



# Exploring The Different Factors Of ICT Implementation In University Libraries Across West Bengal

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## Abstract:

This study aims to identify and analyze the different factors influencing the adoption of Information and Communication Technology (ICT) in university libraries. A structured questionnaire survey was conducted among professional library staff, supplemented by face-to-face interviews for data collection. The research focuses on key factors like economic factors, technological factors, human factors, invisible factors. Findings indicate that these factors have a significant positive impact on ICT adoption in university libraries.

**Index Terms:** Technological factors, External Support, ICT Adoption, Institutional Intervention, Economic factors, invisible factors

## Introduction

The adoption of ICT in university libraries is influenced by a variety of factors, including financial, technological, human, and environmental elements. Among these, environmental factors—comprising competitive pressure, external support, and institutional interventions—play a crucial role.

Universities in West Bengal have initiated the process of library automation, but the level of implementation varies across institutions. Although the integration of ICT in central and departmental libraries has transformed traditional library services, the current progress still falls short of meeting user expectations.

The Ministry of Human Resource Development (MHRD) and the University Grants Commission (UGC) have been actively supporting the modernization of library infrastructure by providing funding and facilitating access to online resources through initiatives like INFLIBNET and INDEST. These external agencies have a significant influence on ICT adoption.

In addition to external support, competitive pressure among academic institutions and proactive institutional interventions are vital drivers of successful ICT implementation. Globally, market competition has emerged as a key motivator for ICT adoption across various sectors, including higher education. The rapid evolution of digital technologies continues to redefine the competitive landscape, encouraging universities to modernize their library services.

## 2. Review of Literature :

The development and availability of information and communication technologies (ICTs) in libraries have today not only increased and broadened the impact of information resources at their doorsteps, but also placed more emphasis on effective and efficient services. Their applications in libraries, commonly known as library automation, have indeed continued to ease & promote quick & timely access to and transfer of information resources that are found dispensed round the globe. The various services provided in the libraries are

complimented by available facilities, some of which are technology driven. In modern library, technology application in the provision and performance of library services provided by libraries to patrons. The utilization of emerging technologies in recent times in libraries worldwide has proved beyond reasonable doubt, that a library, whatever its services can perform better when facilities are adequately provided to enhance access to the content of the library.

### **2.1 Application of ICT in higher education institute**

Institute of higher learning mainly universities and colleges, academic libraries are those libraries which are located in institutions and intend to provide information to the students, research scholars and faculty. The main objective of the institutional libraries is to assist its users in the process of transforming data to information and information to knowledge. As fountains of knowledge, academic libraries provide services to support learning and research.

Swanson (1980) stated that libraries are not designed at least not in the sense that one might design a computer or a factory, rather they have evolved in response to certain problem situations and have been shaped by countless, relatively independent individual decisions. Several authors (Hellen, 2007 and (Mishra, 2014) have indicated that academic libraries are currently operating a new technological environment and that they need to adapt to it. Otik (2004) adds that one of the major challenges that libraries and the library profession will face in the new millennium is how to cope with digital literature.

Odero Musalaki and Mutula (2007) opined that universities must be improved their abilities and potential for this new technologies at all sector and activities and strategies.

A study conducted by Haneefa (2007) on academic libraries and concluded that library and information centre should adopt ICT and digital resources and services to satisfy the divers information need of the users. and he identified that effort have been made by different libraries in adopting ICT in their various operation and services.

Ghuloum and Ahmed, 2011 pointed out that ICT is used in the academic libraries in different area such as WAN, LAN, online information service, Internet, databases and CD-ROMs, OPAC, online archive etc.

### **2.2 Different factor responsible for ICT adoption**

Library adopted new technologies for the users to provided value added services they also faced many problems for new modes of collecting, storing, retrieving and providing information (Emmanuel and Sife, 2008),

Ghuloum and Ahmed (2011) have identified the factors like financial factor, technological factors, human factors, cultural factors hinders the ICT adoption,

Ani, 2005 and Starr, 2001 included some other factors such as lack of qualified librarian, lack of motivation and need among librarians to adopt ICT for their daily duties.

#### **2.2a Financial factors:**

Amutabi, 2009 pointed out that to provide ICT service sufficient fund are required to acquired modern ICT facilities like computer, server, scanner, software, printer, and subscribe online and offline resources such as e-book, e-journals, and other resources,

Kamba (2011) concluded that sustainable funding is necessary to updated their acquired technologies and software otherwise the institute could not take the advantage of early adoption of ICT.

#### **2.2b Technological Factors;**

Several person are opined that insufficient of technological infrastructure in the library is the hinderence of ICT adoption. A study by Rosenberg (2005) reveal the fact 85% of the libraries provide less than one computer for every 100 students and 36% provide less than one computer for every 500 students

Chisenga studied on the application of ICT in the libraries and result showed that most of the librarians had internet connectivity but none of them offering web based information service to their users.

Minishi –Manjanja (2005) identified that the telecommunication service are the main cause of web based service for the low bandwidth, technical fault and other network configuration problems.

#### **2.2c Human Factors:**

Human factors are very important because ICT is implemented by the human for the human trained library personnel play an important role for ICT adoption, Many researcher (Sife, 2008, Minishi-Majanja, 2007, Kamba, 2011) have identified the problem of trained library personnel and attitude of the authority towards ict adoption is the major factor.

## 2.2d Cultural factors:

Educational background, socio cultural values, institutional relations, socio economic condition influence the perception of the users and therefore it has impact on ICT adoption.

Amutabi, 2009 opined that lack of IT culture in public universities impedes rapid diffusion of new technologies. He stated that many university officials started their career as typewriter, before the wide scale application of computer in the university and find it is very tough to accustom with computer. In the study of Gould and Gomez, 2010, found that most countries, libraries are still being regarded as a place to study or store books thus many users have doubt whether library is a place to go for ICT service or not?, many people still think that computer can only be found in cyber cafes and computer lab but not inside the library, so there is need for library management and library personnel to change this perception in order to encourage the users to visit the library for ICT use.

## 3 Conceptual Framework for the Study

The conceptual framework tested in this study contains constructs that have the theoretical support based on a number of researches done in this area in different developing countries, particularly on the adoption of ICT and other innovation perspective. Factors used in this framework have been guided by the foregoing review of literature. This framework is ideal for this study as it provides the various parameters that characterized ICT adoption which constitutes the purpose of study. In this study, ICT adoption is the dependent variable. The dependent variable is analyzed in this research in order to find out the answer or solution to the problem i.e. what factors hinder libraries in adopting ICT.

### 3.1 Research Aim and objectives:

The focus of this study is to explore the area of application of ICT in the university libraries in West Bengal and to identify the factors affecting ICT adoption in the university libraries. The overall aim of this study, therefore is to explore ICT infrastructure in the library and find out factors affecting ICT adoption in the library,

Following are the main objectives of this research

- i. To identify basic ICT infrastructure developed in the university libraries of West Bengal
- ii. To identify lacuna of ICT infrastructure in the library
- iii. To study the area of library operation and services those are performed through ICT in university libraries in west Bengal
- iv. To identify the factors which affect ICT adoption in the library
- v. To identify the benefits and barriers to use ICT in university libraries in West Bengal

### 3.2 Research question:

In achieving the above aim and objectives this study tries to answer the following research question:

1. What types of ICTs are commonly used in University libraries?
2. What are the perceived benefit and barriers of using ICT?
3. What are the factors affect ICT adoption in the university libraries?

### 3.4 Research Design

This study utilized the qualitative as well as quantitative research process. This study attempts to describe such things as characteristics, hardware, software, computerized services and attitude of libraries and librarians towards ICT. A structured questionnaire were distributed as well as interviewed

### 3.5 Population

The population for this study comprised of the University library (Central library and departmental library) of West Bengal, the library which was established at least ten years ago, name of the library and number of respondent are as follows: 1. University of Calcutta central library, (36) 2. Jadavpur university library, (49) 3. Rabindrabharati university library, (16) 4. presidency university library, (11) 5. St. Xavier's university library, (12) 6. Kalyani University library, (11) 7. North Bengal University library, (7) 8. Burdwan University library (17) 9. Viswabharati University Library (36) 10. Vidyasagar University Library, (9) Librarian and all the professional staff of the library is considered for study.

### 3.6 Sample Design

In order to achieve desired representation, stratified random sampling will be used. This is because the accessible population is not homogenous in terms of the role they play in fostering ICT adoption. The two strata namely the librarians and library assistants are formed from the accessible population. This is almost a census study all the librarian and professional staff has been considered from selected universities.

### 3.7 Data Collection Tools

The questionnaire method was adopted for collection of data for this study, supplemented by interviews of Librarians to gather additional information. A draft questionnaire was designed based on discussions with professional colleagues and related research studies.

Two sets of structured questionnaires were prepared; one questionnaire to the University Librarian or Librarian in Charge and another to the library professionals in the central and departmental libraries in the universities selected for the study.

**3.8 Research methodology:** This is a qualitative as well as quantitative study, here survey method of research designed, it is almost a census study. A total number of population is 206 university librarian and professional staff working within the study area. Total number of Librarian and library professional are 206 in number, questionnaire was distributed among the 204 library professional out of 204 respondents 167 respondents submit their questionnaire, so percentage of respondent are near about 82%, along with questionnaire interview also conducted

### 4. Research propositions and findings:

This part presents the research propositions related to the first research question

1. What types of ICTs are commonly used in University libraries?

| Items                                                                               | Yes | %   |
|-------------------------------------------------------------------------------------|-----|-----|
| Server Machines (name of the company and configuration-Model/Generation, processor) | 10  | 100 |
| Client workstation (Generation)                                                     | 08  | 80  |
| Laptop Computer (Generation)                                                        | 10  | 100 |
| Dot Matrix Printer                                                                  | 10  | 100 |
| Lesser Printer                                                                      | 10  | 100 |
| Inkjet Printer                                                                      | 10  | 100 |
| Network Printer                                                                     | 07  | 100 |
| Barcode Printer                                                                     | 10  | 100 |
| Flatbed Scanner                                                                     | 08  | 100 |
| Barcode Scanner                                                                     | 10  | 100 |
| LCD Projector (short throw or long throw and name of the company)                   | 10  | 100 |
| CD-ROM Tower                                                                        | 10  | 100 |
| CD-Server                                                                           | 10  | 100 |
| UPS (name of the company and KW)                                                    | 10  | 100 |
| CC TV (Camera capacity and storage capacity)                                        | 10  | 100 |
| Smart board technology                                                              | 03  | 30  |
| E-reader devices                                                                    | 05  | 50  |
| Book vending machine                                                                | 00  | 00  |
| RFID system                                                                         | 02  | 20  |
| Telephone and fax                                                                   | 10  | 100 |

#### Automation profile of University Libraries

| Service automated         | Number of libraries | Percent |
|---------------------------|---------------------|---------|
| Acquisition and budgeting | 08                  | 80%     |
| Cataloguing and OPAC      | 10                  | 100%    |
| Circulation               | 07                  | 70%     |
| Serial control            | 06                  | 60%     |
| Inter library loan        | 02                  | 20%     |

## 2. What are the perceived benefit of using ICT?

| Sl. No. | Statements                                                                                                                                                                             | Strongly Disagree | Disagree | Neutral | Agree | Strongly agree |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|----------|---------|-------|----------------|
| 1       | Using ict enable users to access information easily and quickly                                                                                                                        | 06                | 09       | 12      | 45    | 95             |
| 2       | Using ict enhances effectiveness in accessing most relevant information                                                                                                                | 10                | 25       | 07      | 40    | 85             |
| 3       | ICT offers 24/7 service in providing information to the users at any time and any places                                                                                               | 02                | 11       | 09      | 35    | 110            |
| 4       | It provides a growing range of materials for a variety of purposes because it includes almost everything of interest to the users community.                                           | 05                | 09       | 05      | 50    | 98             |
| 5       | ICT helps a wide range of users to find and use information more easily and staff provide better on-screen search tools that enable users to find information quickly and efficiently. | 03                | 07       | 02      | 55    | 100            |

## Problem faced by library professional

## 3. What are the factors affect ICT adoption in the university libraries?

| Sl. No. | Problem faced                                                                           | Number of respondent out of 167 | Percent % |
|---------|-----------------------------------------------------------------------------------------|---------------------------------|-----------|
| 1       | Lack of infrastructure                                                                  | 135                             | 81%       |
| 2       | No support from administration in training library professionals                        | 97                              | 58%       |
| 3       | Lack of support from authorities for implementing ICT applications in library           | 85                              | 51%       |
| 4       | Lack of co-ordination among library staff                                               | 77                              | 46%       |
| 5       | No initiative from professional associations to conduct specialized training programmes | 120                             | 71%       |
| 6       | Lack of Attitude of Library professionals towards ICT applications                      | 65                              | 39%       |
| 7       | Problem faced by Library professionals regarding technological support                  | 124                             | 74%       |

**Technological factors:**

| Sl. No | Sub-Factors                                | Number of respondents out of 167 | %   |
|--------|--------------------------------------------|----------------------------------|-----|
| 1      | Inadequate number of computer              | 42                               | 25% |
| 2      | Old Generation of computer                 | 95                               | 57% |
| 3      | Computer periphery( Printer, scanner, etc) | 78                               | 46% |
| 4      | Internet connectivity regarding number     | 116                              | 69% |
| 5      | Internet connectivity regarding speed      | 142                              | 85% |
| 6      | Regarding LMS operation                    | 65                               | 39% |
| 7      | Regarding power supply                     | 35                               | 21% |

From the above table it has revealed that about 85% of respondent are agree with problem of internet speed and it ranked 1<sup>st</sup> among the sub factors and 69% of respondents thought that number of terminal with internet should be increased ,next ranked (i.e 3<sup>rd</sup> ranked) 57% of respondent reported about old generation of computer, old generation of computer is very serious problem, next ranked 46% of respondents feels lacuna about

computer periphery items like scanner and printer , webcam etc.39% of respondents identified problems about Library management software(LMS) operation, least but not negligible 25% respondents thought that number of computer should be increased and last21% respondents identified problems regarding power supply. From the analysis of the data it can be conclude that number of computer is not major factor but generation of computer is big factor, and power supply is moderately better and speed of the internet should be increased and number of internet connectivity should be increased.

#### Economic factors

| Sl. no. | Sub-Factors                                       | Number of respondents out of 167 ( said Yes) | %   |
|---------|---------------------------------------------------|----------------------------------------------|-----|
| 1       | Lack of fund for new technology implementation    | 95                                           | 57% |
| 2       | Lack of sustainability of funding                 | 125                                          | 75% |
| 3       | Lack of economic incentive for the staff training | 77                                           | 46% |
| 4       | Lack of fees structure for ICT service            | 28                                           | 17% |

From the above table it is indicated that75% of respondent identified problems about sustainability of funding and it is ranked first, it followed by factor lack of fund for new technology implementation it ranked 2<sup>nd</sup> very interestingly it has identified that about 46% of the respondent want economic incentive for ICT training and better service, least but not negligible about 17% of respondent opined that free service decrease the value of ICT service ,if little fees charged for the ICT service than users will use more and consequently benefitted more.

#### Human Factors

| Sl.No. | Sub factor                                 | Yes | %   |
|--------|--------------------------------------------|-----|-----|
| 1      | Lac of well trained staff for ICT handling | 110 | 66% |
| 2      | Lac of staff for maintenance of ICT tools  | 145 | 87% |
| 3      | Lac of trainer for ICT application         | 125 | 75% |
| 4      | Lac of ICT users                           | 45  | 27% |

From the table it is reflect that 87% of the respondent identified that there are lack of maintenance staff and it ranked first, 75% of the respondents voted on lack of trainer for ict application which is ranked 2<sup>nd</sup> 66% respondents thought is lack of well trained staff is major factor for ict adoption. 27% respondents opined that users are not very much interested to use ICT

#### Invisible Factors

| Sl. No. | Sub Factors                                                   | Yes | %   |
|---------|---------------------------------------------------------------|-----|-----|
| 1       | Lac of positive attitude of authority towards ICT application | 105 | 63% |
| 2       | Lac of planning and policy                                    | 90  | 54% |
| 3       | Lac of coordination among the staff                           | 65  | 39% |
| 4       | Technophobia of staff to ICT operation                        | 42  | 25% |

Factors of this table is very important but these factor cannot be seen but their existence is highly reflected in this table ,63% of respondents are identified that there are lack of positive attitude of authority towards ICT adoption, 54% of the respondents thought are there are lack of policy and planning, 39% of the staff opined that lack of coordination among the staff hamper the ICT adoption. 25% respondents are identified that there are some technophobia which affect ict adoption

**Conclusion:** Result of this study is very encouraging and promising that most of the University libraries under study in West Bengal are computerized. The results of the assessment reflect a high level of awareness among the university librarians about the benefits that could be derived from utilizing ICTs. As noted from the above responses , it can be concluded that the basic ICT infrastructure is available in most of the university libraries , seven libraries are fully computerized and three are computerized . However , other service such as digitalization , digital repository , RFID , Book vending machine , Digital reference service seems to be lagging behind. Though there are some problem about Infrastructure and staff training

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