CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

The world is undergoing a transition from paper to digital economy. It is essential for libraries in developing countries throughout the world to take part in this changing scenario. Developing countries are being encouraged to invest in their national information infrastructure, so that they can enhance along with knowledge-based development. Information and communication technology (ICT) has provided libraries with new opportunities to improve their resources and services.

Automation of library operations is a key action in this perspective. Earlier a user come to the library only to get a document or information but today latest information reaches the doorstep of each and every user. Electronic resources, databases and web resources play a vital role in transforming the conventional resources to digital means in libraries supporting higher education. Web publishing has now become a major route for transmitting knowledge (Aina, 2003). To meet the nascent and state-of-the-art contemporary requirements of scientists for high-quality information, libraries of renowned institutions have become early adopters of ICT services. ICT reduces a lot of hectic and tedious mechanism in these kinds of libraries.

The present century is the age of digital nervous system. Information is dynamic and the infinite resource energy that affects all disciplines. It acts as basic input to education and planning of research and developmental activities. The recent advancement in information processing, storage and communicating mechanism have revolutionized the role of the libraries all over the world.
As a result, libraries are facing new challenges, new competitions, and new demands for variety of services with latest up-to-date technologies. To meet the new challenges and multifaceted information needs of the user, libraries tend to undergo a change over by reconsolidating, reshaping and redesigning their information services, resources and products by incorporating new tools and technologies.

1.2 INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

ICT is one of the prominent key for driving latest knowledge-based information in the 21st century. It transforms the way human beings live, learn, work and play. Advances in computing and communication technology have created a new infrastructure for business, scientific research and social interaction. This expanding infrastructure is providing us with new tools for communicating information throughout the world and for acquiring knowledge. The insight for information relies on the time consumption taken for reception by the user. ICT provides a vehicle for economic growth. ICT will make the corporate world reach the latest information with authentication, improve the quality of health care in medicine field and make the government authorize a more responsive infrastructure accessible to all citizens. Hence, ICT penetrated all activities of human life with the existing technology. It also acts as a link to the development of the society. The management of developmental activities and government programs require generating, collecting, storing and retrieval of a large volume of data. ICT has been employed for the effective manipulation of data and information and had started to play a crucial role in increasing the overall efficiency of the economy and its own growth.
ICT: MEANING AND DEFINITION

ICT incorporates a range of technologies used to support communication and information. ICT includes both networks and applications. Networks include fixed, wireless and satellite telecommunications and broadcasting networks. Internet, database management systems (DBMS) and multimedia tools are some of the well known applications on technology worldwide. A holistic understanding of ICT necessarily includes consideration of implication of new policies on information and human resource development (Islam and Islam, 2006: 809-817).

ICT is a diverse set of technological tools and resources used to communicate and to create, disseminate, store and manage information (Blurton, 1999: 46-61). ICT is a term used to describe a range of equipment (hardware: personal computers (PCs), scanners, phones, faxes, modems and video conferencing equipment), computer programs (software: database and multimedia programs) and new infrastructures that allow us to access, retrieve, store, organize, manipulate, present, send information and communicate locally, nationally and globally through digital media (Dunmill and Arslanagic, 2006).

Marcelle (1998) argues that the ICT sector is a heterogeneous collection of industry and service activities including information technology equipment and service, telecommunication equipments and services, media and broadcast, provision for internet service, libraries, commercial information providers, network based information services and related professional specialized services. Hamelink (1997:86d.p.) provides a useful and clear definition of ICT indicating that ICTs are technologies that enable the handling of information and facilitate different forms of communication. These include capturing technologies (e.g. camcorders), storage technologies (e.g. CD-ROMs), processing technologies (e.g. application software),
and communication technologies (e.g. Local Area Network) and display
technologies (e.g. computer monitors). So, we can define ICT as ‘the use and
application of computers, telecommunications and microcomputers in the
acquisition, storage, retrieval, transfer and dissemination of information’.

1.4 COMPONENTS OF ICT IN LIBRARIES

ICT refers to the devices and tools used in the generation, gathering,
processing, storage, retrieval, communication and delivery of information. It is the
convergence of computers, communication and micro-electronic based
technologies. In the present century, IT has expanded so rapidly to include a wide
array of devices, information products and services that transformed the role of a
library into a gateway of accessing global information resources.

ICT is a comprehensive and parallel concept with IT, which denotes not
only a single unit of technology but an accumulation of technologies like
telecommunication equipments, data processing equipments, semi conductors,
consumer electronics, etc. The concept has brought a phenomenal change in the
collection, preservation and dissemination of information throughout the world. For
the profession of librarianship, this turn of the events is a blessing in disguise
(Pradhan, 2004: 100).

The emergence of IT is one of the gifts of modern science and technology
which has brought tremendous changes in Library and Information Science (LIS). Application of IT to library and information work has revolutionized the traditional
concept of libraries from ‘store house of books to an intellectual information center’
connoting the concept of electronic library. It has opened up a new chapter in
library communication and facilitated global access to information crossing the
geographical limitations (Munshi and Roknuzzaman, 2002: 23-39). Using ICT, libraries are also playing a very important role in facilitating access to global information and knowledge resources (Chisenga, 2004).

Rahman (2003) stated that ICT is the fusion of two important technologies: Electronics and Communications. Patil, Kumbarand and Krishnanda (1994) categorized the components of IT, which is frequently used in library and information center as follows:

i) Computer Technology

The wide spread use of computer technology has made dramatic development in the information transmission process in every field of human life. The current developments in computer technology include Mainframe Computer, Super Computer, Mini Computer, Personal Computer, Microchip Technology, Artificial Intelligence, Software Technology and CD-ROM Technology.

ii) Communication Technology

Communication or telecommunication technologies are used to transmit information in the form of signals between remote location, using electrical or electromagnetic media as carriers of signals. Telecommunication technologies include Audio Technology, Audio-visual Technology, Motion Picture, TV, Videodisc, Video Conferencing Applications etc.
iii) Reprography and Publishing Technology

Reprography and publishing technology is used to identify the field of information processing which concerns with technologies and equipments for the reproduction of data in documents. Micrographic is the field of IT which concerns making use of microforms. It includes optical media for the high density recording and storage of optically encoded information. Printing technology is another device for the reproduction of data in documents.

1.5 AREAS OF ICT APPLICATION IN LIBRARIES

ICT has expanded on the library management system to incorporate OPAC, Web OPAC, CD-ROM networks etc. Libraries mainly concentrate on the house keeping function consisting of the following systems:

1. Acquisition System:

In a computerized library, the acquisition process from book requisition to procurement is done by the computer. It is easier and automatic to maintain bill register, expenditure register, and direct vendor entry etc.

2. Cataloguing System:

Cataloguing is one of the important functions which link user requirements to the documents in a library. Computerized catalogue is the most efficient tool in easily and quickly retrieving information about documents in a library.
3. Classification System:

Call number of the book is to be assigned manually and relevant call number for each book is to be fed in the computer through keyboard. Computer can help in alphabetical classification while sorting only by taking key words from acquisition module.

4. Circulation System:

Usage of technological devices such as computers, barcode scanners and the management software applications used in maintaining circulation of books among users all of which help in easily and quickly performing the routine operations in a library. An automated circulation system provides information about the location of the item on loan, on reserve, print recall notices, renewal, calculation of fines, print recall notices, printing due date slips and automatically generating order for lost books and provision for inter library loan transactions.

5. Serial Control System:

Serial includes periodicals, newspapers, manuals, journals, proceedings, transaction, etc. An automatic serial control system provides the following benefits:

- Ordering and renewal / discontinuation of new journals; Sending reminders and receiving the journals.
- Preparation of a list of periodicals on various stages.
- Bindery management including recording and accessing bound volumes.
- Estimation of the budget for the next year and announcement of the missing serials for recording the same.
6. Article indexing system:

The system facilitates indexing and abstracting of articles from various journals, technical reports, conference proceedings, monographs etc. It includes scanning of articles; entry of citation; online searches on author, keywords and even word-based free text searches.

7. OPAC System:

The library staff and the users can usually access it through computers within the libraries using a server. In 1980s, OPAC terminals began to replace card catalogue in all types of libraries.

8. Bulletin board System:

Bulletin board is a facility to display an electronic bulletin board, news announcement, etc. with constant updating of information.

9. Storage Technologies:

The latest technologies have succeeded in storing information on various media. Mass storage is necessary to meet the following needs:

- Providing large volume digital storage for archival management.
- Providing users with immediate access to the rapidly growing volume of data and information that is stored in digital information system.
• Providing users with access to quick and interactive multimedia information.
• Transferring large volumes of data and / or files from one system to another.

10 Multimedia:

Multimedia is the media that use multiple forms of information content and information processing (e.g. text, audio, graphics, animation and video, interactive media) for the users’ information and entertainment. Video conferencing, voice chatting, computer animation, desktop publishing are some of the finest testimonies of the growing importance of multimedia.

11. CD-ROM:

Many libraries depend more on CD-ROM database than the online systems because CD-ROM needs only a fixed annual charge and there is no need to rely upon telecommunication networks.

12. DVD (Digital Video Disc or Digital Versatile Disc):

DVD is an optical disk storage media format that can be used for data storage. Some of the benefits of DVD are:

• Can deliver the data at a higher rate of volume, speed and clarity than CD-ROM.
• Its utility as a single file system for all disc types.
- Its backward read compatibility with existing CD and future compatibility with read or write.
- To represent more multimedia elements and to integrate many reference sources on a single DVD disc.
- Its high performance for sequential and non-sequential data.

13. Library Networks

Library networking is meant to promote and facilitate sharing of the resources available within a group of libraries in order to provide maximum information to users. Networks like online computer library center (OCLC), information and library network centre (INFLIBNET), developing library network (DELNET), Calcutta library network (CALIBNET), Bombay library network (BONET), Ahmedabad library network (ADINET) and Madras library network (MALIBNET) are examples.

14. Library Consortium:

A library consortium is a formal association of libraries not under the same institutional control, but usually restricted to a geographical area, number of libraries, established to develop resource sharing among members. The committee of experts on consortia-based subscription to electronic resources for technical education system in India listed the following benefits:

- Consortia-based subscription to electronic resources would help to access e-journals at low cost.
- Provides rational utilization of funds.
- Provides qualitative resource sharing and effective document delivery services.
• Increases user base access from desktop of users.
• Provides electronic contents to access bibliography and full text.
• Facilitates inter library lending and document delivery.

1.6 ICT AND THE ROLE OF LIBRARY PROFESSIONALS

IT has changed the sources, delivery and access to information. The role and function of a library and information professionals in the changing environment can be described as, they must facilitate information use, navigate knowledge systems and information sources. The professionals should consult and advise on information problems and audit the optimal management of information resources. They should translate between the technical system and cultural resources. A transformation between data and information flow between systems should be done. They should be capable of offering information policy support for organizational strategies and provide resources for information literacy. The library professionals’ emerging role and functions brings closer to the needs of the users and therefore should have the capacity to evaluate the precise requirements of the users besides having complete access to the world resources.

1.7 SPECIAL LIBRARIES

Special libraries and information centers are a natural outcome of the need for information support to research and development, business and industry, expanded functions of government and similar other organizations. Special libraries are primarily intended for limited clientele with special field of interest. The term special libraries denote specialist libraries. A special library is the one which is specializing in a particular subject or group of subjects or a particular form of
documents. These libraries are also restricted to special professionals or academic group of users whose information needs are defined by a particular subject or activity. Special libraries are formed in research and development establishment, government departments, directorates, industrial and business undertakings, learned societies and professional associations, trade and business associations, hospitals and health services, social and welfare organizations, museums, national gallery of arts etc.

L.M. Harrod in his “Librarians Glossary of Terms” defined that “Special Library is a collection of books and other printed, graphics or recorded materials dealing with limited fields of knowledge and provided by a learned society research organization, industrial or commercial undertaking, government department or even an educational institution. It may also be a special branch of a public library serving certain interests or occupational groups such as a technical library or a special subject library, meeting the needs of all enquiries on that given subject such as a music library”.

D.J. Foskett defined that “Special library is the one serving a group, having an extra-library, existence, whose members direct at least some of their activities towards a common purpose. This excludes academic libraries as their users pursue their individual ends and are in no sense united by a common purpose”.

Broadfield defined that “Special library is a library that is neither academic, commercial, national nor public but it intends to serve the needs of a portion of a community requiring detailed information on a limited subject field”.

According to Reitz’s Dictionary of Library and Information Science, 2005, a “Special Library is established and funded by a commercial firm, private association, government agency, non-print organization or special interest group to meet the information needs of its employees, members or staff in accordance with the organization’s mission and goals”.
1.8 RESEARCH AND DEVELOPMENT LIBRARIES

Library is the backbone of any research organization throughout the world. Research and development libraries are recognized as repository of knowledge and an integral part of education, society and research. The frontiers of knowledge are ever increasing. It is more so in various branches of science and technology, social- sciences and humanities in which researchers search throughout the world in quest of new knowledge. All the researchers and technologies require latest and relevant information to keep themselves abreast of new developments in their respective areas of interest. To meet the information needs of the scientists and researchers comprehensively, the libraries are required to acquire suitable and sufficient quantity of collection in their areas of interest.

1.8.1 Definitions:

According to Harrod’s librarians’ glossary, 1990, technical library is a library containing mostly books of a technical nature. When connected with a public library, it may be a section of the reference library or separate department in the central building or a separate building. The library generally consists of specialized documents and provides facilities for undertaking exhaustive investigation. It may also provide referral services in support of studies in subject fields connected with developments, tests, engineering and evaluation as well as research.

Reit’z Dictionary of Library and Information Science, 2005, states that “Technical library is a library that supports one or more of the applied science, such as engineering or computer science. A technical library can be a branch in a large university, a major collection within a large academic or public library or a special library maintained by a private corporation or government agency”.

According to Title II, Part C of the Higher Education Act, “a research library is a library that supports one or more of the applied sciences, such as engineering or computer science. The R&D library can be a branch in a large university, a major collection within a large academic or public library or a special library maintained by a private corporation or government agency”.

1.8.2 Kinds of Research and Development Libraries:

Different kinds of research and development libraries attached to various research and technical institutions are as follows:

- Libraries of Research Councils
- Libraries in Learned Societies, Research Organizations and Documentation Centres.
- Libraries in the Areas of Agriculture Sectors.
- Libraries of Research Institutes and Research Laboratories.
- Libraries of Industrial and Commercial Firms.

1.9 R&D LIBRARIES: HISTORICAL DEVELOPMENT IN INDIA

India has abundant technical libraries which may be divided into three categories: (i) Government and Semi-Government, (ii) technical libraries in Universities and other teaching institutions and (iii) libraries attached to Research Institutions and Societies. The development of specialized institutions started with the development of the learned societies came into existence with the initiative of Sir William Jones, a judge in the High Court, visited India in 1783. Apart from judicial duties, his interest in scholarly activities was organization of special books at local centre, seminars and setting up of learned societies and in 1784, started the
‘Asiatic Society of Bombay’ at Bombay. Further, other societies namely Mathematical Society of India, Chemical Society of India, and Astronomical Society of India etc. came into existence while Indian Council for Agricultural Research (ICAR) and Indian Council for Medicine Research (ICMR) are devoted to Agriculture and Medicine, respectively. The Council of Scientific and Industrial Research (CSIR) is mainly concerned with the promotion of science, technology and industry sectors of the country. In the 19th century, Calcutta became the earliest active centre for scientific research.

To serve the information needs of the 1.5 million scientific and technical personnel in the country, over 800 scientific and technical libraries emerged with a collection of more than 10,000 volumes. The notary libraries among them are as follows:

- The National Science Library of National Institute of Science Communication and Information & Resources (NISCAIR).
- The National Medical Library of Ministry of Health.
- Defense Science Library of Defence Scientific Information and Documentation Centre (DESIDOC).
- National Medical Library, Delhi.

Some of the research organizations which are well developed to serve the information requirements of the users are as follows:

- Indian Association of Special Library and Information Centre (ISALIC)
- National Institute of Science Communication and Information Resource (NISCAR)
• Defence Scientific Information and Documentation Centre (DESIDOC)
• National Information System for Science and Technology (NISSAT)
• Indian Council of Social Science Research (ICSSR)
• Bhabha Atomic Research Centre (BARC)
• Geological Survey of India (GSI)
• Zoological Survey of India.

1.10 SIGNIFICANCE OF THE STUDY

The shift from print to digital information has a high impact on all components of the research and development library system in India. However, information is considered as an important resource, the use of ICT tools to collect and disseminate information has been in a slow pace in majority of the research libraries. This may be due to various factors like insufficient funds, inadequate staff trained in handling computers and software packages, administrative concerns, etc.

In Tamilnadu, automation has been initiated in almost all research and development libraries using library automation software and is under different stages of completion, but this has been extended to only a few research libraries. The application of ICT has changed the type of services delivered through research and development libraries in the state, but a dynamic change is not yet reflected in the infrastructure and manpower development in the university libraries and the whole of library profession.

The Ministry of Human Resource Development (MHRD), AICTE and UGC has played a major role in modernizing library services across the country by providing sufficient funds for modernizing infrastructure and by initiating consortia
based subscription to online journals and databases through INFLIBNET and INDEST. This has revolutionized the research activities in the country and increased the demand for more user centric information services. Now users are more knowledgeable in using computers and the Internet for their research, and expect to have access to it in their times of need.

It is relevant and essential to know about the status/position of ICT infrastructure in the research and development libraries under study. This study provides current state-of-the-art of ICT infrastructure in research and development libraries in the state of Tamilnadu.

No research study conducted to assess the ICT Infrastructure in research and development libraries, especially in Tamilnadu region which is considered as the backward area of the state even though it has a rich amount of natural resources. The main purpose of this study is to understand the possible areas where the application of ICT is made as a part of overall improvement in the research and development library services.

1.11 STATEMENT OF THE PROBLEM

Libraries have undergone considerable changes in the past two decades. With increasing use of technology to organize and disseminate information, computer has become an important tool for accessing information. Libraries not only have to provide the technology necessary for user access to scholarly ICT resources but also provide a growing number of electronic databases. The physical space in libraries has been modified to accommodate the additional technology necessary to provide user with the tools to use library resources successfully and to meet their information needs. The libraries and librarian’s role have changed rapidly
in recent years, in response to new forms of information and new methods of learning and research.

Furthermore, the user expectations of the ability of a library service to deliver high quality services are growing. Linked to user demands for services is the influence of information communication technology (ICT). The changes due to new technology and information systems mean that all research institute librarians will be expected to master navigational skills to get through electronic databases and show others how to do so. Also, continued financial constraints have placed greater pressure on collection development policies and given impetus to the move towards networked information in electronic format. Therefore to perform their roles effectively and efficiently in such a demanding ICT environment, research librarians have to possess the necessary ICT knowledge and skills.

The purpose of the study was to investigate awareness about the use of ICT in research and development libraries specifically information processing, organizing, storing, searching and retrieving ICT environment. It is also a right time to carry out, to examine and evaluate the existing application of ICT facilities in research libraries in a region of southern India. In India, Tamilnadu is characterized as the hub of IT activities and developments as well as the centre of R&D institutions in India. So the present analytical study is expected to provide fundamental understanding on the current status of ICT applications in R&D Libraries of Tamilnadu and would also prove quite useful for suitable modifications or improvement of existing research and development libraries in Tamilnadu.
1.12 CHAPTER SCHEME

The study is divided into five chapters as outlined below:

The first chapter includes introduction, ICT, meaning, definition of ICT, Components of ICT in libraries, Areas of ICT applications in library, R&D libraries, Definition, Kinds of R&D libraries, Historical development in India and ICT services in R&D.

The second chapter deals with the related review of literature in research and development institutional libraries of Tamil Nadu.

The third chapter focuses on the structure and design of the present study. In this chapter the objectives of the study, Hypotheses, Methodology adapted, Data Collection, Sampling, Pilot Study, Construction of Questionnaire, Components of Questionnaire, Data Processing, Frame work of analysis, limitations of the study and chapter scheme are discussed.

The fourth chapter deals with the detailed analysis of the present study.

The fifth chapter explains major finding of the present study including the findings, suggestions, conclusion and scope for further research.