

Research Report

Impact of Information and Communication Technology on the Information Resources and Services of the Libraries of the Engineering and Technology Institutions of the University of Delhi and Guru Gobind Singh Indraprastha University, Delhi: A critical Study” *

RAJESH KUMAR BHARDWAJ**

1. Introduction

The ICT in the libraries have always acted as a major tool not only in development of information resources but also in providing services. The term Information and Communication Technology (ICT) denotes to broad area of activities and technologies associated with the use of software & hardware i.e. computers, phones, scanners, printers, TV, fax and other related peripherals. It also includes intranet and internet techniques. It implies the application of computers to procure, harvest, store, preserve, process, manipulate, retrieve, dissemination of information. The term *information* basically entities, events and data which define information; *communication* is a process that allows organisms to exchange information by several methods and the term *technology* is mostly used in three different contexts: when referring to a tool or machine; a technique; the cultural force; or a combination of the three.

The application of ICT and rapid developments that have taken place in the field of LIS have paved the way for reevaluation in management of library resources and extending services specially in engineering and technology institutions. There are following major reasons have been identifies to apply the ICT in Libraries.

- Allows remote access of information;
- Can be used simultaneously by more than one user: concurrently, no need of multiple copies;
- Provide timely access;
- Supports searching capabilities;
- Accommodates unique features such as links to related items / information.
- Saves physical storage space;
- Contain multimedia information;
- It does not require physical processing i.e. receiving and binding etc;
- Can be environmentally valuable;
- Can be digitally saved;
- Reduce certain work in the library such as circulation and filing;
- There is no chance of mutilation / disfiguring pilferage / of pages as in the cost of print journals books;
- Solves the problems of missing issues;
- In case of any eventually / calamity such as fire, the resources could be still intact and
- Can reach the researcher (end users) much before the print documents.
- Provide multi platforms for dynamic interaction with end users by using web 2/3 tools.

The impacts of ICT use on libraries have been studied in the light of these reasons to achieve the objectives mentioned in this report.

* **Summary of The PhD Thesis submitted to Department of Library and Information Science: Uttar Pradesh Rajarshi Tandon Open University, Allahabad (UP) & awarded in the Year of 2013.**

** **Librarian, FORE School of Management, New Delhi 110 016 (India). E-Mail rkdce2004@gmail.com**

2 The problem

The forcing factors are meeting increased demands with fewer resources, efficiency and performance criteria and users demands. The ICT has created a revolution, which is more powerful than the industrial revolution. It is altering the norms, forms and processes of acquisition and dissemination of information. Libraries are most suitable platform to share and disseminate the information resources for maximum usage with the use of ICT.

The application of ICT is preliminary needed for overall better management of library resources and delivery of quality services. There are some current forcing factors of ICT application and for me to choose this topic for evaluating the impact of ICT on libraries.

- Information explosion;
- Unpredictable financial factors;
- Increasement of information clients and their expectations;
- Changes in the scholarly communication system to the needs of the teaching, learning and research are forcing to find the new strategies of implementing ICT and its impacts on library resources and services;
- Building of institutional repository for archiving the information;
- Legal limitations, boundaries and entity: recognition, intellectual property right and copy right;
- ICT savvy human resources;
- Lack of expertise and
- Cop up with the latest development.

Therefore, the statement of the problem “Impact of Information Communication Technology on Resources and Services of Libraries of Engineering and Technology Institutions of University of Delhi and Guru Gobind Singh Indraprastha University Delhi: a critical study” have been undertaken.

3 Objectives

Based on the aforementioned reasons and current forcing factors, the following major objectives have been identified.

- Study the present ICT infrastructure available with the libraries.
- Study the print and digital resources available.
- Study of manual and ICT enabled services provided by the libraries.
- To find out the expenditure incurred on ICT based tools, techniques and resources;
- Comparative statement of print and digital resources.
- Mapping level of satisfaction in respect of print and digital resources.
- Mapping level of satisfaction in respect of manual and ICT enabled services
- Find out major barriers facing to cater services in ICT environment
- Carry out the results of the study including the research methods used.
- Assess the future planning of building information resources and providing services in the light of ICT.
- Reflect critically on these findings and raise the discussions.
- To critically examine the impact of ICT on resources and services.

4 Hypotheses of the study

The following hypotheses are proposed to be tested in selected institutions:

- The libraries under study are still not automated.

- The libraries under study still not have developed their library websites.
- E-resources are more utilized than the print resources by the users.
- The users of these libraries are more satisfied with ICT enabled services than the manually operated services.
- The libraries will focus more on ICT based resources and services in future.

5. Scope of the study

The DU and GGSIPU are among the largest universities in India imparting education in engineering and technology. The libraries of affiliated institute with GGSIPU are new generation libraries and would have applied the latest technologies.

This research definitely will work like a candle in the dark, and will be very fruitful for the library professionals, organizations in planning and organizing as well as for government authority and decision makers working in the area of library and information science, engineering and technology managing the academic institutions and conducting teaching, learning and research.

6. Research design methodology

In order to achieve objectives set forth for the study, it is proposed to use the following methodology for the present study:

Review of Literature;

Use of Documentary Records and their analysis;

Survey Method using: Questionnaire, and Personal Interview Technique

6.1 Literature Survey

Number of published and unpublished works; primary and secondary sources have been surveyed in order to conduct this study. The studies based on impact of ICT on library services and resources were consulted, among which a few were Ph.D. theses and research papers on science and engineering. A number of published documents by the institutes itself proved a good source of information. The profile of all institutes and their libraries were also examined in order to get correct information about their structure and profile. This profile was additional to the information which was collected through the questionnaires. Some informal discussions were also made with related institute officials and the library staff of the institutes.

These discussions were very helpful to collect some facts which were not covered under the questionnaire. A number of research articles, discussions and commentary given in leading Journals/Magazines were also studied to understand the need for quality research and the current scenario.

Further the thematic classification has been done for the purpose of reviewing the literature available on the topic under study. The complete literature has been classified into such themes like Application and impact of ICT, Role of ICT in Libraries, Science and Engineering Libraries, Study of University of Delhi and GGSIPU libraries, Study of University of Delhi and GGSIPU libraries, Library Networks and consortiums and User studies satisfaction

6.2. Use of documentary records

Documentaries as well as Official records have been used to trace the origin, development and expansion of DU, GGSIPU, other related institutions and their libraries. Data in respect of faculties, clientele, enrolment, membership, amount spent each year etc. has also been collected from these sources. Documentary analysis has helped in obtaining knowledge from previously unexamined areas and for re-examining problems for which no definite answers are available. The sources of Information used for this purpose include: (i) Annuals reports (ii) Official records concerning the ICT procurement, expenditure, resources collection, and use, etc.

6.3 Survey Method using: Questionnaire, and Personal Interview Technique

6.3.1 Questionnaire Method

“Questionnaire is a major instrument for data gathering in descriptive survey and is used to secure information from varied and widely scattered sources. It is particularly useful when one can not readily see personally all the people from whom one desires responses.

As a pre-requisite of designing the questionnaire, the investigator has a professional responsibility to;

- (i) Know and analyze carefully the research problem;
- (ii) State the questions clearly;
- (iii) Request only information that can easily be provided;
- (iv) Questions must be conceptually valid, promote understanding and accuracy and encourage respondents to participate in the research¹².

All the above pre-requisites were also taken into consideration while designing the questionnaires.

6.3.2 Questionnaire Designing

The study shall be theoretical as well as practical in nature thus it is expected that study shall make use of statistical and survey approaches. After initial review of the literature on topic, using a combination of the following, the required data/ information will be collected. The tools for data collection will be Questionnaire and Interview method. The Questionnaire is a major instrument for data collection in descriptive survey and is used to secure information from varied and widely scattered sources. The Questionnaire will be circulated to the librarians of the libraries under study. The interview will be conducted to know the challenges and difficulties faced by the librarians and other library staff in these libraries to know the statistics & impact of ICT and results thereby.

6.3.3 Selection of Libraries

The city of Delhi being capital of the country has an advantage of having many scientific, technical, research and academic institutions. It is therefore appropriate to select libraries from the city of Delhi. The study has been restricted to two major Universities. Once the study and its findings are completed, they can be applied to similar type of other institutions. The ICT has been employed in the developing countries since 1970s and particularly focused in education and research organizations, but there is no study has been carried out to highlight its impact which leads to a policy document. Various parameters which have been looked into while selecting the libraries include: strength of Faculty members and Research Scholars, availability of research facilities, application of ICT in library functions, expenditure of hardware and software.

The first questionnaire survey was done to collect qualitative input from these for assessing the statistical significance of the identified variables and after evaluation; the status of the libraries is as under.

Table number – 1

Sr.	Universities	Total	Selected for the study
1.	University of Delhi	02	02
2.	GGSIIP University	49	06
	Total	51	08

In the second stage, after receiving the necessary preliminary data, it was properly evaluated, analyzed and prepared a final list of eligible libraries. The selected list of libraries is placed here in alphabetical order for further deep and through study.

Table number - 2

Sr no.	Name of the Institute
--------	-----------------------

1	Bharati Vidyapeeth's College of Engineering
2	Delhi College of Engineering
3	Guru Tegh Bahadur Institutes of Technology
4	H M R Institute of Technology and Management
5	Indira Gandhi Institute of Technology
6	Maharaja Agrasen Institute of Technology
7	Maharaja Surajmal Institute of Technology
8	Netaji Subhas Institute of Technology,

A second structured survey questionnaire was designed to collect data on library resources and on the use of ICT and was distributed to the selected libraries.

In the third stage, after receiving the necessary data, it was properly evaluated, and analyzed and presented in the form of textual, tables, graphs and appendix in the thesis. The third questionnaires for meant user's, aims to collect information about their views such as purpose of library visit, frequency of visit, ICT based facilities and satisfaction level, usage of resources, preference of resource and service, satisfaction level and suggestion on library future plans.

- a) The size of population and sample obtained from two categories, i.e., library professionals of selected libraries and users of the libraries
 1. Statement of second questionnaire to Library professionals. The second questionnaire was sent to all selected library heads.
 2. Statement of third questionnaire to users.

Table number - 4

User Category	No. of users	Questionnaire distributed	Response received
Faculty	862	225 (26.10%)	25 (11.11%)
Students	16200	4200 (25.92%)	450 (10.71%)
Others	1167	410 (35.13%)	40 (9.75%)
Total	18229	4835(26.52%)	515(10.65%)

6.3.4 The Span Period of Study

Keeping in view the availability of data, the study covers the period: 2004-05 to 2008-2009. In order to collect data, each university and institution had to be visited personally several times at the different intervals during 2008 and 2009. This was essential because information required for successful analysis of the research problem is so complicated that, it is required personal involvement, and there was need to have personal dialogue with each institution library authority's decision on application of ICT, expenditure incurred and policy matters etc.

6.3.5 Limitations

- (i) This study is restricted only to the libraries of selected institute affiliated to DU and GGSIPU.
- (ii) The study is limited to the specific period under which the data was collected and thus, examines the impact on resources and services under selected institutions only at the time of study.
- (iii) The use and impact of fax, radio, TV and telephone has not been included in the study. The impact of computers and internet has been included only where applicable for resources and services.
- (iv) The data obtained is truly indicative of the selected libraries.
- (v) The response of the library professionals and users are assumed to be sincere and candid.

7. Analysis and interpretation of data

Basic data based on the objective of the study were collected through questionnaire, however, the gap were filled through use of other methods like interviews and use of official records.

Each phase or data analysis has resulted in data reduction as large volume of data have been brought to manageable form by means of interpretations. For the analysis of data, all the questionnaire received from the individuals were coded with the help of the coding structure developed for the purpose of data processing. Later the coded data in the questionnaire were entered in data input sheets. The entire data was fed to the Excel Package and statistical analysis through SPSS software, and subsequently print out of the data was obtained and checked to rectify error.

The two commonly used procedure "frequency" and "cross tables" have been used for data analysis. The first procedure has produced frequency distribution tables for almost all the variables, whereas the second procedure has produced tables which establish relationship between variables. Since the questionnaire meant for libraries was different from the one administered to the individuals, a descriptive analysis on the basis of aggregate analysis was calculated for the purpose of data analysis. The analysis of data have been present with the help of tables, and supplemented by graphs wherever necessary. The data have been analyzed using statistical techniques viz. mean: for calculating average, percentage averages, median: to measure the middle of a set of numbers, mode: to find the value of variables which occurred most frequently in the series, and ranking method. On the basis of the analysis, the Impact of the ICT on LIS resources and services has been analyzed, suggestions on various aspects have been drawn and given. The detailed analysis process of the data have been carried out with the help of SPSS (Statistical Packages for the Social Sciences): (version 16.0). The SPSS is a Predictive Analytics Software which has been used to analysis the data in, i.e., Descriptive Statistics and Paired Sample T-Test.

The mean is probably the most often used descriptive statistic which is a particularly informative measure of the "central tendency" of the variable. Through SPSS, the mean was computed wherever it was needed and used to analyze the variables. Paired sample t-test is a statistical technique that is used to compare two population means in the case of two samples that are correlated. It compares the means of two variables and computes the difference between the two variables for each case, and tests to see if the difference is significant. There are two type of library resources and service categories viz. Print and Electronic resources, Manually Operated and ICT Enabled services. The study has analysed the differences between the two pairs of library resources such as Print and Electronic, on various parameters. The another pairs for study analysed the differences in respect of library services such as Manually Operated and ICT Enabled library services, on various parameters.

5. Findings

As per the responses from the librarians and library users of selected institutes under study collected during the period of 2004-05 to 2008-09 were analyzed. Based on the result, the data revealed the following major findings.

1. The increasing trend in incurring expenditure on print resources is observed.
2. The increasing trend in adding digital resources and incurring expenditure too is seen. The increasing trend in subscription of online resources during 2005-06 to 2007-08 but decline in 2008-09 is seen.
3. The application of ICT has provided a new platform for networking and consortiums and sharing of library resources. The library consortium and network are very much useful to

these libraries in providing satisfactory services especially access of online resources and sharing of documents.

4. The ICT have changed the information phenomenon and provided the new environment for journals access.
5. The usage of print resources was highest in 2004-05 and decline trend observed from 2004-05 to 2008-09. Overall, libraries observed that the print resources are having more usage than the e-resources. But the increasing trend in e-resources usage is seen.
6. The usage of digital resources was least in 2004-05 but increase trend observed from 2005-06 to 2008-09.
7. All libraries (100%) are using library management software to automate their library functions. Seven libraries (87.5%) out of eight are automated, only one (13.5%) is partially automated. The computerization of library functions is the result of application ICT in libraries and changed the entire way of functioning. Computerization based library services and functions such as circulation; search and retrieval of documents, acquisition, finance management, serial control, cataloguing, classification, report generation, usage statistics, stock verification are more satisfactory than the manually operated.
8. The ICT has provided the platform to build the digital / online repository to create and sustain the institutional knowledge and to develop and design the library websites.
9. As overall, the ICT enabled services are rated higher than manually operated services in respect of users' satisfaction.
10. As overall, in respect of satisfaction level, the ICT enabled services are rated higher than the manually operated.
11. In the contexts of growth and development of libraries. It is an important component of each institution. Regarding the future plan and level of urgency, the following facts came out to enlighten the research.
 - a) In respect of print and e-resources, library opinions are that the e-resources should be added more than the print in future.
 - b) In respect of manual and ICT enabled services. The response proved that the ICT enabled services have the more demand than manual operated services

6. Conclusion

Information has emerged as the key resource in the present century and exerted a profound influence on traditional libraries especially academic libraries. The application of ICT for library functions avoids respective and repetitive jobs and saves considerable amount of time and manpower. It also makes speedy technical processing and information services. There are many various problems arisen due to the ICT such as it needs special expertise and trained professionals, it is still expensive in terms of some areas of application, at the one side libraries have to serve the traditional users and at the same time, libraries have to serve the modern technology savvy users. The most of the libraries are under the phase of transition of change and many library staff may not ready to cop up with latest technologies. Due to the application of ICT, organizations, libraries, professionals, and users have become more technology dependence and further human brain is less used in day to day activities which is not a good sign for any system.

There are following major impacts which have been observed due to the application of ICT in libraries and institutions.

1. The institutions have drastically reduced the number of print journals subscriptions not only due to the budgetary constraints but also due to the versatile features of digital subscriptions.

2. The private institutes have no other source for income except the fees collected from the students. Only in specific cases, they receive financial assistance from donations, endowments and from projects. This results in a direct impact on library resources and services.
3. The government institutes are dependent on government financial support, the fees collected from the students is very less and does not meet institute expenditures.
4. The ICT now has become a mandatory requirement for an institute library. Many ICT based library services / facilities / instruments have become the necessary requirement of daily use.
5. If the software and hardware stops working, it stops all library functions including routine work of the library.
6. Most of the library professionals were in the opinion that there is a definite impact of ICT on library resources and services. There are many library's operations identified based on the following categories which are...
 - a. Remain unchanged even after the ICT application?
 - b. Simultaneously followed in manual and ICT enabled?
 - c. Partially followed in manual and ICT enabled?
 - d. Eliminated in manual and shifted to ICT application?
 - e. Eliminated in manual and not required in ICT application?
 - f. Introduced new due to / based on ICT application?

7. Suggestions and recommendations

1. The level of computerization in libraries is not up to the mark and needs more up-gradation. The seven libraries are fully automated out of eight. One library is partially automated. But still there is a need to focus more on computerization.
2. The older libraries are more advanced and leading libraries in terms of building resources and adopting application advance technologies in library functioning.
3. A national government agency should be established as a facilitator and coordinator enabling the funds and standards for research and development activities in the country. This agency should provide a single counter service and act as a coordinator for all proposals and projects.
4. A national research knowledge resource centre needs to be established to facilitate research information services. A network of such centers should be set up in the same line of public library system in India. Or some advanced libraries should be identified to convert into a knowledge resource centre and a librarian should be designated as research resource officer.
5. The application of ICT has given an opportunity to spread information in a new paradigm, many new web and internet tools viz. Subject or Information Gateways, News groups, Discussion forums, Listserv, OSS (open source software) i.e. CMS (content management software), LMS (library management software), DLMS (digital library management software), E-mail forum, Message board or Bulletin boards. Posting and updating of news, views and sharing professional information. Participating in video conferences, chats, voice over IP, p2p networks, Instant Messaging, Pod and vodcasting, Streaming Media, Blogging, Tagging, Search, Social book marking, SMS Enquiry Service, Social networking, wikis, and RSS.
6. It has been observed that the usage of digital resources should be enhanced more and users group i.e. students, faculty and other staff should be trained to utilize the resources maximum. The orientation and training programmes should be organized for them on a regular and periodic basis.
7. The opinions observed on the future growth and development of library that there is a heavy demand for digital resources and ICT based information services. It is high time for libraries to identify the users' changing needs and accordingly develop the digital collection and initiate to customize the ICT enabled services.

8. The ICT has multiplied the speed communication and online storage and access of information. To exploit the ICT advantages, the collection of one library resources can be utilized by other similar libraries. The mutual understanding of sharing information resources should be developed for better finance management, manpower and time.
9. The LIS professionals should work with the faculty members and have to participate in education and learning programmes of the organization. The students should encourage designing their assignments and projects based on the information resources available with their library. The participation of faculty, student and librarian can only make the maximum utilization of money spent on subscription of resources.
10. It is fact that internet has a great extent usage in all libraries; it has broken all geographical barriers and turned libraries as a village library. Therefore, it is recommended that the speed of internet bandwidth / connection should be enhanced to increase the usage of digital resources,
11. The Indian libraries are taking advantages of ICT, but it is not enough. In a wider prospect, a network of networks with systematic approach and smooth mechanism is required to integrate all national knowledge resources. Libraries with rich budgets or collections cannot have enough resources to become self-sufficient. No single library can claim and cannot provide a complete satisfaction to their users even if it is full of resources.
12. After 1968, it has been observed that there is no amendment in library operations (refer table number 7.58 of thesis) to supersede the finance ministry study in this regards. It is well accepted that there is a definite impact on library functions due to the application of ICT. These ICT based functions should be considered and included in the list of library functions and operations and based upon that restructuring of library activity performance with time schedule, staff allocation and changes in recruitment rules, syllabus revision etc. has become urgent requirement of libraries

This study describes the present situation related to development in print and digital resources, ICT infrastructure development and expenditure, traditional and ICT enabled services, computerisation status, development of digital library, development and deployment of library staff, development of library website, and impact of ICT on library resources and services.