INTRODUCTION

Mehaboobullah K. “Impact of information and communication technology (ICT) in information seeking and enrichment of researchers in universities in Kerala” Thesis. Department of Library and Information Science, University of Calicut, 2012
Chapter 1

INTRODUCTION

- Importance of Information
- Information and Research
- Information and Communication Technology (ICT) and Research
- Kerala University
- Kerala University Library
- Calicut University
- Calicut University Library
- Mahatma Gandhi University
- Mahatma Gandhi University Library
- Cochin University of Science and Technology
- CUSAT Library
- Statement of the Problem
- Definition of the Key Terms
- Objectives of the Study
- Hypotheses of the Study
- Significance of the Study
- Scope of the Study
- Limitations of the Study
- Organisation of the Report
- Conclusion
INTRODUCTION

Information and Communication Technology (ICT) is one of the biggest achievements in the evolution of mankind. It is a system that is designed to gather, process, or distribute information or it is the science and skill of all the aspects of computing, data storage and communication. ICT is a combination of tools and procedures that facilitate the generation, acquisition, storage, organization, retrieval, searching, viewing, updating and transmission of information using electronic means (Mohamed & Abdul Shukkoor, 2010). Recent developments in the field of Information and Communication Technology are indeed revolutionary in nature. As its capabilities are increased they are being increasingly applied in all sectors of the society. The widespread of ICT opens up new opportunities for information institutions like universities to harness these technologies and services to serve their goals.

There is no doubt that ICT has radically altered the way in which research is conducted not only in science and engineering but also in the humanities and social sciences. Researchers consume information for solving the problems and produce information which is added to the available knowledge base. Consumption and production of information is entirely changed by the emergence of Information and Communication Technology. New and new information are produced in exponential growth and its subsequent dissemination has become more and more easy and fast due to the modern computer and communication technology.

Proliferation of ICT makes tremendous impact on researchers in Kerala. Their information seeking pattern has entirely changed. Paradoxically ICT is considered to be the major cause of information overload. Technostress
is another negative impact of ICT which adversely affects the overall research output. Therefore it is necessary to analyse how the researchers of Kerala utilise these technologies and its impact on their information gathering. Whatever be the impacts the ICT has made, it will always occupy a centre stage position governing all human information process in the coming years making profound impact on society and economy.

1.1. IMPORTANCE OF INFORMATION

Information is nothing but a sequence of symbols that can be interpreted as a message. It has become an ingredient of man’s life cycle, i.e., there is no life in the modern society without information. Information enables man to perform his day-to-day duties. It is a resource of immense economic and social value and one of the fundamental resources indispensable for development in all-vital spheres of the life of civilized society. Right information at right time is the vital source for proper functioning of a democratic society and policy making in business, industry and planning.

Information is identified as a crucial tool in a productive economy and an effective government, a central part of the growth and well being of individual. It is the spirit of research and development of any nation. So it becomes the power of any country. It is the resource on which all the other resources depend, because it is the information, which permits other resources to be identified, evaluated and utilized. There is no aspect of a person’s life where information is not required.

1.2. INFORMATION AND RESEARCH

Information means data and news relevant to specific activity or operation. It is fundamentally an organized collection, storage and presentation of processed data and other knowledge related to an activity or
Research is a process of searching the human facts, a quest for truth and unfolding the mysteries of knowledge through exact and prolongs study. It is being conducted continuously in all fields of knowledge. Every research is based on a known or unknown phenomenon. There can be no research without a problem. The problem may be of any field of knowledge: scientific, technical, philosophical and always related to the problem results in to either the new interpretation or the discovery of new facts which is resulted to establish a new theory.

Researchers from science and non-science need pertinent information for their ongoing research activity. In the field of science, the major activity is experimentation. Experiments are carried out on substances, on life (human, animal, plant etc.) and on natural laws. On the basis of these experiments the researchers come up with certain principle or rules. Social science deals with human behaviour in its social and cultural aspects. Social scientists deal with human history, human interaction and the problems faced by human beings. Both in science and social science, research is most important activity which makes the discipline more growing and dynamic.

The researchers are experts in any field. They contribute a lot to the society. Most of their discoveries and inventions have gone a long way to make life easier for mankind. So the researchers are always in need of high quality information.

Research is ever-growing. No last word can be said on any invention, discovery, facts or principles in field of any discipline. These can be negated at any time to be replaced by something new. Thus because research is ever growing, the need of information by the researchers is also ever-growing.
working researcher spends up to one third of his time searching for information and the cost of this search represents one fifth of all the money allotted to research (Schussel, 1969)³.

The progress of a nation depends on its research work, which in turn depends on the available information. People go bankrupt and even lose their lives in the pursuit of information. Research is one of the better known areas where information has taken root. Most of what we know today is the result of research. The work of researchers in the field of science and non-science continue to give birth to information that is beneficial to the whole society. The government and universities understanding the major role that research plays, also continues to pour funds in to these fields as a result of which more and more information is generated, so much so that the world is being bombarded with information leading to the phenomenon termed ‘information explosion’.

Researchers seek information for various reasons. He has to know what other researchers in the same field have recently completed or are presently studying, as well as to know what is being done in a broader area. This information keeps the researchers up-to-date with the field and provides a broad base to give meaning to their work. They have to satisfy with specific information essential for day-to-day research operations that helps them to understand the phenomenon under observation. This type of information is needed quickly and frequently. Also researchers need to identify and locate all relevant information that exists on the subject and its specific areas. This need is greatest when a researcher moves into a new area of research, when a researcher begins to work on a particular problem or when the results of research are being prepared for publication. Finally researchers are in need for brief but complete picture of the recent developments of a related subject or a
subject in which the researcher is not very much interested or which did not come within the area of his interest.

**1.3. INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) AND RESEARCH**

Universities are knowledge based organisations whose functions are largely confined to teaching and research. India has one of the lowest number of researchers per million as compared to developed economies. A matter of greater concern is the poor performance of the university sector fostering research. To compete successfully in the knowledge based economy of the 21st century, India needs enough universities with high end research facilities that would not only produce bright graduates but also support sophisticated research in various scientific and scholarly fields and invent knowledge and technology needed for an expanding economy. India shows very poor status in research and development like researcher per million is just 119 which is very low compared to other countries. Table 1.1 depicts the details about the other countries (http://www.nationmaster.com).

**TABLE 1.1**

<table>
<thead>
<tr>
<th>S.I No</th>
<th>Country</th>
<th>Researchers per Million</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Japan</td>
<td>5287</td>
</tr>
<tr>
<td>2</td>
<td>USA</td>
<td>4484</td>
</tr>
<tr>
<td>3</td>
<td>Russia</td>
<td>3319</td>
</tr>
<tr>
<td>4</td>
<td>China</td>
<td>663</td>
</tr>
<tr>
<td>5</td>
<td>Brazil</td>
<td>344</td>
</tr>
<tr>
<td>6</td>
<td>India</td>
<td>119</td>
</tr>
</tbody>
</table>

Table 1.1 clearly shows that number of researchers in India is comparatively low to the other competitive countries like China and Brazil. It
is a known fact that China and India will be the most powerful emerging country in the world. In this context India should use modern ICT based technologies for improving the quality of the research with high speed so that only we can satisfy our vision of 2020.

Finance is one of the main barriers for producing high quality research in our country. The UGC spends only 4 per cent to promote research and development activities in universities (Varghese, 2012). India spends approximately 1 per cent of its GDP for R&D, compared to 2.7 per cent by the US and 3.3 per cent by Japan. Table 1.2 gives the details about the spending of other countries in R&D (http://www.battelle.org/media/news).

**TABLE 1.2**

*Expenditure of R&D by Different Countries*

<table>
<thead>
<tr>
<th>SI No</th>
<th>Country</th>
<th>Expenditure of R&amp;D (Billion US $)</th>
<th>Percentage of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>USA</td>
<td>405.3</td>
<td>2.7</td>
</tr>
<tr>
<td>2</td>
<td>China</td>
<td>153.7</td>
<td>1.4</td>
</tr>
<tr>
<td>3</td>
<td>Japan</td>
<td>144.1</td>
<td>3.3</td>
</tr>
<tr>
<td>4</td>
<td>Germany</td>
<td>69.5</td>
<td>2.3</td>
</tr>
<tr>
<td>5</td>
<td>South Korea</td>
<td>44.8</td>
<td>3.0</td>
</tr>
<tr>
<td>6</td>
<td>France</td>
<td>42.2</td>
<td>1.9</td>
</tr>
<tr>
<td>7</td>
<td>UK</td>
<td>38.4</td>
<td>1.7</td>
</tr>
<tr>
<td>8</td>
<td>India</td>
<td>36.1</td>
<td>0.9</td>
</tr>
</tbody>
</table>

In the present economic situation it is not possible to spend huge amount in to the research sector because more than seventy percentage of our country resides in rural villages and its basic requirements are not fulfilled yet. The only solution for improving the quality and quantity of research output in our country is that nothing but use of modern Information and
Communication Technologies. Due to the emergence of knowledge society, traditional methods of information handling are disappeared and new method should be adopted for collecting and communicating information.

Research in pure science in India is also on the decline. In major disciplines like physics and chemistry, the number of brilliant students opting for research appears to be sharply declining. For mathematics research, the number has fallen considerably low. With the recent developments in biotechnology and the popular notion created by the media that bio-science is going to fuel the economy in the next century, research in biology has shown a relatively good trend (Balram, 2002)\(^7\). The developed nations are however, managing the problem by attracting brilliant scholars from other countries. If this trend continues, India will face a shortage in R & D personnel very soon!

There are two types of ICT application to the research process. First, the application of ICT to aspects of data identification, collection, capture, analysis, display and presentation that in previous times were undertaken by hand; second, various research processes and information resources that for a number of reason could not be undertaken by hand. Until about forty years ago research was carried out without the use of computer or related ITs. The great advances and discoveries made in the physical and biological sciences between the 17\(^{th}\) and 20\(^{th}\) centuries were all achieved, as it were, by hand. Whatever claims are made for the impact of ICT upon the research process have to be set against the tremendous achievements of three hundred years of research without computers.

When computers become widely available in the 1960s physical and biological researchers, soon followed by social scientists began to use them for data storage, number crunching and data analysis. Various types of information resources and its speedy communication are other important milestones in the research area. In recent years the application of computers
and communication technology to the research process has continued, developed and become a great deal more sophisticated. In these circumstances there must be an efficient central mechanism in all universities for the management of various ICT based resources and services for the benefit of research community (Milliken, & Colohan, 2004).

1.4. UNIVERSITY OF KERALA

One of the first 16 universities in India, the University of Kerala was founded as the University of Travancore in the erstwhile princely state of Travancore (now southern part of Kerala and some neighbouring parts of state of Tamilnadu) in 1937. The earliest origins of the university may be traced back to two institutions of modern learning in Kerala, the University College, Thiruvananthapuram and the Trivandrum Observatory. The University College was initially founded as the Maharaja’s Free School by Maharaja Swathi Thirunal in 1834, with Mr. John Roberts. A Christian Missionary as Headmaster, and soon grew into a college in 1866, affiliated to the Madras University. When the University of Travancore was founded, the Departments of the college became the University Departments, only to switch back again when the transformation to University of Kerala happened in 1957. The University College still retains its connection with the university as an affiliated college.

At present, the university has sixteen faculties and forty one departments of teaching and research in addition to study centres and other departments. Teaching, research and knowledge extension are the mandate of the departments. They primarily focus on post-graduate (masters) programmes, MPhil programmes (1-year research degree) and doctoral research. University’s research activities are also going on in selected affiliated colleges and other recognized research centres in and outside the state. The Institute of Distance Education offers a number of under-graduate
and post graduate programmes which cater to more than 7000 students, all over the country and abroad.

The University has also a number of study centres in specialised areas such as Nano-technology, Kerala Studies, Bioinformatics, Woman Studies, Learning Difficulties, Sree Narayana Studies, Gandhian Studies etc. Some of these centres have taught programmes (Certificate/Diploma/Masters/Mphil) and many offer PhD programmes. The University has also established 10 University College of Teacher Education (UTECS) and 8 University Institute of Technologies (UITs) both of which offer under-graduate programmes (BEd in UTECS and BSc Computer Science/IT, Electronics/BBA in UITs), although masters programmes are available in select UITs. The University College of Engineering at Karyavattom offers engineering education at under graduate level.

The beginning of research activities in the university dates back to the institution of the Department of Research in 1937 under the auspices of the University of Travancore founded in the same year. The research programmes in various disciplines are undertaken by the departments and centres of teaching and research of the university and also under the recognised research centres under the university. These activities include the research done by students who have joined for their doctorate studies, M.Phil programme, the dissertation work or mini research projects done by the students at the post graduate levels and also research by post doctoral researchers, faculty, technical/research scientists and visiting scientists. Sponsored research projects with funding from external sources and consultancy are also undertaken.

The research programmes under the university focuses on social sciences, life sciences, physical sciences, applied sciences, languages and also arts. The university with its good number of researchers and the Ph.Ds
produced ranks one of the best universities in south India. There are many ongoing research projects funded and sponsored by various reputed organisations (http://www.keralauniversity.ac.in)⁹.

1.4.1. KERALA UNIVERSITY LIBRARY

The Kerala University Library (KUL) was established in 1942. It is the oldest and biggest university library in Kerala and is situated adjacent to the university senate hall campus in the Thiruvananthapuram city. It stocks over 3,50,000 books (growing at 5000 titles annually) and subscribes to nearly 500 journals/ periodicals/ magazines. It also offers digital information services such as UGC Infonet. Among its special collections, the Kerala Studies is a unique one. There is also a digitization section as part of the Kerala Studies section. The special collections also include women’s studies, government publications, general biographies, UN and World Bank publications, bound volumes of newspapers and journals and rare books. It is the only library in Kerala which serves as a depository of UN and World Bank publications. The library is currently in the process of digitising its rare collections.

The University in Travancore, founded in 1937 had at its disposal the Trivandrum Public Library until a separate library was started in the present Arts College building. This was soon shifted to the eastern side of the University College (which was then under direct control of the university), in 1946. The present building was constructed with UGC assistance of 10 lakhs and started functioning in September 1962. K. A. Isaac, a student of S. R. Ranganathan, was appointed as the full time librarian in 1959. He continued to lead the library until 1980 when Sri K.C. John succeeded him. Ranganathan's influence on the Kerala University Library is extant in the form of usage of colon system of cataloguing devised by him (http://www.kulib.in/aboutus.html)¹⁰.
The Kerala University Library is complemented with a number of specialised department libraries and also campus library at Karyavattom and study centre libraries at Alappuzha, Kollam and Pandalam. The University Institutes of Technology (UITs), University Teacher Education Centres (UTECs), and University College of Engineering (UCE) also have specialized libraries.

1.5. UNIVERSITY OF CALICUT

The University of Calicut, the second university to be set up in Kerala, came into being in 1968 with the objective of developing human resources in the northern districts of Kerala by extending the reach of higher education and by promoting research in all areas of development with particular emphasis on technology, art and culture of Kerala.

The university made the beginning by taking into its fold the four postgraduate departments set up by the University of Kerala at Calicut and 54 constituent colleges spread across seven northern districts. With ‘Nirmaya Karmana Sree’ as it motto, the university has surmounted challenges to emerge as the largest residential cum affiliating university in Kerala. Its 31 post graduate departments and 304 affiliated colleges has now become a veritable light house beckoning lakhs of young men and women to benefit from higher education.

The university campus, located at Tenhipalam in Malappuram district, 24 km south of Calicut city, is the main hub of academic activities. In addition to the office of the Vice-Chancellor, the university administration, Pareeksha Bhavan, School of Distance Education, Academic Staff College, Educational Multimedia Research Centre, Computer Centre, University Library and other central support and service units, housed on the campus are 22 post graduate departments of teaching and research. These are the Departments of Arabic,

1.5.1. CALICUT UNIVERSITY LIBRARY

The Calicut University Library, established in 1971 and later renamed after C.H. Mohammed Koya, (the former Minister for Education, Government of Kerala), is primarily concerned with the conservation and dissemination of knowledge to its users. It plays an important role in the provision of information to the academic community in the Malabar region. It has a collection of about ninety five thousand books and subscribes to 218 Journals and 10 Newspapers. Library follows the Anglo American cataloguing Rules II (with slight modifications) for Cataloguing and Dewey Decimal Scheme of Classification for the classification of books. It has the distinction of being the first fully automated University Library in the state of Kerala. The library is situated at the main campus at Thenhipalam on the side of the NH17 and is 23 Kilometers away from the historic Calicut city. Apart from the University Library a Study Centre Library is functioning in the Calicut city to serve the academic community in the Calicut city and around.

UGC Infonet is the ambitious project launched by UGC to provide electronic access over the Internet to scholarly literature in all areas of learning to the higher education sector of the country in order to increase in a very fundamental way the resources available to the universities for research and teaching. The e-journals programme is the corner stone of the UGC Infonet effort which is aimed at addressing the teaching, learning, research, connectivity and e-governance requirements of the universities. This noble venture is executed by the Information and Library Network Centre
(INFLIBNET), Ahmedabad. The university is getting direct access to the resources of the publishers through the IP addresses enabled access.

An exclusive centre with 50 numbers of latest computers is opened in the C H Mohammed Koya Library to provide free services to the students, research scholars and faculty members of the university. High bandwidth leased line connectivity is provided for fast access to the valuable resources. The centre functions from 8 a.m. to 8.30 p.m. on all normal working days. Users can copy the downloaded resources to CDROMs and floppies (http://www.universityofcalicut.info.)

1.6. MAHATMA GANDHI UNIVERSITY

Mahatma Gandhi University, one of the major affiliating universities in Kerala, is the premier educational institution that strives to fulfil the higher educational needs of the people of central Kerala. Set on the sprawling 110 acre campus called Priyadarshini Hills at Athirampuzha, 13 kms off Kottayam, the university also has seven satellite campuses in parts of Kottayam and the neighbouring districts. The university was established on 2 October 1983 and has jurisdiction over the revenue districts of Kottayam, Ernakulam, Idukki and parts of Pathanamthitta and Alappuzha. It is a university that conducts a range of programmes at the undergraduate, postgraduate, MPhil and doctoral levels through its 16 university departments, 7 self-financing departments, 82 aided affiliated colleges (of which 8 are colleges with potential for excellence), 158 unaided affiliated colleges and 73 recognized research institutes. It imparts education in the conventional disciplines of science, social science and the humanities as well as in the professional disciplines of medicine, nursing, pharmacy, dentistry, engineering, technology, pedagogy and legal studies. The university has also made its educational presence felt outside its territorial jurisdiction through the off-campus centres of the school of distance education.
At present Mahatma Gandhi University offers research programmes in over forty disciplines through its own schools as well as through its approved research centres. The university has close collaboration for academic, research and extension programmes with a number of national agencies and institutions. The university is also involved in active collaboration with research institutions of international reputation such as the Max Planck Institute of Technology, Germany, Brown University, USA, University of Nantes, France, California Institute of Technology, USA, University of Toronto, Canada, Catholic University, Belgium, Heidelberg University, Germany, and the Institute of Political Studies, Rennes, France (http://www.mguniversity.edu)\textsuperscript{13}.

1.6.1. THE MAHATMA GANDHI UNIVERSITY LIBRARY

The Mahatma Gandhi University Library is situated in the main campus of the university at Athirampuzha, 14 kms away from Kottayam town, on the top of the Priyadarshini hills. The university library was started in 1989 under the supervision of special officer. K A Isaac, former University Librarian and Head, Dept of Library & Information Science, University of Kerala.

The University library is a member of the INFLIBNET Centre, Ahmedabad (Information and Library Network), an Inter-University Centre of the University Grants Commission. The University Library is a fully automated system using the library software package SOUL developed by the INFLIBNET Centre.

The Library is also a member of the DELNET (Developing Library Network). Being a member of these networks, the library is able to share the resources of a number of other libraries and has been able to make inter library loan of books.
The Mahatma Gandhi University is one of the first fifty universities to come under the UGC-Infonet Programme. Through UGC-Infonet e-journals consortium, the university library provides access to more than 4000 journals and databases.

MG University Library and Information System consist of University Central Library and more than 30 libraries of the departments, schools and study centres existing in different campuses. The most important achievement of the MG University Library is the endorsement related to the PhD theses archives developed by the University Library. MG University became the first Indian university to adopt open access to make the results of doctoral research in the university transparent to academics worldwide. MG University has become one of the 20 universities and the first in Kerala during the year to provide access to SciFinder Scholar (SFS) the world’s largest pool of scientific information, which includes numerous mechanisms for retrieving information and also for thousands of knowledge processing applications including laboratory functions. The library has also access to the First Search Services of Ohio College Library Centre (OCLC), USA. About 70 databases are accessible through this (http://www.mguniversity)\textsuperscript{14}.

1.7. THE COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY (CUSAT)

Cochin University of Science and Technology (CUSAT) is a government owned autonomous university in Kochi (Cochin), Kerala, India. Founded in 1971, the university consists of three campuses, two in Kochi and one in Kuttanad, Alappuzha, 66 km inland. In February 1986, University of Cochin was reorganized into Cochin University of Science and Technology (CUSAT).
CUSAT is academically structured into 9 faculties: Engineering, Environmental Studies, Humanities, Law, Marine Sciences, Medical Science & Technology, Science, Social Science and Technology. It has at present 26 Departments of study and research offering post graduate programmes across a wide spectrum of disciplines in frontier areas of science and technology. The School of Engineering additionally offers several graduate programmes in engineering and technology.

All the schools, departments, centres and other buildings of the campus are connected through fiber optic backbone from centralised hubs located in the main campus at Thrikkakara and in the Lakeside Campus at Kochi city. The Lakeside Campus is about 15 km away from the main campus and is connected through a fiber optic cable. The LAN of each department is managed through manageable distribution switches hosted at each department which is connected to the campus backbone.

The university has a bandwidth of 1Gbps provided by National Mission on Education through Information and Communication Technology (NME-ICT) project under the NKN (National Knowledge Network) project of the Government of India. The users of CUSAT will get 150/100 Mbps download/upload bandwidth under this project. Apart from these, university maintains a 24 Mbps leased line Internet connectivity to host the Internet servers like Web, Mail, DNS etc and other public services. University also maintains a telephone exchange with 2000 line capacity. This exchange connects the main and Lakeside Campuses and also has the facility for direct inward dialing which gives the facility to get each officer of the university directly (http://www.cusat.ac.in)15.
1.7.1. COCHIN UNIVERSITY LIBRARY

Cochin University Library was established in 1977 as a central agency for meeting the information requirements of the academic community of the Cochin University of Science and Technology. It is located in a separate building opposite to the administrative block of the Cochin University on its north east side. The functions of the Cochin University Library include collection, organization and dissemination of information.

CUSAT library has restructured its services to face the threat and boon that results from the rapid proliferation of electronic information resources. Library LAN has become a part of campus wide network, which has made it possible for the academic community of 30 departments to access information from their location itself.

Library has acquired ADLIB software package, a user-friendly library management software that supports all in-house activities of the library. Now the library replaced ADLIB software with KOHA. The bibliographic records of books, journals, and theses in the library can now be accessed globally through Web OPAC. With the inauguration of automated library system on 10th March 2000 by the Consul General of the Netherlands, Mr. Hans W Knijnenburg, Cochin University library got the rare destination of being one among the few university libraries in India, which is fully computerized. CUSAT library has IP enabled access to online journals under the UGC-Infonet consortia and INDEST consortia set up in the campus network. CUSAT Library itself is also subscribing e-journals. Twelve systems are dedicated for Internet service in university library on the first come first served basis and spot booking for a minimum of 1 hour. Three systems, including a multimedia system are provided for CD ROM search service. Library has a good collection of multimedia encyclopedia and dictionaries.
and more than one hundred and fifty CDs of books on different subject fields (http://library.cusat.ac.in/eg/eg-home.php.)

1.8. STATEMENT OF THE PROBLEM

The Problem of the present study is entitled as ‘Impact of Information and Communication Technology (ICT) in information seeking and enrichment of researchers in universities in Kerala’.

1.9. DEFINITION OF KEY TERMS

There is a need to define key terms used in the title of the study in order to establish the framework of reference with which the investigator approaches the problem. The key terms are: impact, Information and Communication Technology, information seeking, enrichment, researchers, universities and Kerala.

1.9.1. Impact

Chambers Twentieth Century Dictionary defines impact as ‘the impulse resulting from a new idea or theory or strong effect or influence’ (1972). In the present study impact means the result of an action i.e. result of the application of various ICT tools and services. Hence use of various resources of ICT, variation in its use pattern, extent of its use, level of satisfaction in using it, helpfulness of ICT in research, physiological and psychological impact of ICT on researchers due to the prolonged use, impact in reading habit etc. come under this study.

1.9.2. Information and Communication Technology

According to glossary of flexibility working and ICT terms, ICT is the ‘electronic means of capturing, processing, storing and communicating information’ (2009). In the present study, ICT means all aspects of capturing,
processing, storing and communication of information. It encompasses an array of hardwares, softwares, services, and networks that enable access to online technology.

1.9.3. Information Seeking

According to Shorter Oxford English Dictionary on historical principles, ‘Information’ is defined as the ‘communication of the knowledge of some fact or occurrence or knowledge or facts communicated about a particular subject, event, intelligence, news etc’ (1985)\(^\text{19}\).

According to the Webster’s third new International Dictionary of the English Language ‘seeking’ means ‘try to acquire or gain the thing mentioned or to go in search of thing mentioned’ (1986)\(^\text{20}\).

In the present study ‘information seeking’ refers to the process of collecting and receiving information by different means. The means may include use of various ICT based resources and services such as Internet, social networking sites, Infonet and other information and communication technology based resources and services.

1.9.4. Enrichment

According to Webster’s Comprehensive Dictionary, ‘Enrichment’ means an ‘act of enriching, something that enrich or the act or process of making rich or richer’ (2001)\(^\text{21}\). In the present study enrichment means overall development of researchers by using information.

1.9.5. Researchers

Those who do research or scholars working towards an advanced degree of Ph.D in the universities in Kerala.
1.9.6. University.

An institution of higher learning with the authority toward degree at bachelor, master and doctoral level and usually having research facilities.

1.9.7. Kerala.

The southern state of India, which is known by the name. The Kerala was formed on 1<sup>st</sup> November 1956 with the integration of the Travancore-cochin state and Malabar. Its area is 38,863 Sqkm and has 31 million populations (Manorama Year Book 2011)<sup>22</sup>. Kerala has the highest literacy rate in India and have high academic accomplishments too. But when comparing to advanced level higher educational institutions in national and international level in respect of using modern technologies in the field of research, teaching and learning process in Kerala is far behind.

1.10. OBJECTIVES OF THE STUDY

The major objectives of the present study are stated below:

1.10.1. To identify and evaluate contemporary utilization of Information and Communication Technology (ICT) resources and services for information seeking and enrichment by researchers in the universities of Kerala.

1.10.2 To identify and ascertain Information and Communication Technology (ICT) skill and expertise of the researchers in the universities of Kerala.

1.10.3. To compare the extent of use of Information and Communication Technology (ICT) based resources and services by the different categories of the researchers in the universities of Kerala.
1.10.4. To find out the attitude and level of satisfaction of researchers in the applications of Information and Communication Technology (ICT) for their information requirement.

1.10.5. To examine the various impacts of Information and Communication Technology (ICT) in information gathering and its enrichment by the researchers in the universities of Kerala.

1.10.6. To identify the extent of technological stress (Technostress) among the researchers and methods used by them to cope up with it.

1.10.7. To identify and analyze the hindrances faced by the researchers while using Information and Communication Technology (ICT) resources/tools/services during their information gathering.

1.10.8. To examine the adequacy of training, orientation programmes and workshops on Information and Communication Technology (ICT) resources/tools/services provided by the universities and to identify the specific areas which is to be incorporated in these programmes.

1.10.9. To suggest measures for the improvement of the existing Information and Communication Technology (ICT) resources and services available in the universities of Kerala.

1.11. HYPOTHESES OF THE STUDY

The main hypotheses of the present study are given below:

1.11.1. The utilization of Information and communication technology (ICT) facilities by the researchers in the universities of Kerala is not satisfactory.
1.11.2. Researchers are not fully satisfied with the present Information and Communication Technology (ICT) based resources /tools/services for their information seeking and enrichment.

1.11.3. Researchers are much benefited by the use of various ICT based resources/tools/services in relation to their research work.

1.11.4. The Information and Communication Technology resources and services available in the university libraries of Kerala are not effectively exploited by the researchers for gathering and utilising information.

1.11.5. Science researchers effectively make use of ICT based resources and services more than that of non-science researchers.

1.11.6. There exist a significant difference among the researchers of different universities and between the subjects regarding the utilisation of various Information and Communication Technology (ICT) based resources, tools and services.

1.11.7. There exist a significant difference among the researchers in different universities and between the subjects regarding the purpose of conducting searches, different search methods used and the use of advanced search methods in ICT based information resources and services.

1.11.8. Application of Information and Communication Technology (ICT) based resources and services make a significant change in the reading habit of the different categories of researchers in the universities of Kerala.
1.11.9. Proliferation of Information and Communication Technology (ICT) has created technostress among the researchers in the universities of Kerala and it affects the overall research activity.

1.11.10. Researchers are not provided with adequate training programmes in Information and Communication Technology (ICT) based resources, tools and operations in the universities of Kerala.

1.12. SIGNIFICANCE OF THE STUDY

Information and communication Technology (ICT) makes a profound impact in all the areas of human life. Various studies have been conducted recently to analyse the information needs and the seeking pattern of different user communities. However, the number of serious studies conducted in Kerala to analyse the impact of Information and Communication Technology in researchers are very low.

Despite the fact that Kerala is one of the states which has highest number of researchers in the country, it has less number of successful research output. The main reason for this unfortunate situation is the inability of most of the researchers to exploit the benefits of modern technological advancement especially in the modern Information and Communication Technology. So it is essential to know to what extent the researchers in Kerala utilise the ICT resources and to identify the various factors that hinder the use of these resources and services so that the authority can take necessary steps to overcome these barriers.

Though still unorganised, the researchers are potential information seekers who are in need of extensive information resources and services. The essential prerequisite for providing relevant information services to researchers is to understand the actual information requirements of this group.
Thus this study is of great importance as it aims at understanding the information requirements of the researchers in the IT environment.

The information searching behaviour of researchers are different from other groups who have definite and well defined information needs. In order to satisfy the information needs of the researchers, the university infrastructure must be adequate in its ICT facilities in terms of quality, quantity and currency. The study is aimed at revealing the adequacy of ICT resources and services in universities in Kerala with respect to the researchers’ point of view. Thus this study will help the universities to strengthen the available ICT infrastructure and services in order to provide better satisfaction to the research community.

As the study aims at analysing the availability of ICT based infrastructure and services to cater the need of the researchers, it is expected to reveal the strength and weakness of ICT resources and services. The study also aims to analyse the impact of ICT on researchers in Kerala. This includes how ICT affect their research activity, the traditional reading process etc. This will help the university administrators to strengthen or modify the existing ICT based resources and services targeted towards the researchers.

The study also aims to find out whether there are any psychological and physiological outcomes due to the prolonged use of information and communication technology among the researchers in Kerala. It also highlights various methods used by the researchers for coping up with the technostress.

The barriers of information access may prevent the researchers from getting the required information at right time. As this study aimed at understanding the barriers to ICT based information access, the study is expected to help the administrators to reduce the barriers and give maximum satisfaction to the researchers. The study also examines the adequacies of
training programmes and the areas that researchers want to incorporate in the training programmes on ICT based resources and services.

Thus the study is of greater importance in understanding the information gathering behaviour of the researchers in digital environment and its impact in their personal and academic life. It will help the government, universities and administrators to improve the existing ICT resources and services on the basis of the actual requirements of the research community and get justification for the huge amount spend for these resources. It will also help the society by producing speedy output from research, which is essential for the sustainable development of any nation.

1.13. SCOPE OF THE STUDY

The present study is an attempt to explore the impact of ICT in information seeking and enrichment of the researchers in Kerala. The researchers are the most important component of the academic community. The quality of the research work definitely influences the development of the society. So the researchers need to know about the various information resources, tools and services for getting latest and speedy information for their research work.

The scope of the study extends to cover the researchers from four universities in Kerala. Hence the study aims to analyse the use of various ICT based information resources and services, and check whether they can exploit the ICT based information resources and services in its full swing. The study also aims to understand the impact and barriers of various ICT based information resources and services on researchers in Kerala.

Thus the use of ICT based resources and services, its frequency of use, its impact, adequacies, use and impact of social networking sites, application of ICT in university libraries, different barriers of information
access, researchers’ level of satisfactions, impact of ICT on reading habit and technological stress (Technostress) experienced by the researchers in Kerala etc. come under this study.

1.14. LIMITATIONS OF THE STUDY

The investigator selected only four major universities and studied the impact of ICT on researchers, comparing only two characteristics that are ‘university’ and ‘subject’. Information and Communication Technology is a tremendously growing technology, therefore it is very difficult to include all minute developments taking place in this field. So the investigator selected only prominent areas of the ICT based resources and services. The study was conducted on the sample of 728 researchers from four universities in Kerala. It is neither feasible nor possible to take all the researchers in this state for the study. Thus a representative sample from all strata is taken. The study is limited to the full time researchers working in the four universities in Kerala. The basic approach of the investigator of the present study is mainly that of an information scientist rather than that of an IT expert.

Considering the limitations, the investigator wishes to note that such limitations are not unusual in the study of this kind. Despite the limitations the investigator hopes that the study fulfills the objectives.

1.15. ORGANISATION OF THE REPORT

The main body of the report is organized in six chapters. The preliminary part, bibliography and appendix are also given at appropriate places. The main body of the report is organized as detailed below.

Chapter.1. Introduction

The first chapter constitute the ‘Introduction’ which contains brief outline of the problem, importance of information, Information and
Communication Technology and research, outline of various universities and university libraries under study, statement of the problem, definition of the key terms, objectives of the study, hypotheses of the study, significance of the study, scope of the study, limitations of the study and organization of the report.

**Chapter 2. Information and Communication Technology: An overview**

The second chapter provides an overview about development of Information and Communication Technology (ICT). The development in the field of storage technology, communication technology including Internet and its tools, social networking sites, Infonet, ICT application in university libraries and technological stress etc. are described in this chapter.

**Chapter 3. Review of Related Literature**

‘Review of the related literature’ is dealt with in the third chapter. This chapter overviews the related studies conducted in India and abroad on various aspects of Information and Communication Technology.

**Chapter 4. Methodology**

‘Methodology’ forms the fourth chapter, which describe the variables used for the study, objectives of the study, hypotheses of the study, selection of sample, tools and methods used for data collection, data collection procedure, consolidation of data and statistical techniques used in this study.

**Chapter 5. Analysis and Interpretation**

The fifth chapter is ‘Analysis and Interpretation’. This chapter presents the detailed analysis of data collected from the researchers in the universities of Kerala through structured questionnaire.
Chapter 6. Finding, Testing of Hypotheses, Suggestions and Conclusion

The last chapter, six sketches major findings, tenability of hypotheses, suggestions for the improvement of ICT based information services and resources, suggestions for further research and conclusion.

1.16. CONCLUSION

As society is becoming more complex and dependent on science and technology, the need of timely organization, communication and dissemination of Information is increasing. Contemporary society is in the age of Information and Communication Technology with information explosion as the major indicator. Research is always based upon the available information and knowledge, which consumes and produces information, which is the main reason for the information explosion. The sources of information are definitely available in the universities and various types of ICT based resources like e-journals, e-books, Internet, Infonet etc have diversified the information seeking behaviour of researchers and make tremendous impact on their academic and personal life. In this context it is very relevant to examine the extent of use of the various ICT based resources and its impact on the researchers in the universities in Kerala.
REFERENCES


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