Indian Institutes of Technology are the national and reputed institutions in India. These institutions are playing vital role in promotion of engineering education and research. The libraries are changing their shape and size due to information technology. To cope up information need of the users, library and information centres are modernising their infrastructure, collection and services. Information technology is used as tools by the library professional for collection, organisation, process and dissemination of the knowledge. To create new services and update existing services, one has to develop proper ICT based infrastructure in the libraries and information centres. They are offering state of art infrastructural and other facilities to the faculty members, research scholars and students. Each institution has their own library with modern information communication technology infrastructure to provide library

resources and services. ICT has changed the traditional library infrastructure into modern infrastructure.

Information technology (IT) entered into libraries, especially academic and research libraries, during the 1960s. Libraries employed Information Technology to speed up their daily actions and reduce their functioning costs. In digital era, bulk of reading materials are available in the electronic form which can be accessed through internet as well as intranet. Modern information communication technology infrastructure is very essential for the library functioning and services. These electronic resources can be created by two methods. One is the content created in the digital form, another the print resources can be converted in the electronic form. Electronic information resources have ample opportunities in the collection development, creation of new services and up-gradation of existing information services. For optimum utilisation of electronic resources and modern library and information services to the potential users, libraries should develop adequate ICT infrastructure.

In present scenario, information communication technology, ICT infrastructure, digital library, library automation and networking are playing vital role in the libraries. ICT infrastructure in new IIT Libraries of India is still in different stages of development. The new Indian Institutes of Technology (IITs) are not equally developed in comparison to old Indian Institutes of Technology libraries. Inadequate sitting capacity, lack of facility in infrastructure than old IITs should be improved and increased. Hence there is need to change in newly established central libraries of IITs. A novel idea and suitable policy should be enclosed by the new IIT library authorities.

Study explores that central library of IIT Kharagpur has the highest (160) numbers of computers followed by IIT Madras (150) and lowest (10) no. of

computers are provided by IIT Hyderabad and IIT Ropar. IIT Bombay has highest (12) numbers of server machines followed by IIT Ropar (7), IIT Bhubneshwar (6), IIT Kanpur and IIT Guwahati (5) while IIT Patna, IIT Indore and IIT Mandi have lowest (1) number of server machines. Study reveals that maximum numbers of sitting capacity is provided by IIT Kanpur (2000) followed by IIT Kharagpur (1500) and minimum is provided by IIT Hyderabad (50) and IIT Mandi (50). All the central libraries of IIT provide software facilities in the library in which majority (62.50%) of central libraries of IIT are using Libsys software. Majority of librarians agreed that open source software's are sufficient for management of the library activities and services. Survey explores that all libraries are using D-Space digital/institutional repository software and IIT Madras is also using the E-Print Archive software. Majority of libraries have CCTV followed by smart cards and RFID to protect their library. Majority of libraries are using Linux followed by Windows NT and no library is using UNIX. Majority (75.00%) of libraries are using Local Area Network (LAN). IIT Bombay is providing the highest bandwidth capacity that is 2.7 GBPS followed by central library of IIT Kharagpur, IIT Patna, and Jodhpur are providing 1 GBPS. All the central libraries of IITs are providing the facility of plagiarism checking for their research scholars.

Social networking sites have attracted to the millions of users in their professional as well as personal life. These are being used by academically for the purpose of linking with one to another. They are using for the means of communication to their friends and relatives. This study provides important information on libraries of academic institution on social networking sites. The result shows that the central libraries of IITs are using Facebook, YouTube, Blog and Twitter for linking with library users, creating awareness about library collection and

services and for getting feedback/sharing problems to the users and they are also using for promotional activities and users education programme. Central libraries of IITs are mostly using Facebook and least used Blog and YouTube.

The study suggests that new IITs central libraries must increase the hardware as well as software facility to enable the users to maximize the usage of ICT-based resources and services and also increase the number of sitting capacity for users. The study concludes that some central libraries of IITs need to proper ICT infrastructure for the library users to utilize the resource and services.

Through the analysis of user's data, it is found that majority of the users of both old and new IITs visit library for reading subject books. Almost all the users are utilizing information communication technology based services like online library catalogue, online access of electronic resources, digital reference service etc. In old IITs, only 164 (40.60%) users of IITKGP, IITB, and IITM are using social networking sites while in new IITs, 222 (44.85%) users of IITP, IITH, IITBBS and IITRPR are using social networking sites like Facebook, YouTube, Twitter and RSS Feed. Majority of users of old and new IITs are satisfied with the digitized collection of central libraries. In old and new IITs, most of the users are satisfied with the relevant collection available in the library. In both the IITs, majority of respondents are using the available e-resources in the library like e-journals, e-books, e-theses, e-databases etc.

## **STRUCTURE OF THE THESIS**

Present study is divided into following chapters:

### **Chapter- 1: Introduction**

In the first chapter, following points have been discussed such as background of the study, libraries and information technology, information communication technology, applications of information communication technology, emerging technologies,

objectives of the study, scope of the study, hypotheses, research methodology, sample size, statistical tools and techniques and significance of the study.

### **Chapter- 2: Review of literature**

Second chapter, review of literature discusses all recent study on information communication technologies in library and services in different institutions or universities of national and international level. It encompasses such as general studies on ICT, studies on ICT infrastructure, studies on e-resources, studies on library automation, studies on web 2.0, studied on software, studies on internet, studies on RFID, studies on web OPAC, studies on cloud computing, studies on mobile devices and studies on current trends.

### **Chapter-3: Current Trends in ICT Applications in Libraries: A Theoretical Framework**

This chapter describes Current Trends in Information Communication Technology Applications in Libraries. This chapter also discusses the use of ICT in library automation, library services, library collection, information retrieval, library security, promotional activities, library management and library networking.

### **Chapter-4: Profile of the Central Libraries of Indian Institutes of Technology**

This chapter presents the brief introduction of Indian Institutes of Technology along with profile of their central libraries are used as scope of the study.

### **Chapter-5 Analysis and Interpretation of Data**

This chapter presents the tabulation, statistical analysis, interpretation and graphical representation of the collected data from libraries.

### **Chapter-6 Findings, Suggestions and Conclusion**

This chapter presents the findings and suggestions of the study and concluded with suggestions in future to improve the information communication technologies applications and uses in the university libraries. It offers conclusion based on findings.