SCHOLARLY USE OF WEB BASED INFORMATION RESOURCES AND SERVICES IN UNIVERSITY LIBRARIES IN KERALA

Thesis submitted to the
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for the award of the Degree of

DOCTOR OF PHILOSOPHY IN LIBRARY AND INFORMATION SCIENCE

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2020

DECLARATION

I, **Deepa P. K**., do hereby declare that, this thesis entitled **"Scholarly use of web based information resources and services in university libraries in Kerala"**is a record of independent research work carried out by me under the supervision and guidance of Dr. Abdul Azeez T.A., University Librarian, University of Calicut, in partial fulfillment of the requirement for Doctor of Philosophy in Library and Information science, University of Calicut and no part of the thesis has been presented for the award of any degree, fellowship or other similar title or recognition before.

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CERTIFICATE

This is to certify that, the thesis entitled **" Scholarly use of web based information resources and services in university libraries in Kerala"** prepared by Mrs. Deepa P. K. for the award of the degree of Doctor of philosophy in **Library and Information Science** of the University of Calicut is a record of bonafide research work carried out under my supervision and guidance. No part of this thesis has been submitted for any degree, diploma, fellowship or other similar title or recognition before.

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LIST OF ABBREVIATIONS

ACS	American Chemical Society
AIP	American Institute of Physics
CAS	Current Awareness Service
CD-ROM	Compact Disc Read-only Memory
DOC	Document file
E-book	Electronic book
E-databases	Electronic Databases
E-journal	Electronic Journal
E-mail	Electronic mail
EPW	Electronic and Political Weekly
ERNET	Education and Research Network
ETD	Electronic Thesis and Dissertation
HTML	Hypertext Markup Language
ICT	Information and Communication Technology
IRs	Institutional Repositories
ISBN	International Standard Book Number
ISID	Institute for Studies in Industrial Development Database
KU	Kannur University
LAN	Local Area Network
MARC	Machine Readable Catalogue
MGU	Mahatma Gandhi University
NICNET	National Informatics Centre

OPAC	Online Public Access Catalogue
PDF	Portable Document Format
RSS	Really Simple Syndication
SGML	Standard Generalized Markup Language
SMS	Short Message Service
SPSS	Software Package for Social Science
UC	University of Calicut
UK	University of Kerala
Web OPAC	Web Online Public Access Catalogue
WWW	World Wide Web

Chapter 1

INTRODUCTION

- Introduction
- Role of university libraries
- Web-based information services in libraries
- Common web-based services in libraries
- Advantages of web resources and services
- Web-based information services for research scholars
- Statement of the Problem
- Definition of key terms
- Need and significance of the study
- Scope and limitations of the study
- Chapter organization
- Conclusion

1. Introduction

A library and information centre form an important part of every education system. Now traditional libraries have evolved in to more easily accessible and thoroughly searchable digital libraries in which data can be searched using keywords, hyperlinks, or photographs, besides the conventional form of searching using author names, page numbers, chapter headings etc. The changes brought about by the steadily advancing technology have generated fresh prospects and task for libraries in data storage, as well as creation, distribution, and spreading of information (Madhusudhan, 2012).Web services meet the requirements of users very effectively and within the time limit. A wide variety of libraries are now available through the web environment for the users. In earlier days, physical access to books and manual searches were mandatory for using any library. As against this, digital libraries can be accessed from one's own home and can be accessed at any time of the day.

Web is a complement to traditional library services. The inherent character of web information system offers many advantages and improvements for library services including the ability to hyperlink to other resources, use a graphical interface, and provide access for remote users. Application of web-based services can be seen in many library services like online catalogue service, institutional repository, library blog, alerting services and so on. Using these services are quite beneficial and practical as they facilitate easy retrieval of information, provide multiple-user access, and are available round-the-clock. Most of the libraries are now providing these services through the library portal. A library portal acts as a gateway to all these library services.

Universities are mainly focused on students and the research community. Learning and scientific research are now mainly influenced by gathering of information through technology applications. Advances in technology help the academic community to search the library resources more effectively. The change in the academic libraries in terms of services and resources supports the students in a better way. This has become possible by providing current awareness service, SDI service,

document delivery service, CD-ROM service, library portal service, web OPAC and also digital library services.

Though library services have been increasingly adopting new technology, they also store a substantial amount of printed material. They combine the two to cater to the needs of conventional people who may prefer printed material and the tech-savvy individuals whose preference could be for digital materials.

Web services in libraries help not only the users but also aid the librarians significantly in dispensing their services. As more and more services are shifted to the online environment, the library website becomes increasingly important as a service provider in its own right and as a major tool in marketing other products of the library (Dhamdhere & De Smet, 2015). Searching and locating the required materials can be easily done by the implementation of web information services, thereby turning libraries into a more accessible, approachable and friendly facility.

1.1.Role of university libraries

As a part of the university, a university library serves the objectives of its parent organization. University libraries meet the needs of faculties as well as students by providing the documents and services they want. Nowadays university libraries accommodate the latest technological trends and keep on innovating in order to keep pace with the changing expectations of teachers and students.

Libraries act as a physical and virtual space for providing information. Now students can get the library resources without their physical presence in a library. As the academic library users' needs and expectations are varying with the time, it is the responsibility of the library staff to know these requirements and strive to meet them (Andaleeb, & Simmonds, 2001).

Quality of service is an important key to the success of every organization and libraries are service-oriented institutions. All services like lending and returning, delivering reference, information search, training programs, and information technology services are provided at libraries.

1.2. Web-based information services in libraries

Since the web environment is a part of most of the libraries nowadays, libraries offer many web information services like e-resources, institutional repository, web OPAC and so on. With the help of these services, users get library services round-the-clock. Data management in libraries can be done easily with web applications.

With the implementation of web services, users can access library resources outside the library and can get lots of advanced information through different channels. It also makes resource-sharing very easy. The practice of commuting to libraries and carrying home heavy volumes has been significantly reduced with the implementation of web resources in libraries.

Libraries are a must for higher institutions like universities. They are primarily necessary for research and also for developing reading habits among students. Besides books, both faculty and students must have access to scholarly journals, globally-collected dissertations and theses, newspaper archives, indexed abstracts, government gazettes etc. Present-day university libraries, which are a combination of digital and physical libraries, perfectly cater to these rapidly-changing needs.

1.3. Common web-based services in libraries

Application of web technology provides easy access to library services and resources. The well-known current web-based information services of libraries are the following:

1.3.1. Library portal

Library portals are user-centered, typically web-based gateways to library services and resources. These systems provide users with convenient, often personalized access to a comprehensive collection of information resources of relevance and authority (Detlor & Lewis, 2004). Subject gateways are important components of a library website, designed for library users to help them discover high quality information in a quick and effective way.

Library automation provides integrated solution for in-house operations and web-enabled services, and intranet on the campus provides wide accessibility to the services. At present many of the library services are provided through library web pages. Web services are being offered using various web software and tools by integrating the technologies to provide web-based services to the users.

Subject gateways can be defined as a facility that allows easier access to web-based resources in a defined area. The simplest type of subject gateways are sets of web pages containing a list of links and provides a simple search facility. More advanced gateways offer a much enhanced service via a system consisting of a resource database and various indexes, which can be searched or browsed through a web-based interface. The portal sites or subject gateways redirect a user to the site holding the original material. A library portal reflects the strengths and weaknesses of the libraries very effectively.

1.3.2. E-Resources

The focus of collection development and management of academic libraries at college and university level has shifted from printed materials to electronic resources (Kaur & Walia, 2016). E-resources refer to that information which requires computer access and which may either be locally accessed or accessed remotely through the internet. The arrival of e-resources in libraries has made it possible to have better options for retrieving information easily and swiftly (Mittal, Bala, & Phil, 2007). All university libraries are members of different consortia which provide a series of online databases and e-journal services. This covers both free internet resources and electronic resources purchased or licensed by the libraries from either commercial or from non profit organizations.

E-resources control the overflow of information and storage problems of libraries. They provide opportunities for providing faster and quicker access to information. Selection of e-resources is influenced by factors like subject coverage, license agreement, vendor support, and quality of a particular e-resource (Kaur & Walia, 2016).

1.3.3.Online library catalogue

The library catalogue has evolved from the days of C. A. Cutter to the present-day internet-worked world and from the traditional card catalogue to the computer-based online public access catalogue (OPAC) (Naik & Nikam, 2014). Online library catalogue facility enables the speedy searching of library databases which provide access to books, journals, periodicals and manuscripts. In this system, the books or reading materials are arranged according to the subject content which is given a call number. Now-a-days the library catalogue is available in the web environment and it is called Web-OPAC. The OPAC system offers keyword searching and Boolean searching facilities. The search results help in accessing and obtaining all the documents related to the search query and saves time and energy for the searching person.

Now the online library catalogue has become more popular than the conventional catalogue among users of academic libraries. It helps significantly in speedily locating the documents in any given library irrespective of whether these documents are print publications or digital publications.

1.3.4. Alerting services in libraries

Alerting services in libraries help users to track new information and resources. When a user subscribes to alerting services of a library, he gets updates from it regarding new journal publications and continuing updates on his search queries. These services provide information on reservation status, due date information and most importantly up-to-date sources of information. Alerts can be on ‘Table of Contents’ and ‘citations’ also.

New arrivals added to the library database can be easily identified with the help of alerting services. There are system-generated automatic alerts and manual alerts provided by the library staff. The alerting may be done through e-mail, SMS, or RSS feeds.

1.3.5. Institutional repository

An institutional repository is a digital archive where a research institution's own intellectual work is collected, stored, and made accessible to users in digital format. The research output consistently increases in such institutions and the unpublished information is archived through the institutional repository. An institutional repository is "a set of services that a university offers to members of its community for the management and dissemination of digital materials created by the institution and its community members" (Lynch, 2003).

DSpace, Greenstone Digital Library, e-prints etc. are different software used for building and distributing the various collections of a library in digital format. Both DSpace and Greenstone Digital Library are open-source software. Greenstone Digital Library is easy to use for making simple or personalized collections whereas DSpace is more suited for making larger collections. Faculty publications, lecture notes, student's dissertations, question papers, photographs, theses etc. can be successfully uploaded to such software.

Institutional repository is created by an institution to support its community members. Building an institutional repository for any organization is very important because it preserves the intellectual output of an organization for future use.

1.4. Advantages of web-based information services

Web services provide many benefits to the library staff as well as for the users. Some of the advantages of web services are given below.

- It saves the time of users as well as library staff
- Wide access to information at different places and in different formats.
- Reusability of the resources and services
- Reduction of physical movement for both library staff and library users
- Round-the-clock access to library resources
- Combined access to different types of resources.

1.5 Web-based information services for research scholars

As a higher institution of education, universities are mainly focused on teaching and research. The quality and quantity of research output is an important indicator of a country's development. "India ranks 5thin global research publication output where countries from North America, the European and Pacific dominate both in terms of quantitative and qualitative research, a joint study by Council of Scientific & Industrial Research—National Institute of Science Technology and Development Studies (CSIR- NISTADS) and Indian Institute of Science Education and Research (IISER) revealed" (Sharma,2017). However, varying yardsticks can be used to gauge the quality and quantity of research output and when we take into consideration the population of the country, the number of portals of higher education in India, and the number of research scholars in India, the volume of research output may not appear satisfactory. "India's research output in science and technology has been poor as compared to other major economies of the world" (Sangomia,2018).Inadequate funding by the government and other concerned organizations to universities is considered the main barrier for good quality research.

Research is a systematic investigation. It includes identifying a topic, designing methodology, collecting data, analyzing collected data and preparing the report. Web services give a variety of platforms for updating the knowledge of a researcher. Unlike using the traditional library setup, users get abundant information in an easy way by using web services. Research scholars are able to keep abreast of the latest developments in their fields of study by relying on web services.

1.6. Statement of the problem

Universities play an important role as leaders in teaching and learning, education, research and technology. According to Altbach (2016), "Universities have been the source of research for more than 200 years, and need to continue as such. They are the only societal institutions that will carry out basic research, and they need to be supported by the government accordingly". In a knowledge-driven society, proper enhancement and spreading of knowledge is mandatory to enrich the culture and economics and general well-being of its members. Now universities are undergoing

profound changes and searching for new dimensions to support teaching and research activities. Updated and well-stocked libraries are absolutely necessary for information dissemination of modern educational institutions.

A Library is considered the 'heart' of a university because of the crucial role libraries play in the spreading of knowledge. A well-organized library is indispensible for the overall development of students such as the development of their personality, communication skills, creativity and knowledge. The applications of ICT and the arrival of web technology on the scene have enhanced the role of libraries in sharing and disseminating information. These improvements help to facilitate easy and fast dissemination and retrieval of information.

Web-based resources and services like library portal, institutional repositories, online catalogue and alerting services have all now been put into service in most libraries. In the case of university libraries in Kerala also, all these services are in place. However, in these universities, the dissemination of resources and services to the end user has still not reached a satisfactory level. Though studies regarding the various web services and resources have been conducted at the national and international level, there has not been any study regarding this in Kerala.

In view of the above, the researcher has under taken the research problem conceived under the title "**Scholarly use of web-based resources and services in university libraries in Kerala".** The study has analyzed the web-based information resources and services available in the selected universities in Kerala and their use in the learning processes of the researchers of these universities.

1.7. Definition of key terms

1.7.1 Scholar

Cambridge Dictionary defines scholar as "A person who studies a subject in great detail, especially at a university"

1.7.2 Scholarly

Merriam – Webster defines scholarly as "Concerned with or relating to formal study or research".

1.7.3 Scholarly Use

In the context of this study, the phrase 'scholarly use' means 'relating to the use made by research scholars of different disciplines'. Search and use pattern of information, which supports scholarly endeavours of research scholars, is the primary focus of this study.

1.7.4 Web

The World Wide Web or just 'the web' is an information service on the internet. It is a handy tool based on hypertext, providing hypertext links in addition to giving a simple list of menu choices. Users can point and click on any text highlighted on the screen for further information or connection to another service (International Encyclopedia of Information and Library Science, 1997).

1.7.5. Information Resources

Any source ie. Organization or individual enable to give meaningful information (Dictionary of Library and Information Science, 2002)

As defined for the purposes of the National Referral Center (q.v.): any organization, facility, or individual willing and able to give authoritative responses to scientific or technical enquiries out of an existing store of knowledge or expertise (The Librarian's Glossary, 1971)

1.7.6. Information Service

An information service is a service provided by an agency or a special library service which draws attention to information stored by that library or information department in anticipation of demand. This is managed by preparing and circulating news sheets, literature surveys, reading lists, abstracts, particulars, etc. which are

anticipated to be of interest to potential users of the service (The Librarian's Glossary,1971).

1.7.8. University Library

A library or library system established, administered, and funded by a university to meet the information, research and curriculum needs of its students, faculty and staff is known as a university library. Some large universities maintain separate undergraduate and graduate libraries as different from college libraries (Dictionary for library and information science, 2004).

1.7.9. Kerala

Kerala is a small coastal state in the southern part of India, formed by the merger of the former state of Travancore-Cochin and Malabar. It has an area of 38,863 Sq.km and a population of 31 million (Manorama Year Book, 2011).

1.8. Need and significance of the study

As institutions of higher education, universities are primarily focused on imparting knowledge and doing research. A library plays a significant role in supporting the process of teaching, learning and research. Developments in the field of information and communication technology have changed libraries from their traditional form to a new one. Now that libraries have migrated to the web environment, users can access all its services quite fast and easily. Various studies have been conducted to analyze the various web services and their methods of working. However, the number of studies conducted in Kerala regarding the subject is very low.

It is essential to know the services of university libraries in web environment and their utilization patterns. The present study is an attempt to assess the use of web information resources by the researchers in the universities of Kerala to find out the differences in their usage pattern and level of satisfaction with regard to web information resources.

Researchers are the main information seekers in a university campus. By selecting them for study, the actual information requirements of such groups can be easily

understood. This study explores the adequacy of web resources and services from researchers' point of view so that authorities can take the necessary remedial measures to overcome the shortcomings.

With the help of this study, the importance of web services and resources for gathering information by researchers can be easily understood. It will help the universities and administers to improve their services. This in turn will help the researchers in producing quality research output which is essential for the development of the nation.

1.9. Scope and limitations of the study

The present study is an attempt to explore the present status of web-based resources and services in the university libraries in Kerala. The scope of the study is limited to the use of web-based information services and exploring the accessibility and usage pattern of researchers of universities in Kerala. Hence the study may not be extendable to other categories of users and researchers.

There are various information resources and services in libraries and these services are updated from time to time. Now most of the library services have moved to the web environment. These changes in libraries provide instant access to their services from anywhere. So the study analyses the various services available in the library which facilitate the speedy access of information. Geographically, the scope of the study is confined to the universities of Kerala. Out of fourteen Universities in Kerala, the present study focuses only on four state Universities. The universities selected for this study are University of Kerala, Mahatma Gandhi University, University of Calicut, and Kannur University. Special universities are excluded from the study. Some of the universities are newly formed and they have also been excluded from this study.

Further, this study is limited to the regular full time research scholars from arts, science and social science disciplines only, avoiding professional students like those doing engineering and medical courses. The study covers only the prominent areas of web-based information resources and services.

1.10. Chapter organization

The thesis has been organized into six broad chapters. A brief description of the chapters is given below.

Chapter 1

The first chapter introduces the problem of the study. It includes a brief description of the subject, the need and significance of the key terms, scope and limitations of the study and organization of the thesis.

Chapter 2

This chapter gives the profile of the universities and university libraries covered under the study. It also gives a glimpse into the web-based information resources and services of the selected universities.

Chapter 3

The third chapter provides details of the views of the earlier studies done in this area and related fields. The review of related literature provides a comprehensive view of the work accomplished so far.

Chapter 4

The fourth chapter describes the methodology of the research, variables used for the study, sampling design, data collection tools and techniques and statistical techniques used for data analysis.

Chapter 5

The fifth chapter deals with the analysis and interpretation of the data. This chapter presents the detailed analysis of data collected from the universities selected through the structured questionnaire.

Chapter 6

The sixth chapter deals with findings, tenability of hypotheses, suggestions, area for further research and conclusion of the study. This chapter is followed by appendices and bibliography.

1.11. Conclusion

The present study provides a detailed status of web-based information services and its use in university libraries in Kerala. All the university libraries are now moving into the web environment. The services like library portal, online library catalogue, library consortia, and alerting services are some of them.

This study will be useful in understanding the existing conditions of web-based information services and resources in university libraries in Kerala. The migration of library into the web environment would definitely be helpful to enhance the qualities of resources and services in university libraries. In this context it is very relevant to examine the extent of use of the various web-based services and their impact among the researchers in universities in Kerala. This particular study will also add value to the existing higher education system of Kerala.

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PART- A

Profile of University Libraries selected under the study

2.1. Introduction

This chapter provides a description of the university libraries which have been selected for research under this study and the web-based services available in these libraries. Prevalence and access to higher education in a country is akin to its economic development and it is widely recognized as an important investment in human capital, necessary for economic growth (Tilak, 2001). As advanced institutions in the field of education, universities play a vital role in the development of the society and the nation. In addition to this, many policies are implemented at the national and state level for the development of higher education in India. In order to improve the quality of higher education in the present day, it is important to integrate technologies in all fields.

The advancements in the field of higher education are having a profound influence on the institution of libraries. Since the core function of libraries is resource and information management, it is mandatory for libraries to have improved student services and facilities in this digital era to make information widely and easily accessible to all.

2.2. Universities in Kerala

The state of Kerala has obviously performed well in the field of higher education and this has been amply proved by its high literacy rate compared to other states of the country. There are fourteen universities in Kerala, including the Central University of Kerala in its northern most district. They are University of Kerala, Mahatma Gandhi University, Cochin university of Sciences and Technology, Kerala University of Fisheries and Ocean Studies, National University of Advanced Legal Studies, Sree Sankaracharya University of Sanskrit, Kerala Agricultural University, Kerala Kalamandalam Deemed University for Arts and Culture, Kerala University of Health and Allied Sciences, ThunchathEzhuthachan Malayalam University,

University of Calicut, Kerala Vetenerinary and Animal Sciences University, Kannur University, Central University of Kerala. Universities of Kerala offer undergraduate, postgraduate, doctoral and other professional programs in different subjects. Out of the fourteen universities, the investigator has selected four universities, i.e., University of Kerala, MahatmaGandhi University, University of Calicut and Kannur University.

2.2.1. University of Kerala

University of Kerala, located in Thiruvananthapuram, the capital of the state of Kerala, is the oldest university in the state. It was established originally as the University of Travancore in 1937 by the Maharajah of Travancore. Ten colleges became affiliated to the university in the beginning and those were, at that time, affiliated to the Madras University. The Maharajah of Travancore Sri ChithiraThirunal Balarama Varma was the first Chancellor of Travancore University and the eminent scholar Sir C. P. RamaswamyAyyar was its first Vice-Chancellor. It was later renamed as University of Kerala in 1957 upon the coming into force of the Kerala University Act of 1957 after the state of Kerala was formed in 1956 by the merger of the erstwhile Malabar, the then state of Cochin and most part of the then state of Travancore. Many luminaries of Kerala and one of the presidents of India were alumni of Kerala University.

The university has evolved in many ways after its inception. Today there are 239 colleges affiliated to it and these are divided into autonomous colleges and non-autonomous colleges. Of these, many are arts and science colleges numbering to 60. Other colleges are medical colleges, engineering colleges, nursing colleges, teacher training colleges, dental colleges, pharmacy colleges, fine arts colleges and others. There is also a music college and also colleges teaching alternative systems of medicine like ayurveda, homeopathy, and siddha medicine. In addition to the departments, centres and affiliated colleges, the university has under it various institutions like the Human Resource Development Centre, the Centre for Adult and continuing education (CACEE), the Department of Publication etc.

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 mandates of the various departments of the university. They primarily focus on post-graduate (masters) programmes, MPhil programmes, and doctoral research. The university has also a number of study centres in specialized areas like nano–technology, Kerala studies, Bioinformatics, Women's studies, Learning difficulties, SreeNarayana studies, Gandhian studies etc. (http://keralauniversity.ac.in/history).

2.2.1.1. Kerala University Library

The Kerala University Library came in to being in 1942 and is the oldest university library in Kerala. The Kerala University central library is situated at Palayam and the campus library is at Karyavattom. The library has a rich collection of books, periodicals, journals, magazines and digital document collection. It has a present collection of more than 3,50,000 books and continues to grow at the rate of more than 5000 titles annually. Library subscribes to nearly 500 journals/periodicals/ magazines (www.kulib.in).

Besides catering to the academic needs of students and faculty members of the university, the library offers a vast collection of encyclopedias, dictionaries, almanacs, yearbooks, directories, census reports, technical reports, printed books, bibliographies, biological sources, geographical sources, handbooks, manuals and current sources (www.kulib.in/collections.html). It also offers digital information services such as UGC-infonet. Through this it provides services like electronic journals, bibliographic data bases, gateway portals and also open-access journals. In addition, Kerala university library contains special collections like Kerala studies, women's studies, government publications, general biographies, bound volumes of newspapers, UN & world bank publications, theses, bound volumes of periodicals (science & social science), and closed references (Rare books).

2.2.2. Mahatma Gandhi University

Mahatma Gandhi University (MG university or MGU), located in Kottayam in Kerala, is another premier educational institution of Kerala, catering to the myriad needs of the increasing number of knowledge-aspirants of the state. The university, established on 2nd October 1983, on the birthday of Mahatma Gandhi, has jurisdiction over the revenue districts of Kottayam, Ernakulum and Alappuzha of central Kerala. The institution offers a large number of programmes at the undergraduate, postgraduate, MPhil and doctoral levels through its 17 university centres, 10 inter-school centres, 77 Govt./aided affiliated colleges, 10 autonomous colleges (of which 8 colleges have a high potential for excellence), 200 unaided affiliated colleges and 273 recognized research centres. It imparts education in the interdisciplinary as well as conventional disciplines of science, social science and humanities besides the professional disciplines of Engineering, Technology, Legal studies, Pedagogy, Pharmacy and Nursing (http://www.mgu.ac.in/about/overview).

Mahatma Gandhi University offers research programs in forty disciplines through its own institutions 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.

2.2.2.1. MG University Library

The Mahatma Gandhi University Library is situated in the main campus of the university in Athirampuzha, in the Priyadarshini Hills, which is 14kms away from the town of Kottayam, and 4kms from the town of Ettumanoor. MG university library was started in 1989 under the supervision of a special officer Prof. K.A Isaac, former Librarian and Professor & Head, Dept. of Library and Information Science, University of Kerala. MGU Library and Information system consist of university central library and more than 30 libraries of the departments/schools and 4 study centers situated in different campuses (library.mgu.ac.in/about-us/).

MGU library maintains a rich collection of books and other printed as well as non-printed materials. It also provides services and resources like document delivery

services, CD-ROM information retrieval service, internet services, online information retrieval service, reprographic service, inter-library loan services, UGC-Infonet and so on.

2.2.3. University of Calicut

University of Calicut is the largest university in Kerala and was established in the year 1968. Located at Thenhipalam in Malappuram District of Kerala, it is the second university to be set up in the state. The university aims to nurture excellence in education and research in its catchment areas of Northern Kerala, with 34 teaching and research departments and 427 affiliated colleges. University of Calicut offers a vibrant and stimulating environment to facilitate creative, original and free thinking. It is one of the leading universities promoting and winning laurels nationally and internationally in sports and games.

Calicut University was created through a government plan that bifurcated Kerala University. As per the plan, the four post-graduate departments of the University of Kerala operating in Calicut (Kozhikode) were annexed to the new university along with fifty-four constituent colleges spread across seven northern districts of Kerala. The new university chose the motto 'Nirmaya Karmana Sree' which means 'prosperity will be produced by action'.

2.2.3.1. C H Muhammed Koya Library

The Calicut University Library is known as C H Muhammed Koya Library. It was established in 1971 and was later renamed after CH Muhammed Koya, who was the Minister for Education in the Govt. of Kerala for long periods between 1967 and 1977. The library is primarily concerned with the conservation and dissemination of knowledge to its users. It is situated at the main campus at Thenhipalam on the side of NH 66 and is 23 kilometers away from the historic city of Calicut. Apart from the university library, a study center library is also functioning in the Calicut city to serve the academic community in the city and around. The library of Calicut University has a rich collection of books, journals (both printed and electronic),

maps, CDs, theses, dissertations, DAISY books etc. in addition to UGC-Infonet sevices.

The library plays an important role in providing information to the academic community in the Malabar region. The total collection of the library is more than 1,15,000 which includes books, gift books, theses/dissertations and bound volumes. The collection also contains 410 CD-ROMs and 205 Microfilms on various topics. The CHMK library is an approved research centre for library and information science and sociology. It follows the Anglo American Cataloguing Rules II (with slight modifications) for cataloguing and Dewey Decimal Scheme of classification of books.

2.2.4. Kannur University

Kannur University was established by the Act No. 22 of 1996 of Kerala Legislative Assembly. A university by the name 'Malabar University' had come into existence earlier by the promulgation of an ordinance by the Governor of Kerala, on 9th November 1995. The university was inaugurated on 2nd March 1996. The objective of Kannur University Act 1996 was to establish in the state of Kerala a teaching, residential and affiliating university, promoting the development of higher education in Kasargod and Kannur revenue districts and the Mananthavady Taluk of Wayanad District.

Kannur University is unique in the sense that it is a multi-campus university with campuses spread across various locations under its jurisdiction. The act envisages that the university shall establish, maintain, manage and develop campuses in Kannur, Kasaragod, Mananthavady, Payyannur, Thalassery, Kanhangad and such other places as are necessary for providing study and research facilities to promote knowledge in science and technology and other relevant disciplines.

2.2.4.1. Kannur University Library

Kannur University Central Library started functioning in Kannur town in 1988. It was opened to the academic community in 1999. The library has been serving the various sections of the university community viz., students, research scholars,

faculty members, staff, graduates and students belonging to the institutions within the university's jurisdiction by offering library services. The library is also recognized as a research centre of the university in the subjects of History, Sanskrit, Statistics, Philosophy, English, Sociology, Economics, Malayalam, Urdu and Music. The holdings of the library are fully automated using the library software KOHA. The library provides the services of DELNET and UGC-INFONET e-journal consortium. In addition to the central library, campus libraries are functioning at the different campuses in Kasaragod, Nileshwaram, Payyannur, Mangattuparamba, Thalassery and Mananthavady.

2.3. Web-based information system

The available features and services in libraries have advanced significantly in recent years as a result of integration of ICT in libraries. Because of these changes, libraries are able to provide highly accurate and timely services to its users. Incorporation of web services in the field has introduced new ways to share and store information. This development began with the introduction of library automation and it has gradually led to the development of basic website formations in libraries. Now libraries offer advanced services like single searching interface, online educational resources and so on. According to Doll and Torkzadeh (1988), in a computing system the end-user satisfaction is dependent on features like the content, accuracy, format, ease of use and timeliness, as shown in the figure.

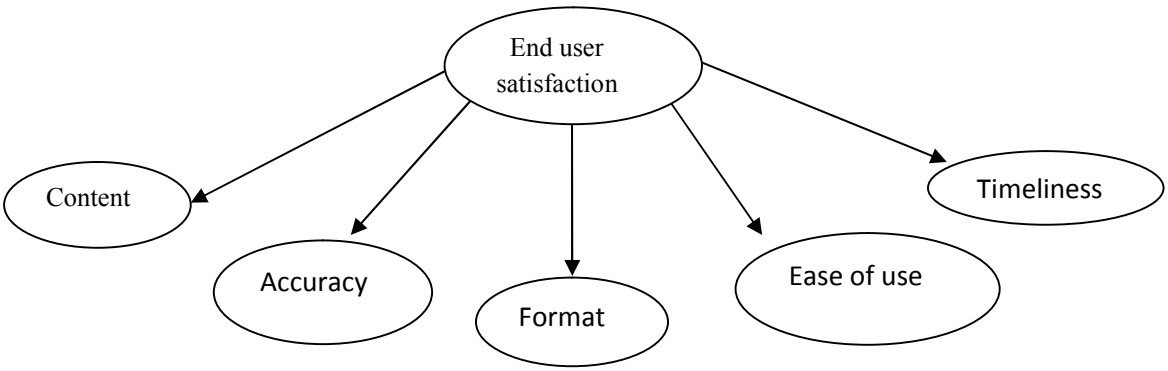

Figure 1

Measuring end-user computing satisfaction

While providing library services, the primary focus of every library has to be on end-user satisfaction. By the development of websites and web resources, different users can access library services and resources simultaneously without being physically present at the libraries.

Before the advent of digital technology, a library was merely a place where documents for reference were stored. The introduction of ICT has brought about a sea change in the field and has transformed libraries substantially. The development of information and communication technology (ICT) has changed library practices from its root. It has significantly reduced the time and effort that human beings have to put forth for obtaining specific information.

The dramatic shift in information flow has affected not only its distribution pattern but the format of resources as well. Libraries and its resources have been moved into an online environment. Web-based services have increased the access to remote library services and users can now access them from anywhere and at any time. The pattern of library services has undergone a vast change from what it was a few decades ago. It started with the introduction of library automation and later advanced distribution patterns of library resources were incorporated to it in the web environment.

2.4. Web-based resources and services in libraries

There are many web services available in the libraries for accessing information conveniently. These services cater to the varying needs of the users. Each of these services is distributed through a particular platform. The important web-based information resources and services are explained below.

2.4.1. Library Portal

Library portal or library website is the main accessing point for library services and resources. The portal offers the users several accessing methods through a single interface. The portal technology has enabled librarians to shift to a more proactive, user-centered, and service-oriented model of library (Letha, 2006). Such services

include online catalogue, institutional repositories, e-resources, bibliographical search, and reference services.

The main advantage of a library portal is that users can customize the resources to suit their requirements. An effectively-designed portal simplifies and expedites the accessing of resources of the library through bibliographical search. In addition, the portal also provides facilities for navigation and resource-linking effectively. Some library portals give interactive services like email and 'Ask a Librarian'.

The portal services benefit both the librarian and the users. Dissemination of information resources and retrieval of information are easier in the digital environment with the help of the portal. The application of web portals in libraries has revolutionized the method of accessing the wide variety of information resources. It has also enhanced the use of electronic resources, combined searching of different resources and the personal services to the users. Moreover, a library portal acts as a bridge between information resources and services and the users by providing options for cross-searching of different resources and through the facility for resource-linking.

2.4.2. Online Library Catalogue

An online library catalogue is an electronic bibliographic database that describes the collection of a particular library like books, videotapes, periodicals etc. Online public access catalogue (OPAC) is a searching gateway of library collections. It facilitates the searching of library documents online. The library OPAC provides advanced searching techniques like Boolean operators.

There are many advantages in having an online library catalogue. It can lead to a wide range of library resources through a single interface of library OPAC and it is also accessible to wider audience. The developments in the field of library OPAC has led to the application of VuFind in many libraries. It is a resource portal designed and developed specifically for libraries. It enables users to search and browse all the library resources including catalogue records, locally cached journals, digital library items, institutional repositories and other collections. It's an open

source, so that the modules can be modified according to the requirement of the library. (https://vufind.org/vufind/)

2.4.3. CD-ROM Services

CD-ROM stands for Compact Disc Read-Only Memory. CDs can store computer data graphics, text and audio files (http://www.cd-info.com/cd/cd-rom/index.html). They include CD-R and CD-RW discs. CD-ROM technology was introduced in the mid-1980s and became increasingly popular in the 1990s. This format is very useful for storing frequently-used reference material such as encyclopedias, dictionaries, directories, journal archives and the like (Shivaraja & City, n.d.). In places where the internet is not available uninterruptedly, CD-ROM is very useful for distribution and accessing of materials. Some fields of CD-ROMs like health and medical fields are updated regularly.

CD-ROMs provide the content with multimedia facilities so that they convey the matter easily and clearly. Other advantages of a CD-ROM are that it provides a large database access, gives easy searching facility, allows fast use, and is portable. It can also be easily integrated with internet technology. If the CD-ROM-installed computer is mounted on a local network, the data can be made available to a wide audience of the library.

The many benefits of CD-ROM services are the following:

- It is a sum of the combination of all the media assets like animation, photography, sound and text.
- A large amount of information can be stored on it and disseminated through a network to larger user groups.
- It is easily accessible through the computer.
- It is compact and portable.

2.4.4. Institutional Repository

An institutional repository (IR) is a digital collection of intellectual output from a particular institution. A university-based institutional repository is a range of facilities offered by a university to its academic community and all users in general, for the access and use of the digital materials produced by that university's students and staff themselves. Organizing an institutional repository is an obligation on the part of the university for safe guarding and preserving such materials and ensuring their proper distribution and availability (Lynch, 2003).

An institutional repository centralizes the knowledge generated by a particular institution. The items in the repository are arranged in a standardized way. It helps to distribute an institution's digital work over the web and it also preserves digital work over a long period. Hence institutional repositories preserve intellectual output over a long term and communicate them to those who are in need of it. IRs support digital formats like images, and all document formats.

There are many open source software available for IRs management like e-print, Dspace etc. With the help of IRs, both the profile of the institution and those of its scholars are rising globally. The system of open access and open archives has changed the pattern of information dissemination of intellectual output beyond the boundary of the library. Some institutions provide access to their research documents and learning materials to the scholars all around the world. Keeping a good institutional repository is a great benefit to the contributors, to the institution as well as to the users.

2.4.5. UGC-Infonet Service

UGC-Infonet is the most ambitious project sponsored by the University Grants Commission. It provides access to a large e-resources collection in various disciplines to all the universities in India. It ensures access to and effective usage of e-resources for both teaching and research purposes. UGC-Infonet digital library consortium provides access to current as well as archival peer-reviewed journals and bibliographic databases from the leading publishers as well as aggregators.

UGC-Infonet was providing access to the following full-text electronic journals and bibliographic databases for the research and development of academic community.

Electronic resources	URL
American Chemical Society	http://www.pubs.acs.org
American Institute of Physics	http://www.scitation.org
American Physical society	hppt://www.scitation.org
Annual reviews	http://arjournals.annualreviews.org
Wiley-Blackwell publishing	http://www3.interscience.wiley.com
Cambridge University Press	http://journals.cambride.org
Elsevier science	http://sciencedirect.com
Emerald	http://iris.emeraldinsight.com
Institute of Physics	http://www.ipo.org/EJ/
J-STOR	http://www.jstor.org
Nature	http://www.nature.com
Oxford University Press	http://www.oxfordjournals.org
Portland Press	http://www.portlandpress.com
Project Euclid	http://projecteuclid.org
Royal Society of Chemistry	http://www.rsc.org
SIAM	http://epubs.siam.org
Springer Link	http://www.spingerlink.com
Taylor and Francis	http://journalsonline.tandf.co.uk/
Bibliographic databases	
SciFinder Scholar	http://www.cas.org/SCIFINDER/SCHOLARS/index.html
MathSciNet	http://www.arms.org/mathscinet
Royal Society of Chemistry	http://www.rsc.org/publishing
ISID	
JCCC	http://jccc-infonet.informindia.co.in/

e-Shodh Sindhu

MHRD (Ministry of Human Resource and Development) recently merged UGC-INFONET digital library consortium, INDEST- AICTE consortium and NLIST in the year 2015 and has formed e-Shodh Sindhu, the current model of centrally controlled and centrally financed consortium would have option to select resources from comprehensive list of resources that are being subscribed by the consortium as well as those that are being subscribed by individual institution. Moreover, institutions would themselves be responsible for paying for resources that they select

from their own funds. However, consortium would continue to act as a body to negotiate the rates of subscription with publishers on behalf of institution.

2.4.6. Current Awareness Service

CAS is one of the information dissemination services. There are traditional and modern types of CAS. Traditionally CAS was provided through photocopied journal tables and contents but in the latest methods different databases are created and sent through email or SMS content alert. CAS keeps the users up-to-date in their fields of interest as well as related subjects.

CAS may be provided in two different ways. In the first method, it is directed towards individuals or groups of users through informal conversation or via telephone, selective dissemination of document and routing of periodicals and other documents. In the other method, it is directed towards all the users by bibliography, indexing and abstracting services and also through the current awareness bulletin.

2.4.7. Alerting Services

Alerting services act as a medium between the service provider and the user. For the user, the alerting service is a natural extension of information seeking in the digital environment (Jabr, 2008). It helps to access information through the intranet and internet. Marketing of library products is also possible through email or SMS alert.

Reservation of books, due alert, fine enquiry etc. is possible through alerting services. In addition to this, answers to enquiries like queries about the e-journal and other databases can be effectively provided through alerting services. It helps to save time for both professionals and users of libraries.

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3.1. Introduction

Web-based information services in university libraries provide easy and timely access to information. In this chapter, a detailed survey has been done about the studies conducted in India and abroad on web-based information services, with a view to justify the needs and relevance of the present study. This facilitates the researcher to gain a better understanding of the topic and it helps to design tools for the successful completion of the study. The literature for the study was collected from databases like Emerald, E-shodhSindu, other open-source databases and print journals. This chapter contains the review of studies related to the following topics:

I. Web-based information services.

II. Different web applications and services in libraries

III Web-based information retrieval pattern

IV Other related studies.

3.2. Web-based information services

Various studies have been conducted in the field of web-based information services available in the libraries. In this section, published studies related to web-based information resources and services in general have been reviewed and it has helped the investigator to get an idea regarding different areas of web application in libraries and its pattern of use by different user categories.

Comeaux & Schmetzke (2007) tried to find out the trends in accessing the Web in the university libraries and library schools. The study covered all ALA-accredited library websites as well as the libraries at the respective campuses. 56 campuses offered ALA-accredited graduate programs in library and information studies. Of these, 49 were located in the US and seven in Canada. The statistics of the study included the percentage of Bobby-approved (denoting conformance with WAI parameters) web pages, average number of barriers per page, range of the percentages in each set, relative frequency, specific accessibility errors, spearman's rank, correlation coefficient for data sets involving rates and Pearson's product

moment correlation coefficient. The results of the study revealed that the seven Canadian schools performed much better on Bobby-tested variables. In the case of the US libraries, 60 percent of web pages were Bobby-approved. Highly ranked sites also had higher scores in terms of accessibility.

Islam & Panda (2007) conducted a study on web-based information retrieval trends of researchers in Sambalpur University. In this study the investigator has analysed the current trends of web-based information retrieval patterns and the magnitude of the dependency of researchers on printed materials. The study has covered only full-time researchers and data were collected through a structured questionnaire. The findings of the study have clearly showed that electronic materials would eventually replace all the printed materials used in conventional libraries.

Sundin (2008) presented a discussion on web-based tutorials for information literacy. 31web-based Scandinavian tutorials for information literacy were used for it and their similarities and differences were analyzed. The empirical focus of the study was on web-based tutorials for information literacy in university libraries. The empirical material for the study included Scandinavian web-based tutorials for information literacy that was available between August and October 2004 via websites of university libraries in Sweden (20) Denmark (six) Norway (Four) and Finland (one). The selected tutorials combined texts, sounds, animation, illustrations as well as video sequences by using graphical interfaces. The identification and selection of the tutorials was achieved through a "snow ball" method. The target audience of the tutorials was mainly undergraduate students. Four approaches emerged as a result of the analysis and these were termed 'source approach, behavioural approach, process approach and communication approach. The study also pointed out that the approaches could be used practically despite their theoretical inconsistencies.

Balaji& Kumar (2011) have focused on the present situation regarding the use of latest web technologies, comprising of social networking sites and web 2.0 digital programs and their related attributes in the library websites of universities. The study used library websites as the core platform and scrutinized their effectiveness in

offering web-based information services. The sites were appraised according to relative weight checklist and the researchers surveyed the accessibility of sites, their academic contents, web2.0 digital programs, and resource discovery tools available in the libraries. From the findings we get the idea that these technologies could not create much positive impact related to web information services of academic libraries.

Canuel& Crichton (2011) conducted a study on Canadian academic libraries and the mobile web. The study examined the mobile environment and its extent in academic libraries, as well as the nature of content and services provided through the mobile. A close monitoring of the presence of mobile Web in academic library environment for four months was the first step of the study. After that they extended their work into the websites of libraries of other institutions of the Association of Universities and Colleges of Canada. The findings of the study showed that out of the 95 member institutions of AUCC, only 13 had some type of mobile web application. It was seen that eight libraries provided mobile websites, in which two libraries gave downloadable mobile apps and three libraries provided the facility for utilizing both the mobile web and the downloadable app. The study also found that the University of Toronto offered an app for Smart phone users.

Kaur & Singh (2011) studied customer service for academic library users through the web. The study explored the nature of customer service in the academic library settings, by making use of a two-phased methodology which consisted of analyzing the subject matter of customer-service literature available in the libraries with special focus on e-services, and also by interviewing students in postgraduate classes in four selected universities of Malaysia. The study identified the main difficulties experienced by the customers and methods employed to solve these problems. The researchers relied on data collection methods used for qualitative research to investigate users' opinions on the efficacy of e-services. The findings did not indicate any specific difference between users in the conventional environment and web environment. Since receiving information was their primary concern, those using e-services needed online support for the problems they faced while searching

for information. The online librarian's efficiency and attitude were very important for good level of demand for reference services. Fast response for queries and the ability of the users to give feedback were also important requirements.

Leung (2011) identified library web/online information services and behavior of students. The study was conducted based on a user survey of students of Colleges of Professional and Continuing Education (CPCE), a self-financing higher education institution which was also affiliated to a government-subsidized university, The Hong Kong Polytechnic university (Poly U). The study found that the majority of students accessed and made use of the library web/online information services through the CPCE libraries website. The information through the mobile technologies and the library website were used for their studies.

Zarei & Abazari (2011) evaluated Asian national libraries in their study done to analyze the web-based services extended by these libraries. The researchers examined 23 Asian library websites that were in English and easily accessible. Data were collected by direct surveillance and checklist appraisal. For ascertaining the services offered by these sites, these were compared against five well-established and very old libraries giving due importance to their geographical location. These were Library of Congress, BibliothequeNationale de France, National library of Russia, British library and National library of China. Findings of the study showed that the National library of Singapore provided the best service through the websites. It appeared to be the only one among the national libraries of Asia that offered a significant percentage of services through its websites. National libraries of countries like Malaysia, Iran, China, Israel, Sri Lanka, Japan, and Kyrgyzstan offered only about 25% to 30% of their services through websites while in the case of Singapore it was more than 50%. On the whole, it was found that the web services offered by national libraries of Asia were not sufficient and they were only an option as an online service provider.

Madhusudhan & Nagabhushanam (2012) studied the web-based library services in university libraries in India. The study analyzed the current state and use of the web by university libraries in India. The researchers did the survey by distributing a

questionnaire among the librarians of the universities and all the respondents cooperated fully by answering the questions. Twenty university library websites in India were surveyed. It was clear from the findings of the study that libraries in all universities were not making full use of web services. New and advanced online library services were being provided by some of them. There was a need of some key improvements and developments, especially in the areas of dynamic library web sites. The study also pointed out the need to give attention to the application of semantic technology which consists of methods for processing, categorizing, and understanding the meaning of data and ontology for facilitating interoperability. The researchers also pointed out the need for introducing Internet Protocol Version 6 (IPV6) and giving multi-language or semantic support for users.

Madhusudhan and Nagabhushanam (2012) focused the extent to which web-based library services are made use of in some of the selected university libraries of India. Their research scrutinized certain factors like users' problems in accessing web-based services, feasibility of web access to library collections, and the extent of user support while availing library services. The study was managed by means of a well-designed questionnaire which was distributed to 600 respondents in 20 university libraries of India. The study revealed that the university libraries in India were lagging behind in taking effective measures for accessing web-based library services, which was a very effective tool for user interaction and communication.

Bhardwaj (2012) conducted a study on web-based information sources and services. The study analyzed the awareness, frequency, usefulness, and method of training programmes for using electronic information sources. The study was conducted at St. Stephan's College, Delhi. Questionnaire was the method used for collecting the data. The survey result revealed that the majority of faculty members were aware of e-resources, and that most of them had participated in workshops and taken training. Most of the respondents rated N-LIST resources as good. It was obvious that most of the faculty members were satisfied with video-library contents and half of the respondents rated them as excellent. The study concluded that St. Stephen's college library provided users with the latest updates on their desktop.

Sivamani, Velvizhi and Palanisami (2013) examined the use of web-based information services. The study was conducted among 4 selected universities in Tamil Nadu. Questionnaire method was used for the data collection. The e-resources and web resources available in the university libraries and the search engines used were analyzed in the study. The study revealed that respondents accessed e-resources and web-based library services from the selected universities in Tamil Nadu. The study observed a significant difference among library users with respect to their research experience. The study could not find any significant difference between e-resources use, search engine use, rate at which e-resources were accessed, and the time required for gaining access to e-resources.

Giddaiab (2014) examined the use of web information resources by researchers in the disciplines of biological sciences in universities of Karnataka. The study covered six traditional universities in the state of Karnataka namely Bangalore, Gulbarga, Karnataka, Kuvempu, Mangalore and Mysore Universities. The study aimed at assessing the frequency of library visit, duration of time spent, various channels of information preferred, various modes of literature covered etc. for the various biological web information resources. To achieve these goals of the study a survey was conducted by questionnaire. Census method was considered for the survey and the collected data were analyzed by counting the frequency. The estimated percentage showed that majority of the respondents visited library for writing reports/ papers/ or theses and that they also made use of e-journals and online databases. Most of the research scholars used online databases for literature search and they did so mainly because research supervisors encouraged them to do so. The study revealed that Biological online tool was the most preferred web information resource.

Gurpreet and Samyal (2014) conducted a study on IIT Libraries in India. The study was conducted through e-survey method. Parameters like general information, access to web-based information resources, use of library 2.0 technologies, catalogue search, information services and facility pattern were evaluated in the study. The result of the study showed that all the library web pages provided a brief

description of the library and its various services. All the IIT libraries were providing access to full text e-journal/databases. There were six libraries which provided access to institutional repositories. IIT Ropar as well as IIT Gandhinagar did not have their own repositories. Out of the 15 libraries only one library provided links to e-reference sources, book company CDs, Digital library databases and video lectures. Very few libraries made use of library 2.0 services to interact with library patrons. Facilities like Document delivery; DELNET, NPTEL, KNIMBUS search etc. were used by some libraries. The overall analysis showed that IIT libraries were doing fairly well, providing services with the help of online resources and services to their patrons.

Khoon and Ramaiah (2014) studied the design and development of web-based online exhibitions. Online exhibitions are basically web-based versions of physical exhibitions. The study gave an overview of the trends in the design and development of online exhibitions in the world. For collecting the user requirements for an online exhibition, it was important to understand the general demographics of survey population. For profiling the demographics of the survey population, some of the specific areas of interests were analyzed such as age group, gender distribution, educational qualification, profession, domain knowledge, work experience and subject background. Users were surveyed to know the different aspects like frequency of web surfing, the average amount of time spent on web surfing, the types of browsers used, and the types of web-sites they would prefer to visit. Finally the expectations of the users about online exhibitions were evaluated with six major areas of interests, namely, 1.Design 2.Content and organization of information 3.Navigation structure 4.Information for help 5.Evaluation of multimedia elements and 6.The full exhibition in general. The study found that online exhibitions offered an exciting environment where visitors could ‘take back’ portions of an exhibition and return for more information or new features or updates in the future.

Sohail and Alvi (2014) investigated the use of web resources by medical students of Aligarh Muslim University. A well-structured questionnaire was prepared and distributed among the students for collecting the primary data. By analyzing the data

the study found that medical students approached web resources generally for their improvement in knowledge and for the quick search and retrieval of information. Most of them accessed web resources links through search engines. Google was seen to be the most preferred search engine. The study revealed that different segments of students had different and varied use patterns of web resources depending upon their area of study and other demographic factors.

Dhamdhere & De Smet (2015) studied the use of web services for patron education and information. The study discussed the current status of various web-based services offered by selected top university libraries in the USA and India. The study found that USA libraries offered many identified services whereas Indian libraries offered only a few. The study also saw that the weakest of USA libraries were stronger than the strongest Indian ones. Traditional bibliographical services took a relatively larger share on Indian library websites than on USA library websites. The ranking of the USA and Indian universities by the number of offered library services was done using'spearman's rank correlation coefficient'. These findings were useful to university libraries in developing countries to diversify their service and change their profiles into more modern information centers with higher educational potential.

Firdaus and Haridasan (2015) focused on the level of use and familiarity of web resources in post-graduate students of engineering in Zakir Husain College of Engineering and Technology (ZHCET), which is one of the colleges of Aligarh Muslim University (AMU) in the state of Uttar Pradesh in India. The study highlighted issues such as the importance of various web resources for the students' academic tasks and the influence of digital resources on their academic work and knowledge acquisition. They also analyzed the extent of user satisfaction resulting from the use and availability of various web resources. According to the study, the effect of web resources use on students' scholastic accomplishment was quite positive. The number of users, who conceded that search of resources to find the required material has become easier because of web resources, was quite significant.

The results of the study showed a high level of satisfaction among engineering students regarding their usage of web resources.

Jeyashree & Ravichandran (2015) identified the impact of Web in higher education institutions in India. The study analyzed the motivation factor for citing websites and its impacts in higher education institutions funded by the Indian central government. Spearman and chi-square analyses were used to highlight the relationship between institution group and website categories. Researchers selected 82 institutions funded by the Ministry of Human Resource Development and categorized them as IIMs, IITs, NITs and ARIs (All remaining institutes). A webometric analysis was used for the study. The findings of the study showed that URL citations increased with the age of the institution. Chi-square test showed that NIT attained first position in all categories. It was concluded that URL citations of NITs had a close relationship and its association was strong with respect to other groups.

Tešendić & Boberić-Krstićev (2015) described web services in libraries for visually impaired people. The study detailed software solutions for lending e-books in Serbia. Many libraries in Vojvodina (autonomous province in Serbia) used the library management system (LMS) of BISIS, which was an integrated software solution to fulfill the demands of libraries. The study found that publishers in Serbia were not interested in collaboration with other libraries because usage of e-books is not widespread in Serbia. The specifications of the Digsrv service linked the audio libraries designed for visually impaired people with the LMS of BISIS so that visually handicapped people could also access the library services through the same system. Implementation of these services and the electronic materials available in libraries were believed to act as a single access point for the audio library system.

Chalawadi, Mallaiah and Ramakrishna (2016) investigated postgraduate students' user behaviour on web in T. John group of institutions in Bangalore city. They analyzed things such as the level of awareness of students about the use and purpose of e-information resources, the factors inhibiting them from the use and finally the satisfaction level of the respondents. Survey method was adopted for the study and a questionnaire was prepared for collecting the data. The study revealed that the

students and faculty members of T. John group of institutions played an important role in promoting their service and gave assistance and guidance whenever required especially while accessing e-resources.

Li & Ranaweera (2016) conducted a study on web-based library services of university libraries in Sri Lankan universities. Fifteen university libraries in Sri Lanka were selected for the study and purposive sampling method was used for the study. The study was analyzed by check-list method. Analysis of the data revealed that the universities had not maintained their websites properly. The study suggested that more attention should be given to web-based library services.

Arunkumar (2017) conducted a study on websites of leading academic libraries in India. The study analyzed the library websites of 20 leading academic libraries of the country. Out of them, eight were from IITs, six central universities, two state universities and one was a deemed university. The selection was done based on national institutional ranking framework 2017. A content survey of the websites was done with the help of a checklist. The main objective of the research was to identify the facilities and services offered through the websites and the level of adoption of web 2.0 tool in these sites. The survey revealed that almost all the websites of the leading university libraries were offering a wide range of courses and services through their web pages. Among the selected libraries, Aligarh Muslim University, Indian Institute of Management, Ahmadabad and University of Delhi scored more compared to the other selected library websites.

In the field of web-based resources, Jagjith (2017) explored the use of web-based resources by medical students of Punjab Institute of Medical Sciences (PIMS), Jalandhar. The study examined factors such as students' awareness, purpose, frequency, and accessibility of these resources. The study also analyzed the problems while using web-based resources. A sample of 149 students was taken for the study. The results showed that majority of the students had the awareness of web resources through their friends. A major portion of respondents used web-based resources for their study and research work. Some respondents were seen using HSLIBNET (Health Sciences Library Network) e-journal consortium. Information

overload was one of the main problems faced by more than half of the students while accessing web resources. The study concluded that MBBS students of PIMS frequently used web-based resources for their improvement in various aspects of their academic activities.

Sahi & Sangita Gupta (2018) critically analyzed the skills of library professionals in web-based library services. The study was conducted among the library professionals working in the academic libraries of Jammu District. The study analyzed how the libraries were providing web-based library services and the level of skills of library professionals regarding the ICT tools that facilitate implementation of web-based library services. Questionnaire method was used to obtain the required data. The statistical tools such as mean, variance, standard deviation and the t-value were used in the analysis of data. The study found that library professionals had enough skills to handle web-based services.

3.3. Different web applications and services in libraries

The emergence of web application in libraries changed the service-providing pattern of libraries. The various resources, tools and services related to web services under different categories are described in this section.

3.3.1. Library Portal

In an earlier study, Detlor & Lewis (2004) studied the impact of library portals. A case study of the McMaster University library gateway was put forward to illustrate the point. The study provided information on the influence of the library's portal in the ultimate information-seeking process. The study brought attention to the influence of library and information enviornments on the design and usability of library portals, especially in terms of their ability to support or inhibit information seeking. The case study was initially carried out by eight MBA and PhD students. The study assessed both the strengths and weaknessess of the library portal.

Noorman bin Masrek (2007) overviewed the academic library portal's effectiveness in constructing information quality, system quality, service quality, user satisfaction, individual impact etc. The study considered library portal itself as an information

system. Individual impacts were frequently measured in terms of job performance, individual productivity, capability of problem identification and decision-making effectiveness. The study was conducted through a survey method. The data were collected from students and faculty of information management from the University Technology of MARA. Most of the questions were prepared by using perceptual measures with corresponding five-point Likert Scale. The results showed that a library portal assured a good service in terms of its quality and it fulfilled the needs and expectations of the user.

Masrek, Jamaludin, & Mukhtar (2010) measured campus portal effectiveness and its contributing factors. The study evaluated the efficacy and usefulness of library portal application in universities from the point of view of students who rely on them. MARA University of Technology (UiTM) was chosen for the study. The student portal of UiTM was chosen because the portal was considered very comprehensive as it provided various categories of information for students. These included the student academic calendar, events, new intake, convocation, and so on. It also acted as a gateway to other systems such as e-learning system, students' affairs information and a few other related systems. The study was conducted by evaluating portal effectiveness by employing Delone and McLean information system success model. The study analyzed the impact of various aspects like approach towards the library portal, individual ingenuity, relationship between portal effectiveness and web navigability, as well as quality of system, quality of service, and quality of information. Students of the main campus in Shah Alam, the state capital of Selangor in Malaysia, were the respondents in the study. Data were collected using a survey research technique. The study adopted questionnaire method to collect data. The findings of the study showed that dimensions of information system effectiveness involving the quality of service and quality of the system have significant correlation with the gratification of the user. Another factor that the study indicated was that web self-efficacy and personal innovativeness were not related to portal effectiveness.

Nishat Fathima (2011) investigated the use of library portal by Engineering and Technology students of Aligarh Muslim University. The study examined the use of library portal by the undergraduate and postgraduate students of the university. The study analyzed the factors such as the level of awareness of the students on this service, its purpose and frequency of use. It also ascertained users' opinion regarding the usefulness and relevance of the particular library portal. The data was gathered by distributing a detailed questionnaire and analysis was done through simple percentage method. The overall analysis showed that a high percentage of respondents were aware about the library portal and that the majority of them used it though not regularly. A high percentage of users used their own library portal and also followed other institutions' library portals.

Mane &Panage (2015) made a content analysis of Jayankar library portal, the library portal of Savitribai Phule University of Pune. By using the descriptive method they tried to analyze the features and the underlying technologies of that particular portal. The study analyzed the availability of e-resources and their subject-wise contribution in the portal. All the primary data were collected by using observation techniques. The study also analyzed the structure and design of the portal, online catalogue, and e-resources available on the portal. It included library-subscribed databases, free resources, subject-wise resources etc.

Gilsha and Bavakutty (2015) measured websites of the welfare departments of the government of Kerala. For the study, Backward Communities Development Department, Scheduled Caste Development Department and Scheduled Tribe Development Department websites were chosen. Qualitative and quantitative analysis were done for the study. Qualitative analysis was carried out by calculating the web impact factor. Different factors were analyzed for the study like the number of web pages, web impact factor, availability of navigation facility, contact details etc. The study found that all the three websites chosen for the study did not provide the last date of updating. The average value of web impact factor of Scheduled Caste Development Department website was less compared to that of Scheduled Tribe Development Department website. This unexpected result was due to a higher

number of web page generation compared to lower number of link pages. Scheduled Caste Development Department website provided timely information and had well-maintained websites but Scheduled Tribe Development Department and Backward Communities Development Department websites lacked these qualities.

Rajendran and Rakesh (2017) studied the role of video in disseminating information. The study described the implementation of "Cumulusclips", an open-source video content management system platform to store and retrieve VSSC Human library videos generated within the centre.

Nishat & Sana (2019) studied library portal use by research scholars of IIT patina and Guwahati. The study used two structured questionnaires for data collection one for librarian and another for users. The study found that nearly half of the respondents used library portal at least once a week. The study also found a small percent of respondents from IITS faced difficulty in locating desired information. The study made suggestions like periodical assessment of requirement of end users would have increased the resources and services accessible via their portal.

3.3.2. Web OPAC

Kumar (2011) identified Online Public Access Catalogue (OPAC)users satisfaction on the basis of the characteristics of the local population, their familiarity and skill with computer, level of education, the assistance they receive in using OPAC, and user-friendliness of OPAC. The study was conducted by survey research method in which 76.8 percent responded positively. The respondents included different user groups of three universities of Punjab region. The results showed that significant differences were noticed only among academic majors. No significant differences were found in user satisfaction among those of different age groups on OPAC use. Except for academic majors, not much distinction was noticed between user satisfaction and population characteristics. However, the level of satisfaction was much more in the case of those with sufficient familiarity with OPAC.

Chintha, Nagabhushanam (2013) evaluated the web-based OPAC services in India. The study explored the number of institution libraries with their web OPAC. The

study was conducted based on content analysis of the library websites and web-based OPACs of the institution/university library which gave province, sector category and URLs for searching Google. It also collected information through LMS vendors' client list and analyzed the data using excel spreadsheet. Out of the 152 libraries, 26 were having web OPACs. The study found that the majority of libraries were using LMS. Compared to commercial LMS, OPAC in open-source services was more flexible. The state of Tamil Nadu showed the highest use of web-based OPAC services, while least usage was seen in the states of Bihar, Jammu & Kashmir, Orissa and Utarakhand. The study concluded that the websites and web OPACs in libraries were in their developing stage.

The studies of Naik and Nikam (2014) analyzed the approch of the staff and students who made use of the web OPAC in the libraries of Karnataka's Law universities. They focused specifically on the libraies in two Law universities. The study's objectives were to understand the users' level of interest in using web OPAC, the sources from which they got guidance for using the catalogue, and the extent to which they used the search methods available in web OPAC. The study was done using questionnaire method and Likert scale of five points was employed in scaling the responses of the questionnaire. Questionnaire were distributed among the staff, research scholars, postgraduatestudents, and degree students of the universities. The researchers did their analyses using the statistical method of mean and standard deviation. According to their findings, the user percentage of web OPAC among the respondents was 92.1 per cent and most of the respondents emphasized that it was the orientation programs conducted by the library that enabled them to use web OPAC comfortably. Though the overall attitude towards the search facilities offered by web OPAC was seen to be positive, many were of the opinion that the guidelines provided by the search page of web OPAC were not fully satisfactory.

Partap (2016) presented usage analysis of Online Public Access Catalogue (OPAC). The study was confined to research scholars of different disciplines in Chaudhary Charan Singh Haryana Agricultural University, Hisar. The study identified information needs, status of OPAC facility, search patterns, challenges etc. A

questionnaire method was used for the study. The study concluded that majority of research scholars agreed that OPAC was faster and easier to search information than the manual catalogue. The use of OPAC by research scholars had increased their information retrieval rate especially in locating books, theses and other reading materials in the library. All the research scholars were found to be satisfied with their search outputs and OPAC facilities.

Wu & Bi (2017) discussed the impact of digital devices on transitioning search methods for use in mobile phones and tablets as well as on desktop computers by using the log data of transactions in a library OPAC. The OPAC logs of Wuhan University library were collected for the study. The logs contained the login and logout time, user identification code, device identification code, retrieval method, search field and query request. The statistical method was used for studying the differences in the search field transition pattern of the three devices. The proportions of different search field transitions patterns, transition times and other indicators were calculated to carry out a comparative analysis. The results showed that search functions of OPAC on the mobile phone, tablet and desktop were progressive. This clearly showed that devices had a great influence on search behavior.

3.3.3. Institutional Repository

Cullen & Chawner (2010) demonstrates institutional repositories in New Zealand. The study found that academics have slow acceptance towards institutional repository. Their number of deposit in institutional repositories was low, the major barrier was related to lack of awareness about repository and lack of encouragement to deposit. The study also made suggestions like institution would to refocus their repositories, and try to make them work for enhanced scholarly communication.

Shyamasree and Panda (2015) reported on the implementation of institutional repository. The study traced the concept of Institutional Repository (IR), its relevance, infrastructural requirements, selection of software and current trends in R & D libraries of Kolkata city, with special reference to the initiatives taken by Bose institute library, Kolkata. By supporting open access, open source and open standards, this library had proved that it was helped significantly by its then patrons

as well as former ones. The arrangement provided easier and comprehensive access to scholarly research. It would be good for many other libraries across the globe, including those in disadvantaged areas, to have access to their important scholarly research.

Shajitha & Abdul Majeed (2019) conducted a study on faculty perception towards institutional repository at CUSAT, India. The study analyzed the awareness and perception of faculty members about Intuitional repository of CUSAT named Dyuthi. The study analysed the experience of faculty members with IR platform, attitude towards institutional policies and preservation methods of published and unpublished work and so on. The study conducted with online questionnaire with the help of google form and was conducted among the faculty members, who were a frequent contributor to IR. The findings found that most of the faculty members were aware and satisfied with Dyuthi. Self-archiving was not unfamiliar with half of the faculty members. But their self –archiving practice in Dyuthi was low. The study also found that most of the faculty members were accessed the self-archived work of others through the Research Gate and IRs.Dyuthi's workflow should be elevate by giving more importance to preservation.

3.4. Application of Web tool

Linh (2008) explored the application of web 2.0 in Australasian university libraries. The study analyzed web 2.0 technologies as well as their purposes and features. The research was done through content analysis. A list of 47 universities was created according to Australasian education network and New Zealand ministry of education. Of these, 32 university libraries, where web 2.0 technologies were used, were selected for the study. The study showed that RSS, Blogs, Instant messaging and Podcasts were the most commonly used web 2.0 technologies. Wikis were not used by any Australasian libraries. Less than a half of the libraries applied RSS for 'new e-journals', 'library news and events' and 'new databases'. Nearly 30 percent of the libraries used blogs for 'new books' display. Podcasts were used for three purposes like 'advice on library skills', 'guidance with resources' and 'library orientation'. The study concluded that two-thirds of Australasian university libraries

deployed one or more web 2.0 technologies to meet their user needs more satisfactorily.

Han and Liu (2010) explored the web 2.0 applications in top Chinese university libraries, analyzing the functionalities and features of these libraries. The study used content analysis of library websites as the research method to collect specific data from different categories. The investigation found that most of the university libraries were still in their basic developmental stage and most of the libraries only used one or two applications in their services like catalogue and RSS, while IM, Blogs, SNS and wiki were less frequent.

A survey of web 2.0 features in university library websites was done by Harinarayana & Raju (2010).Top 100 universities from the ranked list of Times Higher Education Website were chosen for the collection of data. The selection was based on whether the site was in English and it had at least one web 2.0 feature. For the analyses, each university's website was visited and data on their web 2.0 features (such as blogs, RSS, Instant messages, Wikis and the like) were collected and analyzed. The results of the study found that 43 percent of top university libraries were yet to integrate web 2.0 into their websites. RSS and IM were the most widely used web 2.0 applications in university library websites. Wiki was the least applied web 2.0 feature in university libraries. Other applications were used much less by these libraries.

Baro, Idiodi & Godfrey (2013) scrutinized the familiarity level and the extent to which users rely on web 2.0 interactive digital programs in Nigerian university libraries. The study mainly focused on the extent of awareness of web 2.0 applications. The purpose of its use and barriers in its use were also analyzed. Extensive data was collected from librarians, who belonged to 49 Nigerian university libraries, through a questionnaire distributed online to 176 librarians. The study found that social networking was the most popular tool among librarians followed by instant messaging, blogs and wiki. But they did not have much knowledge about RSS feeds, social bookmarking and podcasts. More than half of the librarians used web 2.0 tools for online reference service. Limited availability of

modern computers with internet access was the major barrier in using web2.0 tools. Lots of useful information was provided by the study that enabled better understanding of the way in which librarians in other places made use of web 2.0 tools for providing different services offered by libraries.

A clear assessment of web-based services and tools used by librarians in some engineering colleges of Tamil Nadu was done by Mary and Dhanavandan (2014).The study analyzed the extent of familiarity of web-based tools and services among library professionals and its application in library operations. The questionnaires were distributed to library professionals and analysis was done by simple percentage and weighted average maturity. According to the findings of the study a significant percentage of respondents have expertise in the use of various web-based applications like software that help in acquisition, search, and retrieval of digital documents, systems used to promote e-learning, and applications used for managing web content.

Tella & Oladapo (2016) made a comparative analysis of available features and web 2.0 tools on selected Nigerian and South African university websites. Content analysis was adopted for the study. Twenty university library websites comprising of ten top-ranking Nigerian universities and ten top-ranking South African universities were sampled for the study. Each university website's web 2.0 features, electronic resources and e-databases were collected for the analysis. The result of the study showed that the South African university libraries were a little ahead of Nigerian university libraries. Facebook and Twitter were the most commonly used web 2.0 tools in both countries. Regarding web content/e-resources, they were less available in the Nigerian web pages. South African university library websites provided better current awareness services and more e-databases than Nigerian libraries. E-journals were the most available e-resources in the selected university library websites of both countries.

3.5. UGC-Infonet consortium

Seadle & Madhusudhan (2008) studied the use of UGC-Infonet e-journals by research scholars and students of the University of Delhi. The study focused on their

level of use of UGC-Infonet e-journals. The study detected and categorized the overall needs of users and especially those of students and research scholars of Department of Library and Information Science (DLIS). The survey relied on questionnaire method to elicit the answers. 28 students and 40 research scholars of DLIS were the respondents in the study. The data was analyzed by a simple method of calculation. The results of the study showed that 97 percent respondents knew about UGC-Infonet consortium. Most of them knew about it through their teachers and research guides. The respondents used UGC-Infonet consortium for their research work and it helped them keep up-to-date with their subject information. Boolean search was seen to be the most preferred search technique. Retrieval problem was the most common problem faced by the users. The respondents also opined that they wanted training programs for better utilization of the resources and for managing references. Personal interaction with the research scholars and students revealed many important facts and enabled the investigator to make some important suggestions for the overall improvement of the service.

E-resources use among Kurushethra University research scholars was the topic of study of Madhusudhan (2010). The study analysed the level of use of electronic resources, the users' aptitude and ability in using these resources, and the various purposes for which these resources used. The study was conducted through a structured questionnaire. Among the research scholars, 83 percent responded. For selecting respondents, stratified random sampling was employed. The study concluded that electronic resources were an integral part of research scholars. The speed of availability and ease of accessibility of information made research scholars use e-resources more frequently. The study also showed that sufficiency of computer systems and the speed of the internet could enhance the use of e-resources more effectively and efficiently.

Study by Habiba and Chowdhury (2012) showed the dependence on e-resources in the library of Dhaka University and its overall influence and effects on the users. The purpose for which e-resources are used, its advantages, the extent of user satisfaction, coverage status of the subject and the problem and perceived impact of

e-resources on the users were discussed in the study. The data were collected by the questionnaire method. The study confirmed that a large number of e-resources were made available in DUL and revealed that the majority of the users of DUL use e-resources for their learning purposes. It was also seen that the users were by and large satisfied with the e-resources and materials available in DUL.

Noh (2012) analyzed the performance of electronic resources in academic libraries in Korea. Libraries' performance and efficiency were measured by input-output ratio. The evaluation indicators were divided into inputs and outputs. Input referred to the e-resource use environment as well as the acquisition of e-resources such as web databases, e-books, e-journals and so on. Output quantified the use of each resource. The methodology and procedure of the study consisted of 3 steps. 1. E-resource evaluation indicators and criteria were drafted. 2. Weight was assigned to evaluation indicators. 3. The performance of academic libraries was measured through a Delphi test. If the input to output ratio was higher than 100, its efficiency is considered high. The result of the study showed that a large share of academic library budget was spent on e-resource purchase and its environment improvement.

Baladhandayutham (2014) assessed the use of UGC-Infonet journals by the faculty members, research scholars and students of Manonmaniam Sundarnar University, Thirunelveli. The study focused on assessing the understanding of the knowledge of the users about UGC-Infonet, their reasons for using it and the problems faced while using the services. A Structured questionnaire was designed for the survey which was randomly distributed among the users of Manonmaniam Sundarnar University. The analysis showed that 80.91 percent respondents were aware of the Infonet journals. Nearly one-third of the respondents accessed the UGC-Infonet journals daily. This result clearly showed that the librarians and research guides gave advice to the research scholars on the importance of Infonet and the necessity of consulting them regularly. Most of the respondents had the opinion that the UGC-Infonet digital library consortium was the best resource to access e-journals. Half of the respondents were satisfied with the Infonet journals.

Shaji (2014) carried out a study on UGC-infonet. The study investigated the use and effectiveness of UGC-INFONET digital library consortium at four universities in Kerala, namely Kerala University, Calicut University, MG University and Cochin University. Various statistical techniques like percentage, arithmetic, weighted mean score, chi-square, ANOVA etc. were used in the study. The study found that academic communities used the e-resources provided by the university through UGC-INFONET digital library consortium.

In another research study, Biradarand Kumar (2015) analyzed the awareness and use of UGC-Infonet e-resources by female students of science disciplines. The study was conducted on the basis of their attitude and experience on the use of e-resources. The purpose of the research was to understand the extent of awareness, usage, need for orientation programs, satisfaction level of the students, and the problems faced while using UGC-Infonet e-journals. The survey was conducted among 120 female students of science discipline of Kuvempu University in which 83.33% responded positively. Simple random sample method was selected for the analysis. The findings revealed that 85.00% of the female students used UGC-Infonet e-resources through bibliographic databases and e-journals through UGC-Infonet project. The study showed that more than half the students were satisfied with the UGC-Infonet e-resources. While accessing the e-resources they faced a number of problems such as low band width, slow internet connection, inconsistent supply of electricity, and shortage of computers with internet connection. Apart from that, majority of the students felt that they needed user-friendly library websites. Lack of assistance was another difficulty faced by them. With the help of orientation programs, it would be possible to solve some of the problems of the users.

Ravinder (2015) analyzed the problems of UGC-Infonet E-journals consortium. The study was conducted among the research scholars of Sri Krishnadevaraya University library. The study found that the consortium information influenced the research productivity, purpose of use of the consortium, search techniques etc. The survey for the study was done using the questionnaire method and the study was carried out

among research scholars. On the basis of the analysis, the study found that a user awareness program was essential to facilitate the use of services.

Thomas and Baby (2015) focused on the use of CeRA consortium. For the study, a structured questionnaire was prepared to collect data from the users of Kerala Veterinary and Animal Sciences University. Most of the respondents were aware of CeRA consortium. Students commonly used the searching option of 'Author' to search articles through the CeRA consortium. Students used it mostly for research purposes. Students faced various difficulties while using the CeRA consortium like lack of training, slow internet connection and inadequate computer access.

Nalhe&Ghangare (2016) explored the use of electronic resources. The conclusion and generalizations had been drawn on the basis of the information collected from faculty members of 42 government-aided and non-aided colleges of RTM Nagpur University area. Data collection for the study was done through the questionnaire method. The study showed that the use of electronic resources for their research and development work had created a strong impact on the engineering college faculty of RTM Nagpur University. It was clear from the study that faculty members of the engineering college had accepted the electronic resources but the usage of e-resources among them was not found to be at the optimum level.

Shivarama, Sheela & Sankhwar (2016) assessed e-resources through consortia in management science institutions. The data were collected through questionnaire and were analyzed using an MS-Excel package. The results showed that most of the respondents favored the usage of electronic journals and that they had opined that search engines were useful. The usage of library website, OPAC, library consortia, and cost effectiveness of consortia sharing were also favored features.

In the field of use of electronic resources, Mittal (2017) described the utilization of electronic resources by the library users of the Agricultural University of Kashmir. The study was conducted based on the primary data collected through interviews with the librarians, library staff and library users, and analyzed the availability, purpose, frequency and hindrances to the use of digital resources. It was found that those who used library, mostly used digital information for writing seminar papers

or conference papers. It was also seen that the users did not make full use of all the databases. For the proper utilization of databases, there should be short term training programs, workshops and orientation programs for the users from time to time.

Preeti (2017) analyzed the use of e-resources of the researchers of ChaudharyCharan Singh Haryana Agriculture University, Hisar. The main objectives of the study were finding out the purposes for which they used it, problems while accessing the resources and the level of satisfaction about e-resources. Questionnaire method was used to obtain the data from the researchers. The study showed that majority of the researchers were using e-resources. Researchers mainly used e-resources for research purposes and also to a lesser degree for writing articles or papers, or doing projects. Most of the respondents preferred CeRA. About half of the researchers preferred AGRICOLA database. For accessing e-resources, most of the researchers used the university library. More than half of the students accessed e-resources through the institute's website. Though more than half of the researchers were satisfied with the available e-resources, many had problems with the unsatisfactory internet speed.

Thomas & Kabir (2017) assessed the use of e-resources by the postgraduate students in Journalism and Psychology departments in the universities in Kerala. The study analyzed the e-resources usage among the students. The study was carried out in four major universities of Kerala viz. University of Kerala, Mahatma Gandhi University, University of Calicut and Kannur University. The data for the study was collected by questionnaire. The study found that PG students were using electronic resources for the enhancement of academic activities. It also found that students were using Google and Wikipedia most of the time. They often used valuable resources like open DOAR, ROAR, DOAJ, Digital library in India, shodgangotri etc. Thus the study concluded that more awareness programs regarding electronic information resources had to be provided for postgraduate students.

3.6. Alert services

Jabr (2008) focused on alert services as an approach to researchers' current awareness needs. The study explored the use of e-journals and databases available at Sultan Qaboos University and researchers' knowledge about the alert services. Questionnaire method was used for the study. Questionnaires were distributed to the faculty members of SQU who were familiar with electronic journals and the alert services available through the databases for which SQU library subscribed. The analysis showed that a good percentage of respondents had knowledge about online journals. Researchers were willing to sign up for e-mail alerts for understanding the current status of the alerts as well as for keeping up-to-date with new trends on the subject. Most of the respondents accessed full text articles through their institution subscriptions. Some of them used general search engines such as Google and Yahoo, and the outcome was not always satisfactory.

Paul Anbu & Mavuso (2012) studied about marketing library services through SMS-based alert services. The study explored the details of SMS technology and the way in which libraries and information services in general benefitted from it. It also analysed the preliminary study conducted in the University of Swaziland in this subject and investigated the need to have a basic plan for using SMS technology in alerting services of libraries and their marketing plans. For the study, 200 students and staff from the faculty of commerce were chosen. The study was conducted by creating web-enabled SMS gateway interface that allows sending SMSs from desktop. In addition to this creation of user profile and database creation for identification and transmission of alerts, SMSs can be sent manually or through automated scripts. The results showed that those who used libraries could be encouraged to use library resources using SMS technology. The study also found that SMS services were beneficial to the user community and had the potential to market library services.

ETDs

Coates (2014) examined electronic theses and dissertations and the difference in the behavior of their users according to their location. Auburn University electronic

theses and dissertations were used for the study. The study analyzed the behavior of users in different locations while interacting with the collection. The data were collected by Google analytics for AUETDs page view and user visit for a one-year period (January 13, 2012 through January 12, 2013). The data were filtered according to user location (city, region, country). In some cases, the data were sorted by page type (based on URL) and/or by source (the web sites which referred users to AUETDs). Most local users came to the repository via Auburn University web pages. They used collection home pages and internal navigation pages for their needs. Most of the out-of-state users came to the repository via web search engines. They reached directly on bibliographic information pages less frequently than local users. Users located within the state but outside of the local area interacted with the collection in a way that was intermediate between these two groups.

Gupta and Neerja (2014) critically analyzed the electronic theses and dissertation repositories and government initiatives for depositing ETDs in India. The study also explored whether the guidelines issued for depositing ETDs by various government bodies in India were sufficient to implement the ETD submission nationwide. Snowball technique was used for sampling. The findings of the study showed that University Grants Commission (UGC,2005) and other government bodies had issued guidelines for ETD submission. In 2009,UGC made it mandatory for all the universities to deposit a copy of a thesis submitted, in the national ETD repository, i.e.shodhganga. Yet the universities did not seem very serious about the issue. It was found that most of the Indian universities and higher level institutions were busy with Govt.-funded projects of retro-conversion of the PhD theses piled up in their libraries and less concerned about taking sufficient steps for accepting fresh ETDs and creating facilities for the researchers.

Nanthini and Rekha Rani (2018) explored the growth of ETDs in India. They based the study on quantitative measurement of the contributing universities of Shodhganga. Their analysis identified the institutions that were the major contributors to the repository, the languages of the ETDs that were contributed, departments that contributed more numbers of research work and the amount of

research work undertaken by Indian universities in the last decade. The results showed that the University of Calcutta was the top contributor among the contributing universities with 11025 ETDs, of which 2205 ETDs were contributed by the university's department of science. Though theses written in languages other than English were submitted at Shodhganga, the repository needed to improve in the year-wise report of ETDs.

3.7. Information Search and retrieval

A plethora of information is available about all the subjects nowadays. However, there is a need to develop skills to locate and retrieve this information effectively. Various search methods are available to retrieve web-based information. This particular section provides new glimpses into the trends in information retrieval pattern.

Wien (2000) studied the teaching of online information retrieval to students of journalism. The information needs of journalists differ from the information needs of students of other academic disciplines. The study analyzed the information needs of journalists on a theoretical basis. Secondly an empirical analysis was conducted to find out what information resources were available to Danish journalists. Since only nine out of the 42 newspapers published had a circulation number greater than the mean, those nine newspapers were selected for the study. The study found that most of the newspapers had a library and a librarian who assisted with the search requirements of the journalists. The findings supported the view that journalism students should be taught to express their information needs rather than perform searches themselves. Another factor that the study confirmed was that students needed practical hands-on training in using information retrieval resources.

Using search engines for retrieving health information was the subject on which Teixeira Lopes & Ribeiro (2011) focused. The study evaluated the difference in the effectiveness of the method when used for medical specialities, clinical enquires, and severity of a condition. They also assessed the effects of using evaluation metrics for binary relevance method of classification. Two different health information needs of students were evaluated for the study by giving users a choice

between general search engines like Google, Yahoo, Bing, Sapo etc. and those that dealt exclusively with health issues like Medline Plus, Web MD and Saposaude. Six measures were used by the rsearchers to analyse the distinctions between collections of information requirements and search engines, namely, graded average precision (gap), average precision (ap), graded average precision @5, graded average precision @10,average precision @5, average precision @10. The findings of the study showed that general search engines were used much more than those that focused only on health issues and that Google was the most favoured one.

Another research study by Inthiran, Alhashmi, & Ahmed (2015) pointed out the search-assisting features in personal health tasks. The research was focused on the problems encountered by consumers of healthcare and different domains they used for performing health-related searches. The researchers relied on accidental/ convenience sampling and observational research where the respondents are monitored and analyzed in their natural settings. A total of 36 health consumers participated in this research study for which MedlinePlus was used as a domain for search. Though the respondents in this case were using Medline Plus for the first time, they were not searching for medical information for the first time. The findings of the research showed that those who seek information on health-related issues had good browsing and searching skills. At least some of them had no interest in search assistant features of the program and found a search assistant features of the program and found a search assistant totally irrelevant.

Sudhier and Anitha (2015) explored the way in which search engines were used for retrieving academic information. Survey was conducted through a structured questionnaire. Users from different categories were selected for the study. Stratified accidental random sample method was used for the selection of respondents. The study revealed that students browsed the internet for social, academic and professional purposes. All the researchers and teachers used search engines for the retrieval of scholarly information for research purposes. The study highlighted the practicality of awareness and use of search engines for retrieval of scholarly information. It was pointed out that it would help policy makers, planners and

librarians to understand users' awareness about search engines and their use in academic study and research.

Si, Pan, & Zhuang (2017) conducted an empirical analysis of user behavior on multilingual information retrieval system. They did their information retrieval, which is a discipline of searching for information in a document, using Camtasia studio 7, a screen recorder and editor which record everything that take place on the screen. Using this, participants' thought processes were collected via thinking-aloud protocols where participants think aloud while performing a job. Besides this survey, the researchers relied on interviews to find out the academic background of the platform. By interviewing 41 subjects, they got 32 data points. One important fact that emerged from the study was that most users desired to use their mother tongue for data retrieval. Depending upon their necessity, most of the respondents picked up keywords form their respective tasks for getting information. Search queries with logic symbols were used comparatively more by doctoral students. When there are hindrances for retrieval, users relied on transition tools and continued their exploration by remaining on the original page and later returning to the home page.

3.8. Other related studies

The internet provides various information and communication facilities for libraries. Studies related to ICT application and usage pattern of library resources and services are discussed in this section.

Jantz (2012) studied innovation in academic libraries. The study was conducted in six libraries, through a series of structured interviews. The associated university librarians were selected from the Association of Research Libraries (ARL). Several emerging innovations that went beyond the traditional library space were cited in the study. The study put forward discussions with staff on future plans and explained how small-scale experiments can help to implement new innovations in libraries. The study cited IRs as an innovative project which did not get adequate exposure. The study also found that leadership and management as well as organizational environment factors foster innovation in libraries. Innovations like leasing the library space and selling library services were implemented in the technical sector

while the administrative sector innovations included business plans and a research and development budget. It was seen that these innovations were promising but not very widespread in academic libraries.

Nzivo (2012)did his research in users' opinion about the information resources and library services in the Public Libraries of Kenya. He studied the pattern of use among adult library users for enhancing service delivery and improving the management of services in public libraries. The survey for the research was conducted using questionnaire method. A large percentage of respondents said that information resources from KNLS libraries equipped them with the knowledge necessary to manage their professional information needs. But confidence level with regard to retrieval skills and abilities was seen to be low. Unfamiliarity with electronic resources, lack of books detailing latest technology and user education challenges were found to be key impediments to accessing library services and information resources in KNLS libraries.

Sridevi and Anbu (2013) focused on SMS-based content alert system. The study looked into how SMS-based mobile alert could effectively market library services and provide value-added services. The study got the follow-up from a preliminary project done on a small set of library users in the University of Swaziland to find out how alert services based on SMS worked for them. Later, a project of same type of a broader range was undertaken at Bundelkhand University in the city of Jhansi in India. The study analyzed whether the SMS content alert can be effectively disseminated to users, whether it was technically possible to repackage the e-mail alert into SMS alert and the practical implications of such repackaging. In order to have a meaningful dissemination of information, a profile database for 50 users with five fields (user name, mobile number, department, subject keywords and e-mail id) was created in an excel spreadsheet. After registering each keyword with the publishers for e-mail content alerts, the content alert started reaching the e-mail inbox. Upon reaching the e-mail id, content alert messages from different databases were transmitted as SMS through the SMS gateway to the specific users after crosschecking the profile database. This made an increase in reading interest and

downloads, and also reflected a good response for providing library and information services to users.

The different ways, in which communication and information technologies were utilized in the academic libraries of India, were investigated by Husain & Nazim (2015)The study analyzed the implementation of ICT in housekeeping operations and services, knowledge-sharing and the related challenges for librarians. Fifteen central universities, which were established before 2009, were selected for the study. The university librarians were selected as respondents. Data were collected by using the questionnaire method. The study found that Delhi University library had the largest collection and human resources. In addition to that, it was seen that most of the surveyed libraries implemented ICT applications for providing in-house databases, electronic resources and web-based references. However, many web-based services such as online tutorials, subject gateways/web portal, and alerting services were seen to be used to a very limited extent. Likewise, blogs/wikis, RSS feeds, social networking and social book marking were also found to be not very popular in these libraries. Lack of availability of trained staff for handling ICT-based system and services, low level of ICT skills among library users, and unawareness of potential benefit of ICT infrastructure were the main constraints faced by the librarians in using ICT-based system and services.

Choudhary and Kumar (2017)explored the information-seeking behavior of users. The study was done on the graduate students at the IPS Academy central library in Indore. A structured questionnaire was prepared for the collection of data. The study revealed that users were more or less satisfied with library collections and services, but they wanted training in the correct use of online information.

Esmail and Shamili (2017) studied the use of library information sources and services by research scholars. The study analyzed users' attitude towards the information sources and services available in the library of Annamalai University. Primary data for the research was collected by a structured questionnaire. The study concluded that there was a need to train research scholars in using the various e-

resources available in the library. The majority of research scholars used journals and reference collections as their information material for their research work.

3.9. Conclusion

The investigator has made an attempt to review 77 studies related to the topic of research and related areas like web-based information services in general, web-based library services in particular such as web OPAC, institutional repository, library consortia services etc. General studies on ICT application and online retrieval of library resources were also reviewed.

The in-depth analysis of available literature has helped the investigator to have a clear idea of the topic of research and to finalize the objectives of the present study. During the study of related literature, the investigator did not come across any study of scholarly use of web resources and services in university libraries in Kerala.

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4.1 Introduction

Research methodology is the set of procedures and techniques used to select information about a given research problem and to process and analyse this information. It helps the readers to assess the study's authenticity and dependability. The methodology chapter explains the process used for data collection, methods of data analysis and statistical techniques used for the study.

The present study is an investigation on the web-based information services provided in the university libraries in Kerala. The study focused on the services and facilities in the libraries and the modes and level of usage of web-based services by research scholars. The methodology followed for the study is described under the following headings.

1. Variables used for the study
2. Objectives of the study
3. Hypotheses of the study
4. Sampling design
5. Tools and methods used for data collection
7. Statistical techniques.

4.2 Variables used for the study

Variables used for the study are of two types. They are independent variables and dependent variables.

4.2.1 Independent variable

An independent variable is a variable that is used to predict a dependent variable in a statistical analysis. The following are the independent variables used in this study:

- University
- Subject

Universities selected for the study

Here the researcher tried to find out the university-wise differences in the use of web resources and services among the research scholars of different universities.

Subject Background of Researcher

For comparing the use of web resources and services among researchers, the respondents have been categorized broadly into three groups, namely **science, arts and social science** scholars**.** The actual number of subjects taught in the universities and on which researches are conducted is much more than three because science itself has many subdivisions. Likewise, there is a lot of blurring of boundaries between disciplines like humanities and social sciences. Similar overlapping exists in some other streams of study as well. So, for the purpose of this research, a broad grouping into three was unavoidable and this categorization also ensured that there were sufficient numbers of respondents under each heading. In this division, languages, literature and performance arts have been covered under the discipline of arts, and the other subjects barring science have been put under the heading social sciences.

4.2.2 Dependent variable

The dependent variables or study variables used for this study are the following:

- Awareness about web-based services
- Purpose of use
- Mode of access and extent of use of different web resources and services
- Search pattern
- Advantages of using web resources

- Satisfaction level while using web resources and services
- Hurdles in using web resources

Awareness about web-based services

University libraries provide many web-based information services like e-resources, online catalogue, library portal, ETDs, alerting services and so on. Here the awareness about the different services and their usage level are being analysed.

Purpose of use

The investigator analysed the purpose of use of web resources as well as the frequency of use of various web resources and services.

Mode of access and extent of use

Scholars use different places and platforms for accessing web-based information sources and services like central library, department libraries, hostel etc. These different platforms and the extent of use of the different web resources and services have also been analysed.

Search pattern

Different search methods are available for searching library resources like advanced search, keyword search etc. The study has analysed the user preferences for these search methods and also the orientation programs offered to researchers to familiarize them with these search methods.

Satisfaction level

According to the level of awareness and ease of use, the satisfaction level in using web resources and services vary. The study has analysed the satisfaction level of usage of different web resources and services.

Advantages and Hurdles

There are many advantages in using web-based information sources and services. However, because of fast-changing technology, many scholars encounter hurdles also in making proper use of these resources and services.

4.3 Objectives of the study

The main objective of the present study is to ascertain and analyse the use of web-based resources and services by the research scholars in university libraries in Kerala.

The following are the specific objectives considered for the study

1. To assess the status of infrastructure facility available for providing web-based information resources and services in the university libraries in Kerala.
2. To understand the level of awareness and use of web-based information resources and services by research scholars in the universities in Kerala.
3. To identify the various search methods and criteria used by research scholars while utilizing web-based information resources and services.
4. To find out the impact and satisfaction level of research scholars on the use of web-based information services in universities in Kerala.
5. To find out various impediments faced by research scholars while accessing web-based information services in university libraries in Kerala.

4.4. Hypotheses of the study

1. Infrastructure facilities available for providing web-based information resources and services in university libraries in Kerala are moderately adequate.
2. Research scholars are aware of most of the web-based resources and services available in their respective fields and most of the scholars frequently use web-based information services for their research work.
3. The mode of access to web resources and services are different for scholars of different universities and discipline.
4. The extent of use of various web resources and services among research scholars are at moderate level.

5. Most of the research scholars prefer subject criteria and simple search methods while utilizing web resources and services for their academic purposes.

6. There is no significant difference in the impact of use of web resources and services for academic efficiency among research scholars among research scholars.

7. The satisfaction level of research scholars in using web-based information services vary according to university and discipline.

8. There is no significant difference in the difficulties encountered by research scholars while using web resources and services in university libraries in Kerala.

4.5. Sampling Design

The present study illustrates the use of web resources and services by scholars in the university libraries in Kerala. The study was conducted among the research scholars of the universities in Kerala. The investigator collected information about the number of research scholars doing doctoral degree through different sources. Since it is not possible to administer questionnaire and collect information from every one of the researchers with short span of time.

In Kerala, there are a total of fifteen universities. They are University of Kerala, University of Calicut, Mahatma Gandhi University, Kannur University, Cochin University of Science and Technology (CUSAT), Sree Sankaracharya University of Sanskrit, Kerala Agricultural University, Kerala University of Fisheries and Ocean studies, Kerala University of Health Sciences, APJ Abdul Kalam Technological university, Kerala Veterinary and Animal Sciences University, National University of Advanced Legal studies, Thunchath Ezhuthachan Malayalam University, Kerala Kalamandalam Deemed University for Arts and Culture and Central University of Kerala.

Among these, four prominent state universities have been selected for the present study, namely, University of Kerala, MG University, University of Calicut and Kannur University. Other universities are not considered for the study as these universities are specialized in nature and most of them are newly formed.

The universities in Kerala conduct full-time and part time Ph.D.programmes. As respondents of the present study, only full time research scholars have been selected from the campuses. These researchers were located through different channels like personal communication with the respective university authorities, and the official records maintained by them during the period of 2015-2016. As per the collected records it was found that a total number of 1430 full time researchers were doing research in these four universities. A sample of 500 research scholars was chosen for this study. Multi-stage stratified random sampling technique was used to ensure representation of all categories of researchers. To cover these 500 respondents, 125 questionnaires were distributed to each university. Since number of research scholars in each university is more or less same ie., 392, 358, 379 and 301 full time research scholars in University of Kerala (UK), MG University (MGU), University of Calicut (UC) and Kannur University (KU) respectively. Out of these, 408 properly-filled questionnaires were received back and taken as sample for the final study.

4.5.1. Sampling Technique

The sample size was decided by using US National Education Association statistical table of Krejcie and Morgan (1970).

The formula was $S=X^2NP\ (1-P)\div d^2\ (N-1)+X^2P\ (1-P)$

Where

S = required sample size

X^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841)

N = the population size

P = the population proportion (assumed to be .50 since this could provide maximum sample size)

d = degree of accuracy expressed as a proportion (.05)

As per Morgan table, the sample size for the population up to 1,00000 is 384. Hence 408 samples selected for the study is sufficient and accurate for getting valid inferences and generalization. The breakup of the sample is presented in Tables 1 and 2.

4.6. Breakup of sample

4.6.1. University-wise distribution of sample

University-wise distribution of sample reveals the distribution in each university. The investigator distributed 125 questionnaires among each university among the scholars. Table1 shows the university-wise distribution of samples.

Table 1

University-wise distribution of samples

Sl No.	University	Population	Distributed	Received	Response rate (%)	Total response rate (%)
1	University of Kerala	392	125	103	82.4	25.25
2	Mahatma Gandhi University	358	125	97	77.6	23.77
3	University of Calicut	379	125	110	88	26.96
4	Kannur University	301	125	98	78.4	24.02
	Total	1430	500	408	81.6	100

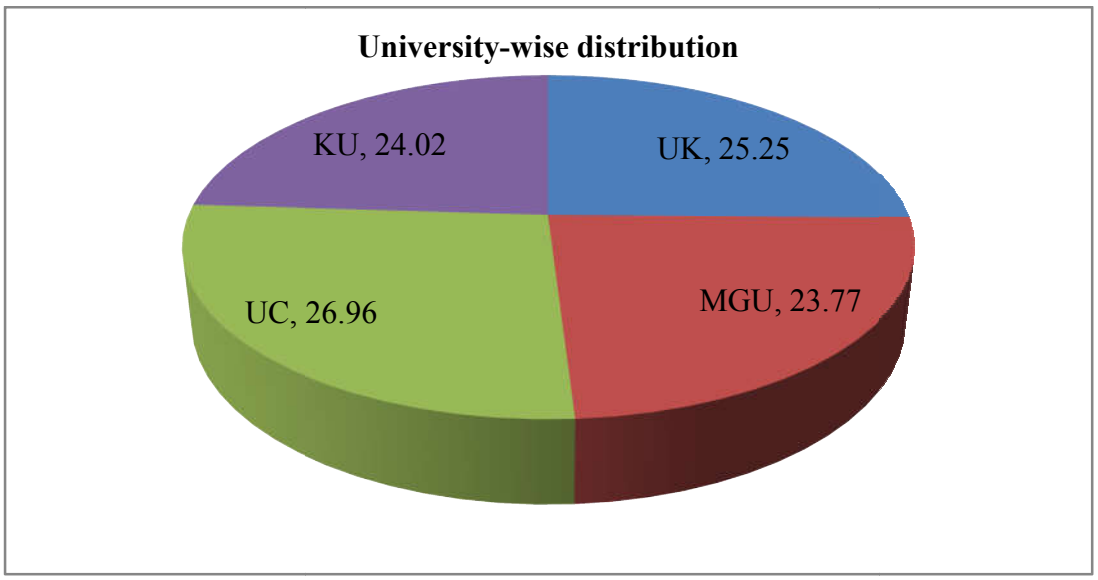

Figure 2 University-wise distribution of samples

Table 1 gives an idea about the responses received from the four universities in Kerala. It shows that 25.25 per cent responses have been received from University of Kerala and 23.77 per cent from MG University. 26.96 per cent and 24.02 per cent of the data have been received from Calicut and Kannur universities respectively.

4.6.2. Subject-wise distribution of samples

Subject-wise distribution of samples are given in Table 2

Table 2

Subject-wise distribution of samples

Subject	Distributed	Received	Response rate (%)	Total response rate (%)
Science	165	137	83.03	33.58
Arts	165	134	81.21	32.84
Social Science	170	137	80.58	33.58
Total	500	408	81.6	100

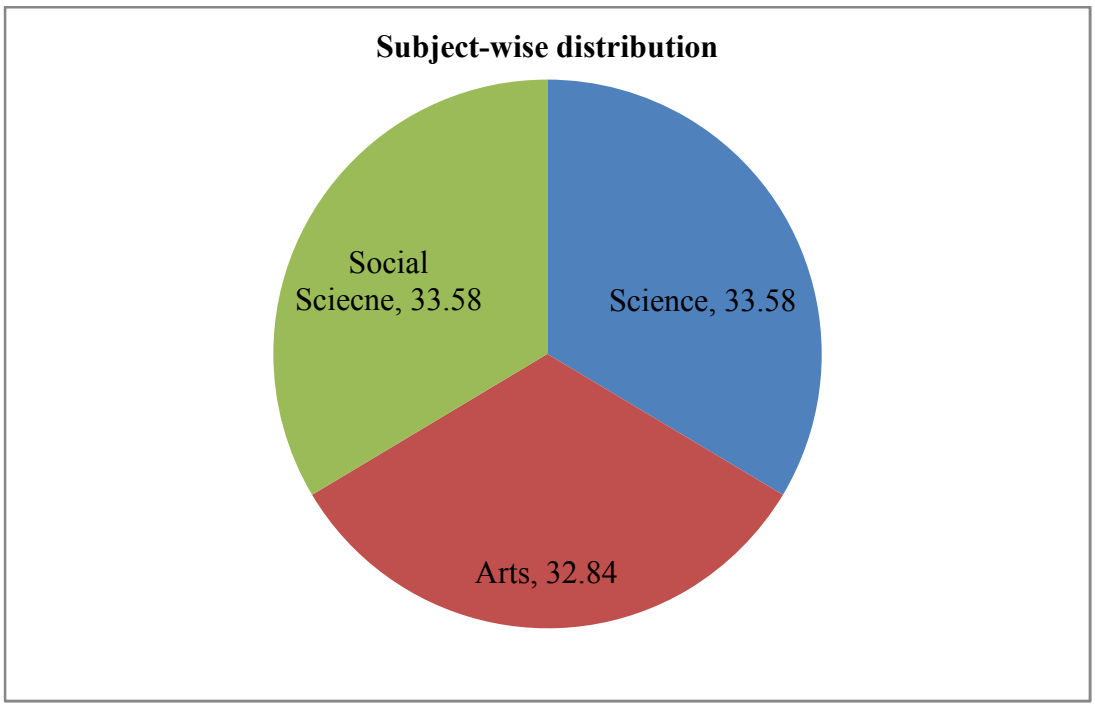

Figure 3 Subject-wise distribution of samples

Table 2shows the proportion in which the respondents belong to the different disciplines. In the present study the research scholars fall under three groups. They are science (33.58 per cent), arts (32.84 per cent) and social science (33.58 per cent).

Graphical representation of the discipline-wise distribution of the sample is given in figure 3.

4.7. Tools and methods used for data collection

Appropriate tools and methods are highly essential for collecting the required data. The investigator used questionnaire method for data collection. Two types of questionnaire were prepared for collecting the data. One was distributed to the research scholars of various departments in the four universities chosen for the study. Another questionnaire was prepared and distributed among the chief librarians of the same universities. The questions were formulated based on research questions and both close-ended and open-ended questions were included in the questionnaire. The investigator personally distributed the questionnaires as well as collected the responses to them.

The draft of the questionnaire was designed on the basis of discussions with the supervising teacher, professional colleagues and with reference to literature review. The questions were pre-tested before final use. The general section of the questionnaire was designed to collect the overall details of the respondent like the name of the university to which he/she belonged, the department of study, gender, age etc. Besides that, the questionnaire had six sections.

The first section consisted of two questions related to the general awareness of web-based information resources and services. Here the respondents indicated whether they were aware of and used the described services.

The second section was for checking the purpose of use of web-based information resources and services. It also assessed the frequency of use of web resources.

The third section contained twenty seven questions and these were arranged under different sub-sections like library portal, institutional repository, library consortia, OPAC and library alert services respectively. Each of these sub-sections contained the necessary questions for assessing the usage pattern of that particular service.

The fourth section dealt with the different search methods used for different web applications. This section also analyzed the frequency of training programs offered in this particular area. It mainly evaluated the quality of orientation programs and frequency of training programs offered by each university.

The fifth section consisted of five questions regarding the advantages, efficiency, level of satisfaction and difficulties involved in the utilization of web resources and services by scholars. This section analyses the advantages and efficiency attained through web resources and services by the scholars. Satisfaction level of the services is analysed through another question. Difficulties are also analysed through the particular section.

The last question dealt with valuable suggestions from research scholars to improve the web resources and services in the selected universities.

Questionnaire for the chief librarian was also divided into different sections.

In the first part of the questionnaire, personal information about the librarian like his educational qualification, experience etc. was sought.

The second part dealt with the details of the institution like its working hours, number of staff and so on. The third part checked the library collection which included both digital resources and printed material.

The fourth part dealt with the library network. This section contained queries on the types of network, operating system, the internet service provider to that particular library and so on.

The fifth question consisted of queries about the automation software and hardware facilities in the library.

The sixth part was designed for checking the different types of web resources and services, and the methods for accessing these resources. Questions about training programs conducted by the libraries were asked in the seventh section.

4.8. Statistical Design

Statistical tools play an important role in research. They help the researcher in analyzing the data. The statistical analysis of data has been done through tables and diagrams. Detailed analysis was made in two ways.

1. University-wise analysis
2. Subject-wise analysis

Various statistical techniques have been used for the study to draw valid conclusions. They are

1. Chi-square analysis
2. ANOVA
3. Scheffe test
3. Weighted Mean
4. Simple Percentage Analysis

Chi-square Analysis

Chi-square test is a nonparametric test which is used to check the goodness of fit for large samples. This test is used to compare the given observed frequencies with corresponding expected frequencies of an assumed theoretical distribution to draw conclusion about whether or not the given data follow the assumed distribution (Panneerselvam, 2013).

The X^2 test is one of the simplest and most widely used parametric as well as nonparametric test in statistical work. The symbol X^2 is the Greek letter chi. The chi-square value is often used to judge the significance of population variance.

Formula for calculating chi-square value: $X^2 = \frac{\Sigma (O-E)}{E}$

Where O is the observed frequency, E is the expected frequency and Σ indicates that we must sum indicated fraction for each category in the study.

ANOVA

Analysis of variance is an analytical method that allows for comparisons of multiple samples. It is probably the most widely used of all statistical methods and can be very powerful. As the name suggests, the method looks at variance, comprising the variability between samples to the variability within samples (Gardener, 2012).

Scheffe test

The Scheffe test is one of the oldest multiple comparison procedures in use today. It is important to recognize that it is a frequently misused procedure. Scheffe test is specifically designed for the situation in which post hoc comparisons involve more than pairwise differences (Salkind, 2010).

Weighted Mean

The weighted mean is a kind of average. Instead of each data point contributing equally to the final mean, some data points contribute more 'weight' than others. If all the weights are equal, then the weighted mean equals the arithmetic mean (the regular 'average' used). Weighted means are very common in statistics, especially when studying populations. (https://www.statisticshowto.datasciencecentral.com/ weighted-mean/).

Simple Percentage Analysis

A percentage frequency distribution is a display of data that specifies the percentage of observations that exist for each data point or grouping of data points. It is a particularly useful method for expressing the relative frequency of survey responses and other data (Shapiro, 2018).

4.9. Style Manual used in report writing

American psychological Association (APA) 6th edition has been followed to write the thesis, to arrange bibliographic references and for formatting the thesis.

4.10. Conclusion

In this chapter the research design of the present study has been presented in detail, and the variables used for the study, the sampling methods employed, as well as the tools and methods used for data collection have been explained. The data collected from the scholars of different disciplines of the selected universities have been analyzed using appropriate techniques. The next chapter furnishes the analysis and interpretation of the data.

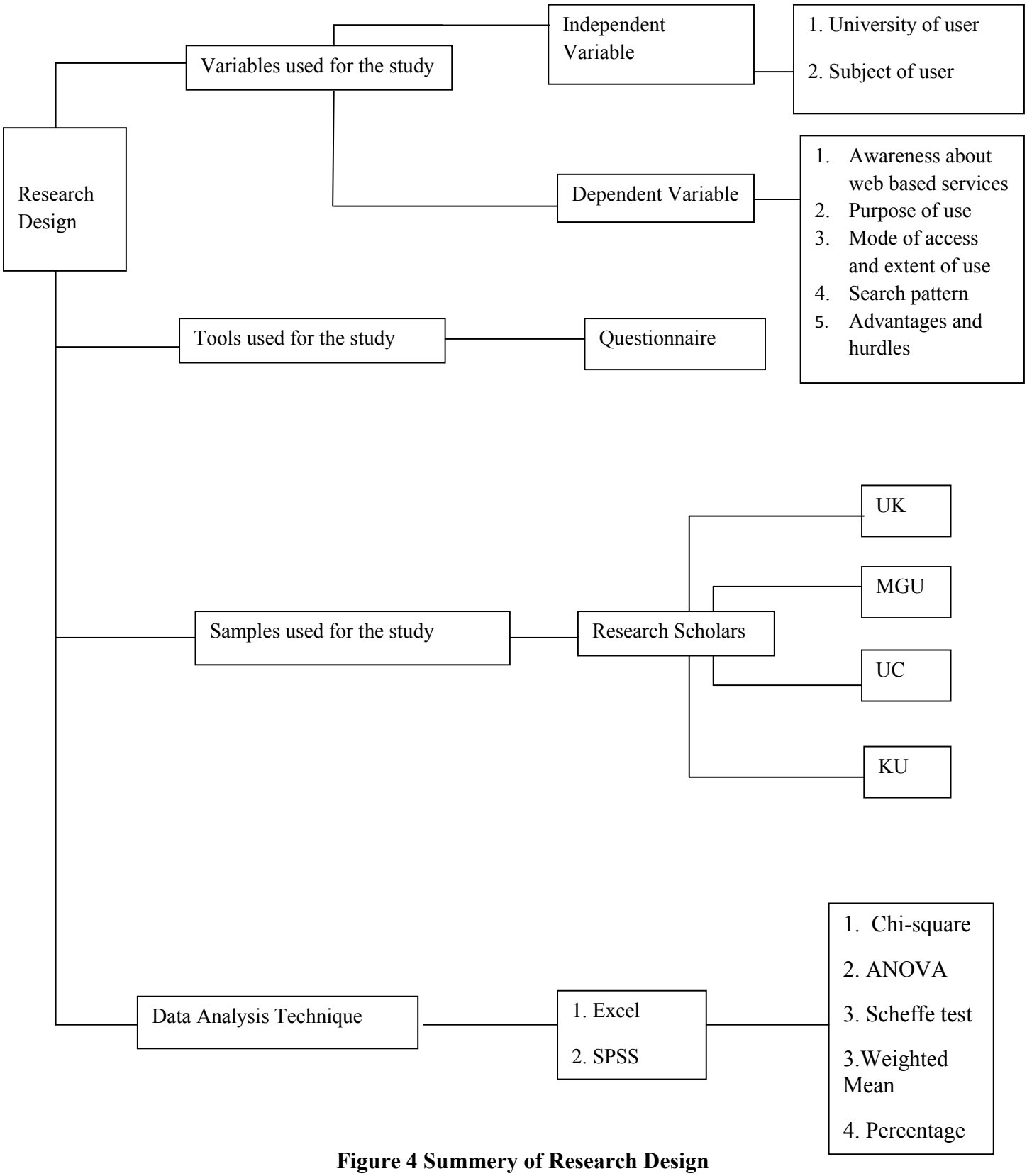

Figure 4 Summery of Research Design

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5.1. Introduction

Analysis is the critical examination of the collected data of a research process. Social science research mostly requires quantitative analysis through various statistical techniques. This chapter deals with the analysis and interpretation of the data collected with the help of questionnaires. The analyzed data are presented in the form of tables and diagrams with their explanations. The collected data have been analyzed on the basis of the following aspects;

- Awareness about web-based services
- Purpose of use
- Mode of access and extent of use
- Search pattern
- Advantages and hurdles in using web resources

The analysis was done on the basis of two independent variables, namely, the university and the subject. The collected data were subjected to various statistical tests like simple percentage analysis, weighted mean score, chi-square, ANOVA and scheffe test on the basis of the entanglement of the hypotheses.

5. 2 Web-based services

The emergence of web services offered many opportunities for the collection, storage and dissemination of information. These recent technologies helped the researchers to find and access resources easily within or outside the libraries. Universities in Kerala implemented many services in their libraries for the benefit of the academic community. Hence it is important to study the awareness about web-based services among the research community.

Different types of studies have been conducted in the area of the internet, web services, tools and utilization of services. Madhusudhan (2012) identified the current level of adoption of these in university libraries in India and the ways in which individual web-based applications are used in different sections of the libraries.

5.2.1 Awareness about web-based services

The availability of diverse web services has changed the pattern of information use, retrieval, use and dissemination. Information resources and services available through the web have become a crucial aspect of daily life.

The level of awareness about the different web services like e-mail, social networking, online survey tool etc. may vary over a wide spectrum, leading to different levels of usage as well. As such, the study analyzed the awareness about the various web applications among the research community.

Table 3

Awareness about the web based services (University wise)

Tools/services		Kerala University (N= 103)	MG University (N=97)	Calicut University (N=110)	Kannur University (N=98)
E-mail	Aware and using	100 (100.00)	100 (100.00)	100 (100.00)	100 (100.00)
	Aware but not using	-	-	-	-
	Not Aware	-	-	-	-
Online survey	Aware and using	41 (39.81)	55 (56.70)	42 (38.18)	43 (43.88)
	Aware but not using	43 (41.75)	27 (27.84)	53 (48.18	38 (38.78)
	Not Aware	19 (18.45)	15 (15.46)	15 (13.64)	17 (17.35)
Chat	Aware and using	79 (76.69)	76 (78.35)	82 (74.55)	88 (89.80)
	Aware but not using	20 (19.41)	16 (16.49)	24 (21.81)	8 (8.16)
	Not Aware	4 (3.88)	5 (5.15)	4 (3.64)	2 (2.04)
Online shopping	Aware and using	73 (70.87)	68 (70.10)	77 (70.00)	65 (66.33)
	Aware but not using	23 (22.33)	26 (26.80)	27 (24.55)	29 (29.59)
	Not Aware	7 (6.80)	3 (3.09)	6 (5.45)	4 (4.08)
Downloading text and multimedia files	Aware and using	88 (85.44)	88 (90.72)	98 (89.09)	96 (97.96)
	Aware but not using	8 (7.77)	5 (5.15)	7 (6.36)	2 (2.04)

	Not Aware	7 (6.80)	4 (4.12)	5 (4.54)	-
Uploading documents and multimedia files	Aware and using	74 (71.84)	76 (78.35)	75 (68.18)	61 (62.24)
	Aware but not using	20 (19.42)	11 (11.34)	20 (18.18)	20 (20.41)
	Not Aware	9 (8.74)	10 (10.31)	15 (13.64)	17 (17.35)
Social networking	Aware and using	87 (84.47)	79 (81.44)	85 (77.27)	81 (82.65)
	Aware but not using	13 (12.62)	7 (7.22)	16 (14.55)	11 (11.11)
	Not Aware	3 (2.91)	11 (11.34)	9 (8.18)	7 (7.07)
Blogging	Aware and using	23 (22.33)	17 (17.53)	18 (16.36)	18 (18.37)
	Aware but not using	53 (51.46)	60 (61.86)	64 (58.18)	68 (69.39)
	Not Aware	27 (26.21)	20 (20.62)	28 (25.45)	12 (12.24)
RSS Feed	Aware and using	13 (12.62)	11 (11.34)	14 (12.73)	4 (4.08)
	Aware but not using	39 (37.86)	28 (28.87)	38 (34.55)	36 (36.73)
	Not Aware	51 (49.51)	58 (59.79)	58 (52.73)	58 (59.18)
Wiki	Aware and using	74 (71.84)	74 (76.29)	75 (68.18)	82 (82.67)
	Aware but not using	15 (14.56)	12 (12.37)	19 (17.27)	8 (8.16)
	Not Aware	14 (13.59)	11 (11.34)	16 (14.55)	8 (8.16)
Creating web page	Aware and using	16 (15.53)	11 (11.34)	12 (10.91)	9 (9.18)
	Aware but not using	60 (58.25)	48 (49.48)	62 (56.36)	57 (58.16)
	Not Aware	27 (26.21)	38 (39.18)	36 (32.73)	32 (32.65)

(Figures in brackets indicate respective percentage)

The level of researchers' awareness of different web-based services was obtained through the questions tabulated in Table No.3 . The table shows that all the scholars from all the universities are aware of and making use of e-mail services. 56.70 per cent of MG University scholars are aware of and using online surveys. A good number of scholars of Kannur University (43.88 per cent), 39.81 per cent of scholars

of Kerala University and 38.18 per cent researchers of Calicut University are also aware of and making use of online surveys.

Kannur University has the highest portion (89.80 per cent) of scholars who make use of online chat. Significant percentages of scholars from other universities also apparently make use of it because MG University has 78.35 per cent, Kerala University has 76.69 per cent and Calicut University has 74.55 per cent of scholars who utilize online chat. Downloading text and multimedia files is also seen to be quite popular because fairly high percentages of scholars from all the four universities are doing so with Kannur University having the highest percentage of 97.96.

Coming to the use of social networking sites, more than 80.00 per cent scholars from Kerala, MG and Kannur universities are aware of and using it, but Calicut University having below 80% (77.27 per cent) who rely on it. Comparatively low percentages of research scholars are aware of and using blogging in all the universities with the highest portion being only 22.33 per cent (Kerala University). Awareness and enthusiasm for web page creation is still low, the highest being only 15.53 per cent (Kerala University). In the case of RSS feed, familiarity appears to be negligible, ranging between 12.73 per cent (Calicut University) and 4.08 per cent (Kannur University).

With Wiki, the awareness appears to be much higher with 82. 67 per cent scholars of Kannur University, 76.29 per cent scholars of MG University, 71.84 per cent scholars of Kerala University, and 68.18 per cent scholars of Calicut University relying on it.

Awareness of Web-Based Services (Subject-wise)

Use and awareness of web-based services are likely to vary among those who are involved in the study of different subjects. Table No. 4 consists of subject-wise analysis of data regarding the awareness of web-based services.

Table 4

Awareness about web-based services (Subject-wise)

Tools/services		Science	Arts	Social Science
E-mail	Aware and using	137 100.00)	134 100.00)	137 (100.00)
	Aware but not using	-	-	-
	Not Aware	-	-	-
Online survey	Aware and using	72 (52.55)	50 (37.31)	59 (43.07)
	Aware but not using	52 (37.96)	56 (41.79)	53 (38.69)
	Not Aware	13 (9.49)	28 (20.89)	25 (18.25)
Chat	Aware and using	112 (81.75)	102 (76.12)	111 (81.02)
	Aware but not using	24 (17.52)	20 (14.93)	24 (17.52)
	Not Aware	1 (0.73)	12 (8.96)	2 (1.46)
Online shopping	Aware and using	108 (78.83)	83 (61.94)	92 (67.15)
	Aware but not using	29 (21.17)	34 (25.37)	42 (30.66)
	Not Aware	-	17 (12.69)	3 (2.19)
Downloading text and multimedia files	Aware and using	134 (97.81)	109 (81.34)	127 (92.70)
	Aware but not using	3 (2.19)	14 (10.45)	5 (3.65)
	Not Aware	-	11 (8.21)	5 (3.65)
Uploading documents and multimedia files	Aware and using	122 (89.05)	72 (53.73)	92 (67.15)
	Aware but not using	15 (10.95)	24 (17.91)	32 (23.36)
	Not Aware	-	38 (28.36)	13 (19.49)
social networking	Aware and using	132 (96.35)	83 (61.94)	117 (85.40)
	Aware but not using	3 (2.19)	23 (17.16)	20 (14.59)
	Not Aware	2 (1.46)	28 (20.90)	-
Blogging	Aware and using	18 (13.14)	27 (20.15)	31 (22.63)
	Aware but not using	103 (75.18)	63 (47.01)	79 (57.66)

	Not Aware	16 (11.68)	44 (32.84)	27 (19.71)
RSS Feed	Aware and using	17 (12.41)	9 (6.72)	16 (11.68)
	Aware but not using	51 (37.23)	35 (26.12)	55 (40.15)
	Not Aware	69 (50.36)	90 (67.16)	66 (48.18)
Wiki	Aware and using	109 (79.56)	87 (64.93)	109 (79.56)
	Aware but not using	17 (12.41)	18 (13.43)	19 (13.87)
	Not Aware	11 (8.03)	29 (21.64)	9 (6.57)
Creating web page	Aware and using	11 (8.03)	14 (10.45)	23 (16.79)
	Aware but not using	101 (73.72)	52 (38.81)	74 (54.01)
	Not Aware	25 (18.25)	68 (50.75)	40 (29.20)

(Figures in brackets indicate respective percentage)

The analysis in Table No. 4 reveals that email is commonly used by students and faculties of all streams, be it science, arts, or social science. A good majority appears to be enthusiastic about online chat also as 81.75 per cent science scholars, 81.02 per cent social science scholars and 76.12 per cent arts scholars are seen using it. 78.83 per cent science scholars, 67.15 per cent social science scholars and 61.94 per cent arts scholars use online shopping also. Science scholars are seen to be ahead in the use of all of the listed web-based services other than blogging and creation of web pages. In the case of online surveys, 52.55 per cent science scholars, 43.07 per cent social science scholars, and 37.31 per cent arts scholars are seen to rely on it.

It is very clear from the table that a large majority of science (96.53 per cent), social science (85.40 per cent) and arts (61.94 per cent) scholars use social networking sites. Blogging and RSS feed usage appear to be comparatively low among researchers. In the case of blogging, the highest percentage of 22.63% is among social science scholars with 20.15 per cent arts scholars, and only 13.14 per cent science scholars being interested in it. More than half of science scholars (50.36 per cent), majority (67.16 per cent) of arts scholars and 48.18 per cent social science

scholars are not aware about RSS feed at all. Creation of web pages is another service to which most scholars appear to be indifferent.

Overall, the analysis indicates that all the scholars are aware of and use e-mail services. As per the study conducted by Gatto & Tak (2008), e-mail communication is the most positively-perceived internet tool. University-wise analysis shows that majority of scholars are comfortable with using online chat, downloading text and multimedia files, and using social networking sites. Kannur University has the highest percentage of scholars using online chat (89.80 per cent), downloading text and multimedia files (97.81 per cent), and using wiki (82.67 per cent) than that of other universities. Online shopping sites (70.87 per cent) and social networking sites (84.47 per cent) are used by a good majority of Kerala University scholars. RSS feed and web page creation is the least-used services among scholars. Subject-wise analysis also found that all the scholars are using e-mail services. More science scholars are aware of and using web services like online surveys, online chat, online shopping, social networking and wiki than scholars of other subjects. Creation of web pages, RSS feed and blogging do not appear to be very popular among most. Even though more than half of social science scholars (57.66%) are aware of blogs, the user percentage appears to be very low.

5.2.2 Awareness of web-based library services

Table No. 5 shows the awareness about web-based services in the university libraries in Kerala. The particular question checked the awareness about the library portal, online library catalogue, institutional repository and so on.

Table 5

Awareness about web-based library services (University-wise)

Tools/services		Kerala University (N= 103)	MG University (N=97)	Calicut University (N=110)	Kannur University (N=98)
Library Portal	Aware and using	83 (80.58)	76 (78.35)	86 (78.18)	52 (53.06)
	Aware but not using	13 (12.62)	20 (20.62)	11 (10.00)	9 (9.18)
	Not Aware	7 (6.80)	1 (1.03)	13 (11.82)	37 (37.76)
Online Library Catalogue	Aware and using	77 (74.76)	87 (89.69)	89 (80.91)	46 (46.94)
	Aware but not using	23 (22.33)	7 (7.22)	18 (16.36)	20 (20.41)
	Not Aware	3 (2.91)	3 (3.09)	3 (2.73)	32 (32.65)
Institutional repository	Aware and using	34 (33.01)	85 (87.63)	43 (39.09)	26 (26.53)
	Aware but not using	54 (52.43)	7 (7.22)	42 (38.18)	15 (15.31)
	Not Aware	15 (14.56)	5 (5.15)	25 (22.73)	57 (58.16)
Library Consortia	Aware and using	45 (43.69)	51 (52.58)	36 (32.73)	20 (20.41)
	Aware but not using	43 (41.75)	19 (19.59)	41 (37.27)	18 (18.37)
	Not Aware	15 (14.56)	27 (27.84)	33 (30.00)	60 (61.22)
Alerting services	Aware and using	59 (57.28)	50 (51.55)	23 (20.91)	14 (14.29)
	Aware but not using	44 (42.72)	15 (15.46)	39 (35.45)	20 (20.41)
	Not Aware	-	32 (32.99)	48 (43.64)	64 (65.31)
E-book	Aware and using	83 (80.58)	88 (90.72)	92 (83.64)	88 (89.79)
	Aware but not using	17 (16.50)	8 (8.25)	15 (13.64)	10 (10.20)
	Not Aware	3 (2.91)	1 (1.03)	3 (2.73)	-
E-journal	Aware and using	94 (91.26)	93 (95.88)	101 (91.82)	93 (94.80)
	Aware but not using	7 (6.70)	4 (4.12)	7 (6.36)	4 (4.08)
	Not Aware	2 (1.94)	-	2 (1.82)	1 (1.02)

(Figures in brackets indicate respective percentage)

Table No. 5 highlights the web-based services offered in university libraries and their awareness and use among the research scholars of various universities of Kerala. Among the various services, e-journal appears to be the most sought-after

service among scholars since its usage ranges from 95.88 per cent (MG University) to 91.26 per cent among the scholars of Kerala University.

Library portal services also appear to be quite popular as 80.58 per cent of scholars of Kerala University rely on it, followed by 78.35 per cent of MG University, 78.18 per cent of Calicut University, and 53.06 per cent of Kannur University scholars. In the case of online library catalogue, 89.69 per cent of MG University scholars, 80.91 per cent of Calicut University scholars, and 74.76 per cent of Kerala University scholars are using it. However, in the case of Kannur University, the corresponding percentage drops to 46.94. The use of institutional repository appears to be quite prevalent among MG University scholars (87.63 per cent) though in the case of other universities the corresponding percentage is much less, being 39.09 per cent in the case of Calicut University, 33.01 per cent in the case of Kerala University, and only 26.53 per cent in the case of Kannur University.

Library consortia services are used by 52.58 per cent scholars of MG University. Alerting services appear to be popular among 57.28 per cent of Kerala University scholars and 51.55 per cent of MG University scholars though in the other two universities this service is not seen to be widely used. E-books and e-journals are apparently the most used web services in all the selected universities. E-books are used by 90.72 per cent of MG University scholars, followed by 89.79 percent of Kannur University scholars, then by 83.64 per cent of Calicut University scholars and 80.58 per cent of Kerala University scholars. In the case of e-journals, the corresponding percentages are 95.88 per cent (MG University), 94.80 per cent (Kannur University), 91.82 per cent (Calicut University) and 91.26 per cent (Kerala University).

Subject-wise analysis of data regarding awareness about web-based services is given in Table No. 6.

Table 6

Awareness about the web based library services (Subject wise)

Tools/services		Science	Arts	Social science
Library Portal	Aware and using	100 (72.79)	91 (67.91)	106 (77.37)
	Aware but not using	18 (13.14)	17 (12.67)	18 (13.14)
	Not Aware	19 (13.87)	26 (19.40)	13 (9.49)
Online Library Catalogue	Aware and using	95 (69.34)	104 (77.61)	100 (72.99)
	Aware but not using	25 (18.25)	14 (10.45)	29 (21.17)
	Not Aware	17 (12.41)	16 (11.94)	8 (5.84)
Institutional repository	Aware and using	62 (45.26)	51 (38.06)	75 (54.74)
	Aware but not using	38 (27.74)	38 (28.36)	42 (30.66)
	Not Aware	37 (27.00)	45 (33.58)	20 (14.60)
Library Consortia	Aware and using	50 (36.50)	44 (32.84)	58 (42.34)
	Aware but not using	41 (29.93)	44 (32.84)	36 (26.28)
	Not Aware	46 (33.58)	46 (34.33)	43 (31.39)
Alerting services	Aware and using	34 (24.82)	18 (13.43)	35 (25.55)
	Aware but not using	36 (26.28)	45 (33.58)	37 (27.01)
	Not Aware	67 (48.91)	71 (52.99)	65 (47.45)
E-book	Aware and using	124 (90.51)	111 (82.83)	116 (84.67)
	Aware but not using	11 (8.03)	20 (14.92)	19 (13.86)
	Not Aware	2 (1.46)	4 (2.99)	1 (0.73)
E-journal	Aware and using	134 (97.81)	115 (85.82)	132 (96.35)
	Aware but not using	3 (2.19)	15 (11.19)	4 (2.92)
	Not Aware	-	4 (2.99)	1 (0.73)

(Figures in brackets indicate respective percentage)

Subject-wise analysis of awareness about web-based information services shows that e-journal is the most widely used service among research scholars. Both library portal and library catalogue services appear to be quite popular with 72.79 per cent of science, 77.37 per cent of social science, and 67.91 per cent of arts scholars using the library portal, and 77.61 per cent arts scholars, 72.99 per cent social science scholars and 69.34 per cent science scholars using online library catalogue. A good number of scholars are aware of and using institutional repository, their percentage being 54.74 per cent social science scholars, 45.26 per cent science scholars and 38.06 per cent arts scholars respectively. Library consortia are used only by 42.34

per cent of social science scholars and much lesser percentages of the other two groups.

Coming to library alerting services, 25.55 per cent social science scholars and 24.82 per cent science scholars are using it but the percentage of users in the arts section is only 13.43. E-journals appear to be well-liked with 97.08 per cent science scholars, 96.35 per cent social science scholars, and 85.82 per cent arts scholars using them. E-books also appear to be equally popular with 90.51 per cent science scholars, followed by 84.67 per cent social science scholars, and then by 82.83 per cent arts scholars relying on them.

The analysis leads to the conclusion that all web-based services and resources are used by researchers. In the case of university-wise analysis, library portal service is seen to be used more by Kerala University scholars than those of other universities, and library catalogue service is seen used more by MG University scholars than by those of other universities. In the use of institutional repository also MG University scholars (87.63 per cent) are more in number with scholars of other universities being way behind in its use. Library consortia appear to be comparatively less used by all, but MG University scholars are in front with 52.58 per cent using them, followed by Kerala University scholars with 43.69 per cent using them, but the user percentage of other two universities being much lower.

Kerala University has the highest percentage (57.28 per cent) of scholars relying on alerting services, followed by MG University (51.55 per cent). The other two universities have much lower user percentages for this service. E-journals are used more by MG University scholars (95.88 per cent) followed by (94.80 per cent) Kannur University scholars and 91.82 per cent Calicut University scholars. E-books also appear to be well-liked by all with the lowest user percentage being only 80.58 per cent in the case of Kerala University scholars.

In the case of subject-wise analysis, most of the scholars are seen using library portal and library catalogue services. In the use of library portal and consortia, social science scholars appear to be more inclined to its use than the other-subject scholars, while in the case of library catalogue, arts scholars seem to have a higher preference for it. In general, reliance on institutional repositories and library consortia appears to be on the average while the use of alerting service is comparatively low. E-

journal and e-book use is high among all categories, with the highest user percentage being among science scholars, followed by social science and arts scholars. Many studies (Swain, 2010; Sivamani, Velvizhi, & Palanisamy, 2013) have also confirmed this high level of reliance and interest on e-journals by scholars of all categories. It will be good if the authorities can focus more on lesser-used services in order to encourage and increase the use of all types of resources and services among the research community.

5.3. Purpose of use of web-based resources

Researchers use web services for different purposes. They may use it for knowledge enhancement, for teaching purposes, or doing research work. The investigator analyzed the frequency with which researchers use web services for their different requirements. Table No. 7 shows the university-wise analysis of purpose of use of web-based resources and services by the researchers in universities of Kerala.

Table 7

Purpose of use of web based resources (University wise)

Tools/services		Kerala University (N= 103)	MG University (N=97)	Calicut University (N=110)	Kannur University (N=99)
Study	Almost every day	84 (81.55)	81 (83.51)	89 (80.91)	83 (84.69)
	Twice in a week	14 (13.59)	10 (10.31)	12 (10.91)	8 (8.16)
	Once in a week	3 (2.91)	6 (6.19)	6 (5.45)	7 (7.14)
	Once in a month	2 (1.94)	-	3 (2.73)	-
	Never	-	-	-	-
Teaching	Almost every day	29 (28.16)	28 (30.93)	33 (30.00)	49 (50.00)
	Twice in a week	21 (20.39)	13 (13.40)	17 (15.45)	7 (7.14)
	Once in a week	14 (13.59)	12 (12.37)	12 (10.91)	6 (6.12)
	Once in a month	12 (11.65)	14 (14.43)	14 (12.73)	15 (15.31)
	Never	27 (26.21)	30 (30.93)	34 (30.91)	21 (21.43)
Research work	Almost every day	87 (84.47)	91 (93.81)	94 (85.45)	89 (90.82)
	Twice in a week	12 (11.65)	6 (6.19)	11 (10.00)	4 (4.08)
	Once in a week	2 (1.94)	-	3 (2.72)	4 (4.08)

	Once in a month	1 (.97)	-	1 (0.91)	-
	Never	1 (.97)	-	1 (0.91)	1 (1.02)
Writing Papers	Almost every day	55 (53.30)	49 (50.52)	55 (50.00)	40 (40.82)
	Twice in a week	18 (17.48)	15 (15.46)	19 (17.27)	12 (12.24)
	Once in a week	17 (16.50)	12 (12.37)	17 (15.45)	14 (14.14)
	Once in a month	10 (9.71)	19 (19.59)	13 (11.81)	19 (19.39)
	Never	3 (2.91)	2 (2.06)	6 (5.45)	13 (13.27)
Updating knowledge	Almost every day	61 (59.22)	68 (70.10)	68 (61.82)	82 (83.67)
	Twice in a week	14 (13.59)	13 (13.40)	13 (11.82)	7 (7.14)
	Once in a week	13 (12.62)	9 (9.28)	14 (12.73)	8 (8.16)
	Once in a month	7 (6.80)	5 (5.15)	8 (7.27)	1 (1.02)
	Never	8 (7.77)	2 (2.06)	7 (6.36)	-
Career advancement	Almost every day	36 (34.95)	38 (39.18)	42 (38.18)	44 (44.90)
	Twice in a week	19 (18.45)	15 (15.46)	14 (12.73)	18 (18.37)
	Once in a week	14 (13.59)	22 (22.68)	14 (12.73)	13 (13.27)
	Once in a month	21 (20.39)	8 (8.25)	17 (15.45)	12 (12.24)
	Never	13 (12.62)	14 (14.43)	23 (20.91)	11 (11.22)
Recreation	Almost every day	43 (41.75)	64 (65.98)	52 (47.27)	49 (50.00)
	Twice in a week	13 (12.62)	5 (5.15)	16 (14.55)	15 (15.31)
	Once in a week	9 (8.74)	5 (5.15)	7 (6.36)	6 (6.12)
	Once in a month	18 (17.48)	5 (5.15)	14 (12.73)	6 (6.12)
	Never	20 (19.41)	18 (18.56)	21 (19.09)	19 (19.39)
Others	Almost every day	2 (1.94)	3 (3.09)	3 (2.73)	2 (2.04)
	Twice in a week	1 (.97)	1 (1.03)	1 (0.91)	2 (2.04)
	Once in a week	5 (4.85)	1 (1.03)	4 (3.64)	2 (2.04)
	Once in a month	3 (2.91)	1 (1.03)	2 (1.82)	-
	Never	92 (89.32)	91 (93.81)	100 (90.91)	92 (93.88)

(Figures in brackets indicate respective percentage)

To understand the proportion in which web-based information is used for different purposes, information has been sought and collected from users and presented in Table No. 7. It is evident from the table that most of the scholars use web resources to aid in their research work, with 93.81 per cent of MG University scholars using it 'almost everyday' for their research work, followed by 90.82 per cent of Kannur University scholars, 85.45 per cent of Calicut University scholars, and 84.47 per cent of Kerala University scholars.

Scholars appear to rely heavily on web services for their study purposes as well, with Kannur University scholars topping the chart of every-day users at 84.69 per cent. They are followed by MG University scholars (83.51 per cent), then by Kerala University scholars (81.55 per cent), and finally by Calicut University scholars at 80.91 per cent. Reliance on web services for teaching appears to be comparatively low with highest percentage being from Kannur University (50.00 per cent), followed MG University (30.93 per cent), then Calicut University (30.00 per cent), and finally Kerala University scholars at 28.16 per cent.

About half the scholars are seen to use web information services 'almost everyday' for writing papers. 53.30 per cent of Kerala University scholars, 50.52 percent of MG University scholars, 50.00 per cent of Calicut university scholars, and 40.82 per cent of Kannur University scholars come under this category. Kannur University has the highest percentage (83.67 per cent) of scholars using these services for updating knowledge, followed by MG University which has 70.10 per cent. MG University has the highest percentage (65.98 per cent) of those who use these services for recreational purposes. The percentages of those who use web services for career advancement is rather low.

Subject-wise analysis of data regarding the purpose for which scholars use different web-based services is given in Table No. 8

Table 8

Purpose of use of web-based resources (Subject-wise)

Tools/services		Science	Arts	Social Science
Study	Almost every day	119 (86.86)	101 (75.37)	117 (85.40)
	Twice in a week	10 (7.30)	22 (16.42)	12 (8.76)
	Once in a week	8 (5.84)	6 (4.48)	8 (5.84)
	Once in a month	-	5 (3.73)	-
	Never	-	-	-
Teaching	Almost every day	39 (28.47)	51 (38.06)	49 (35.77)
	Twice in a week	18 (13.14)	18 (13.43)	22 (16.06)
	Once in a week	19 (13.87)	10 (7.46)	15 (10.95)
	Once in a month	22 (16.06)	13 (9.70)	20 (14.60)
	Never	39 (28.47)	42 (31.34)	31 (22.63)
Research work	Almost every day	129 (94.16)	114 (85.07)	118 (86.13)
	Twice in a week	2 (1.46)	14 (10.45)	10 (7.29)
	Once in a week	-	3 (2.24)	4 (2.92)
	Once in a month	-	2 (1.49)	-
	Never	2 (1.46)	1 (0.75)	-
Writing Papers	Almost every day	86 (62.77)	62 (46.27)	51 (37.23)
	Twice in a week	14 (10.22)	29 (21.64)	21 (15.33)
	Once in a week	13 (9.49)	12 (8.96)	35 (25.55)
	Once in a month	18 (13.14)	17 (12.69)	26 (18.98)
	Never	6 (4.38)	14 (10.45)	4 (2.92)
Current Awareness	Almost every day	101 (73.72)	92 (68.66)	86 (62.77)
	Twice in a week	14 (10.22)	11 (8.21)	22 (16.06)
	Once in a week	14 (10.22)	16 (11.94)	14 (10.22)
	Once in a month	7 (5.11)	8 (5.97)	6 (4.38)
	Never	1 (0.73)	7 (5.22)	9 (6.57)
Career advancement	Almost every day	68 (49.64)	52 (38.81)	40 (29.20)
	Twice in a week	27 (19.71)	20 (14.93)	19 (13.87)
	Once in a week	20 (14.60)	23 (17.16)	20 (14.60)
	Once in a month	16 (11.68)	17 (12.69)	25 (18.25)
	Never	6 (4.38)	22 (16.42)	33 (24.09)
Recreation	Almost every day	77 (56.20)	60 (44.78)	71 (51.82)
	Twice in a week	20 (14.60)	14 (10.45)	15 (10.95)
	Once in a week	13 (9.49)	9 (6.72)	5 (3.65)
	Once in a month	11 (8.03)	19 (14.18)	15 (10.95)
	Never	16 (11.38)	31 (23.13)	31 (22.63)
Others	Almost every day	5 (3.65)	2 (1.49)	3 (2.19)
	Twice in a week	-	4 (2.99)	1 (0.73)
	Once in a week	9 (6.57)	3 (2.24)	-
	Once in a month	1 (0.73)	5 (3.73)	-
	Never	122 (89.05)	120 (89.55)	133 (97.08)

(Figures in brackets indicate respective percentage)

Subject-wise analysis shows that an absolute majority of scholars use web information services for their research work on a daily basis as 94.16 per cent science scholars, 86.18 per cent social science scholars, and 85.07 per cent arts

scholars are seen to do so. Web services are extensively used for study purposes also because 86.86 per cent science scholars, 85.40 per cent social science scholars, and 75.37 per cent arts scholars are seen to rely on them for it.

A good percentage of researchers appear to use web services for writing papers on an everyday basis. The percentages are 62.77 per cent for science scholars, 46.27 per cent for arts scholars, and 37.23 per cent for social science scholars respectively. For teaching purposes, the dependence appears to be less because it is 38.81 per cent among arts scholars, 35.77 per cent among social science scholars and 29.20 per cent among science scholars. For career advancement also, reliance on web services is less than 50.00 per cent in all categories, though for recreation purposes, science scholars (56.20 per cent) and social science scholars (51.82 per cent) appear to have slightly higher interest in web-service use.

Hence, overall analysis shows that majority of scholars use web information services almost every day for their research purposes. University-wise analysis shows that a significant number of scholars use web services on a daily basis for their research work and it is comparatively high among MG University scholars. For study purposes, writing papers, and updating knowledge also, a significant percentage of them use web services. According to Firdaus & Haridasan (2015), a large majority of scholars use web services for their studies. Comparatively few scholars use it for teaching purposes. Subject-wise analysis shows that a large majority of science, arts and social science scholars use web resources and services 'almost everyday' for their study purposes and research work. Majority of science scholars always use web resources and services for writing papers and updating their knowledge. A fairly good number rely on these resources for career advancement also though the percentages are not very high.

5.4 Mode of access and extent of use of different web resources and services

It is the duty of a library to use the latest technology for information dissemination and make the various resources and services like e-resources, institutional repository, online library catalogue etc. available to the users. Through this particular section, the investigator analyzed different resources and services, its accessing method and usage pattern.

5.4.1 Preferable place to use web-based information services

Depending upon individual preferences and subject requirement, different people may prefer different locations to access information. Table No. 9 depicts the details about users' preferable places for accessing web-based information services.

Table 9

Preferable place to use web-based information services (University wise)

	UK (N= 103)	MGU N=97)	UC =110)	KU N=98)	Weighted mean	Rank
University Central Library	4.95	4.52	5.24	4.81	4.88	1
Department Library	3.97	0.83	4.29	3.93	3.25	3
Hostel	3.30	3.08	3.49	3.17	3.26	2
Department lab	2.45	2.31	2.57	2.36	2.42	4
Researchers room	1.70	1.57	1.76	1.56	1.65	5
Others	0.79	0.76	0.90	0.77	0.81	6

Table No. 9 indicates that a good number of users from all the universities prefer the University's central library for accessing and using web information resources. Calicut University scholars have a high level of preference for the university's central library (Mean=5.24), followed by Kerala University (Mean=4.95), then by Kannur University (Mean=4.81), and lastly by MG University (Mean=4.52). For scholars from University of Kerala, their second preference is for the department library (Mean=4.29) whereas for MG University scholars, department library (Mean=0.83) is their last preference. At the same time, a good number of scholars from all the universities prefer their hostels for accessing web information resources. Scholars from the University of Calicut top the chart (Mean=3.49) in the list, followed by Kerala University (Mean=3.30), then by Kannur University (Mean=3.17), and then by MG University (Mean=3.08). The department lab. is the next preferred location for users and in case of University of Calicut (Mean=2.57) scholars show a higher preference for it. Researchers' room is another preferred location for Calicut University scholars (Mean=1.76). Use of web information resources is very low in other places.

Subject-wise analysis of the preferable place for using web information services is shown in Table No. 10.

Table 10

Preferable place to use web-based information services (Subject-wise)

Place	Science	Arts	Social Science	Weighted mean	Rank
University Central Library	6.62	6.29	6.57	6.49	1.00
Department Library	5.48	6.14	5.44	5.69	3.00
Hostel	4.35	6.52	4.35	5.07	2.00
Department lab	3.26	6.38	3.26	4.30	4.00
Researchers room	2.19	6.67	2.19	3.68	5.00
Others	1.06	6.29	1.07	2.80	6.00

The analysis in Table No. 10 shows that research scholars from science discipline have the highest preference for university central library (Mean=6.62), followed by department library (Mean=5.48) and then hostel (Mean=4.35). Arts subject scholars appear to prefer hostel (Mean=6.52) above other locations, then university library (Mean=6.29) and then department library (Mean=6.14). Social science scholars' preference is first for their university central library (Mean= 6.57), then department library (Mean=5.44) and then hostel (Mean=4.35). It can be found that more number of scholars prefer university central library for using web information services (Mean=6.49) followed by department library (Mean=5.69) and hostel (Mean= 5.07). Researchers room got comparatively low mean value (Mean=3.68) and the amount of accessing of web services from 'other places' is quite negligible.

It is clear from the analysis that users give first preference to use web information services from the university central library and it is followed by department library except in the case of MG University. MG University scholars appear to give second preference to their hostel. It is clear from subject-wise analysis that science and social science scholars also prefer to access information from university central library, their second preference being department library. In the case of arts scholars, their choice appears to be the researchers' room followed by hostel.

5.4.2 Adequacy of devices to access web information services in University libraries

To enable the scholars to make full use of web information services, universities require a sufficient supply of appropriate digital devices in their libraries. Table No. 11 shows the adequacy of such devices in university libraries in Kerala.

Table 11

Adequacy of devices to access web information services in University (University wise)

Devices	Adequacy	UK (N= 103)	MGU (N=97)	UC (N=110)	KU (N=98)	Chi-square	p-value
Computers	Fully adequate	56 (54.37)	48 (49.48)	48 (43.64)	30 (30.61)	25.3	.001
	Adequate	23 (22.33)	38 (38.14)	35 (31.82)	47 (47.96)		
	Moderately adequate	15 (14.56)	7 (7.22)	17 (15.45)	12 (12.24)		
	Not adequate	6 (5.83)	4 (4.12)	8 (7.27)	4 (4.08)		
	No comments	3 (2.91)	1 (1.03)	2 (1.82)	5 (5.10)		
Laptops	Fully adequate	46 (44.66)	40 (41.24)	42 (38.18)	42 (42.86)	10.9	.535
	Adequate	21 (20.39)	25 (25.77)	25 (22.73)	20 (20.41)		
	Moderately adequate	10 (9.71)	12 (12.37)	8 (7.27)	4 (4.08)		
	Not adequate	17 (16.50)	16 (16.49)	23 (20.91)	20 (20.41)		
	No comments	9 (8.74)	4 (4.12)	12 (10.90)	12 (12.24)		
Scanners	Fully adequate	22 (21.36)	13 (13.40)	17 (15.45)	10 (10.20)	34.5	.001
	Adequate	16 (15.53)	25 (25.77)	18 (16.36)	19 (19.39)		
	Moderately adequate	9 (8.74)	25 (25.77)	16 (14.55)	31 (31.63)		
	Not adequate	49 (47.57)	29 (29.90)	52 (47.27)	26 (26.53)		
	No comments	7 (6.80)	5 (5.15)	7 (6.36)	12 (12.24)		
Printers	Fully adequate	25 (24.27)	16 (16.50)	20 (18.18)	13 (13.27)	27.8	.006
	Adequate	20 (19.42)	27 (27.84)	20 (18.18)	19 (19.39)		
	Moderately adequate	15 (14.56)	24 (24.74)	22 (20)	27 (27.55)		
	Not adequate	39 (37.86)	28 (28.87)	45 (40.91)	27 (27.55)		
	No comments	4 (3.88)	2 (2.06)	3 (2.73)	12 (12.24)		

(Figures in brackets indicate respective percentage)

Analysis

Analysis of the data presented in Table No. 11 shows the level of adequacy of technical devices necessary for using web-based resources on the campus. In the case of computers, 54.37 per cent scholars of Kerala University feel that its number is 'fully adequate' and 49.48 per cent of Mahatma Gandhi University scholars and 47.47 per cent of Kannur University scholars also feel so. A few scholars are of the opinion that they do not have sufficient number of computers. The chi-square test of desktops reveals significant difference (25.3 p=.001) among the respondents in university-wise analysis.

In the case of laptops, 44.66 per cent scholars of Kerala University are of the opinion that they get it 'fully adequately'. 43.43 per cent scholars of Kannur University are also of the same opinion. Only 38.18 per cent scholars of University of Calicut feel that they get laptops 'fully adequately'. A good number of scholars are of the opinion that laptop supply is not sufficient. The chi-square value (10.9 p=.535) shows that there is no significant difference among users in university-wise analysis of laptop availability.

In the case of printers and scanners, all the scholars are of the opinion that the number is not adequate. In Kerala University, only 21.36 per cent scholars feel that they have enough number of scanners and only 24.27 per cent feel that they have enough number of printers to make use of web information services. A good number (47.57 per cent) of Kerala University scholars and 47.27 per cent of Calicut University scholars feel that they do not have adequate number of scanners in their campuses. 40.91 per cent Calicut University scholars and 37.86 per cent Kerala University scholars are of the opinion that printers are not adequate in their campuses. Some scholars, however, have expressed no opinions on any of the physical infrastructure. A significant difference was revealed when chi-square was applied on these groups of scanners (34.5 p=.001) and printers (27.8 p=.006).

Subject-wise analysis of the adequacy of digital devices for using web information services in university libraries is given in Table No. 12.

Table 12

Adequacy of devices to access web information services in University libraries (Subject-wise)

Devices	Adequacy	Science	Arts	Social Science	Chi-square	p-value
Computers	Fully adequate	72 (52.55)	60 (44.78)	50 (36.50)	24.9	.002
	Adequate	43 (31.39)	43 (32.09)	57 (41.61)		
	Moderately adequate	15 (10.95)	12 (8.96)	24 (17.52)		
	Not adequate	7 (5.11)	10 (7.46)	5 (3.65)		
	No commence	1 (0.73)	9 (6.72)	1 (0.73)		
Laptops	Fully adequate	81 (59.12)	48 (35.82)	41 (29.93)	31.4	.000
	Adequate	27 (19.71)	29 (21.64)	35 (25.55)		
	Moderately adequate	4 (2.92)	14 (10.45)	16 (11.63)		
	Not adequate	15 (10.95)	30 (22.39)	31 (22.63)		
	No commence	10 (7.30)	13 (9.70)	14 (10.22)		
Scanners	Fully adequate	23 (16.79)	22 (16.42)	17 (12.41)	11.0	.203
	Adequate	32 (23.36)	23 (17.16)	17 (12.41)		
	Moderately adequate	29 (21.17)	30 (22.39)	22 (16.06)		
	Not adequate	47 (43.31)	50 (37.31)	59 (43.07)		
	No commence	6 (4.38)	9 (6.72)	16 (11.68)		
Printers	Fully adequate	31 (22.63)	23 (17.16)	20 (14.60)	13.2	.107
	Adequate	36 (26.28)	29 (21.64)	21 (15.33)		
	Moderately adequate	25 (18.25)	33 (24.63)	30 (21.90)		
	Not adequate	41 (29.93)	42 (31.34)	56 (40.88)		
	No commence	4 (2.92)	7 (5.22)	10 (7.30)		

(Figures in brackets indicate respective percentage)

Table No. 12 presents subject-wise analysis of the adequacy of digital devices in the universities in Kerala. 52.55 per cent science scholars, 44.78 per cent arts scholars and 36.50 per cent social science scholars feel that they have a 'fully adequate' supply of computers. The chi-square value of 24.9 and p value .002 shows that there exists a significant difference with respect to scholars of different universities. In the case of laptops, 59.12 per cent science scholars, 35.82 per cent arts scholars, and 29.93 per cent social science scholars feel that the supply is adequate. The chi-square value of 31.4 and p-value of zero indicate a significant difference in laptop availability among scholars of different subjects.

There seems to be quite a difference of opinion about the number of scanners necessary for satisfactory use because 16.79 per cent from science discipline, 16.42 percent from arts discipline and 12.41 per cent from social science discipline feel that there is adequate supply of scanners while 43.07 per cent social science scholars, 37.31 per cent arts scholars and 34.31 per cent science scholars feel that the number is insufficient.

It is the same about printers because 22.63 per cent science scholars, 17.16 per cent arts scholars and 14.60 per cent social science scholars feel that the number of printers is quite sufficient. But 40.88 per cent social science scholars, 29.93 per cent science scholars, and 31.34 per cent arts scholars feel that the number of printers is not adequate. The chi-square value of scanners (11 and p-value .203) and printers (chi-square value =13.2 and p-value =.107) show that there is no significant difference between the availability of these two in subject-wise analysis.

It is apparent through the above analyses that only computers are available in sufficient numbers in the selected universities. The overall analysis shows that half of Kerala University scholars have access to necessary number of computers. Compared to scholars of other universities, Kerala University scholars have better access to sufficient number of devices like laptops, scanners and printers. Overall, significant difference can be seen in the university-wise analysis of the sufficiency of computers, scanners and printers. Subject-wise analysis shows that more science scholars than scholars of other subjects are satisfied with the number of computers and laptops available for regular use. Coming to printers and scanners, only a slightly higher number of science scholars than the rest feel that they have an adequate supply of both devices. Subject-wise analysis shows that there is a significant difference of opinion on the availability of computers and laptops. In the case of availability of scanners and printers, no significant difference is seen.

5.4.3 Preferable device for using web information

There are a number of devices available to access web services. Table No. 13 provides the details of the medium preferred by the researchers to use web services.

Table 13

Preferable device for using web information (University wise)

Device	UK	MGU	UC	KU	Weighed Mean	Rank
Desktop	10.2	9.8	10.9	9.9	10.20	1
Laptop	7.65	7.28	7.28	7.42	7.41	2
Mobile Phone	5.2	4.85	4.85	4.95	4.96	3
Tablet	2.6	2.4	2.4	2.47	2.47	4

Table No. 13 shows the weighted mean score of the preferable device for using web information resources. The scholars of the University of Calicut (Mean=10.9) has the highest number who use the desktop for accessing web information followed by those of the University of Kerala (Mean=10.2), then by those of Kannur University (Mean=9.9) and then by MG University scholars (Mean=9.8). Next preference is laptop for Kerala University scholars (Mean= 7.65) followed by Kannur University scholars (Mean=7.42). Mobile phone is the device of third preference for scholars of Kerala University (Mean= 5.2), Kannur University (Mean=4.95) and both the MG and Calicut universities (Mean=4.85). The least-preferred device in the case of Kerala University scholars (Mean=2.6) is the tablet.

Subject-wise analysis of preferable devices for using web information services is given in Table No. 14

Table 14

Preferable device for using web information (Subject wise)

Device	Science	Arts	Social science	Weighed Mean	Rank
Desktop	0.25	13.5	13.7	9.15	1
Laptop	0.75	9.9	10.27	6.98	2
Mobile Phone	0.5	6.7	6.85	4.68	3
Tablet	1	3.37	3.42	2.60	4

Table No. 14 provides subject-wise analysis of preferable devices for using web information services. The analysis shows that science scholars prefer Tablet (Mean=1) highly, followed by laptop (Mean=0.75). In the case of arts scholars desktop is preferred by most (Mean=13.5), followed by laptop (Mean=9.9). In the case of social science scholars, the first preference is for desktop (Mean=13.7), followed by laptop (Mean=10.27). Their least-preferred device is the tablet (Mean=3.42).

Overall, the analysis shows that desktop is the most-favoured device among university scholars for making use of web information resources. Calicut University scholars top the list in using desktop computers and they are followed by Kerala University scholars. In the case of laptop, Kerala University scholars have more users for it, followed by Calicut University scholars. Tablet is the least-preferred device for most. Subject-wise analysis shows that science scholars prefer Tablet to other devices. For arts and social science scholars, desktop is the preferred device, followed by laptop, mobile phone and Tablet.

5.4.4 Time spent on using web information resources and services

Here the investigator made an attempt to study the time spent for using web information resources and services. Table No. 15 provides information on the time spent for using web information resources and services like Infonet, OPAC, databases etc. by researchers in the different universities of Kerala.

Table 15

Time spent on using web information resources and services (University-wise)

Time	UK	MGU	UC	KU
Below one hour	7 (6.70)	1 (1.03)	6 (5.45)	4 (4.08)
1-2 hour	5 (4.85)	11 (11.34)	13 (11.82)	11 (11.22)
More than 2-3 hour	26 (25.24)	12 (12.37)	23 (20.91)	13 (13.27)
More than 3-4 hour	21 (20.39)	19 (19.59)	23 (20.91)	9 (9.18)
More than 4 hours	44 (42.72)	54 (55.67)	45 (40.91)	61 (62.24)
Total	103	97	110	98
Chi-Square value=26.1		df=12		p=0.011

(Figures in brackets indicate respective percentage)

Table No. 15 contains the university-wise analysis of time spent for using web information resources. The categories are from less-than-one-hour to more-than-4-hours in a day. 62.24 per cent Kannur university scholars use web information resources and services for more than 4 hours, followed by 55.67 percent MG University scholars, 42.72 Kerala University scholars and finally by 40.91 per cent Calicut University scholars.

University-wise analysis also shows that 20.39 per cent Kerala University scholars and 20.91 per cent Calicut University scholars use web information resources and services for more than 3-4 hours in a day, while 25.24 Kerala University scholars and 20.91 Calicut University scholars use these for more than 2-3 hours. The percentage of Kerala university scholars who use these services for 1-2 hours is quite small, being only 4.85 per cent. The number of those who use web information resources and services for less than one hour is very low. The chi-square value of 26.1 and p value of 0.01 indicate that university-wise difference in the time spent for using web information resources and services is statistically significant.

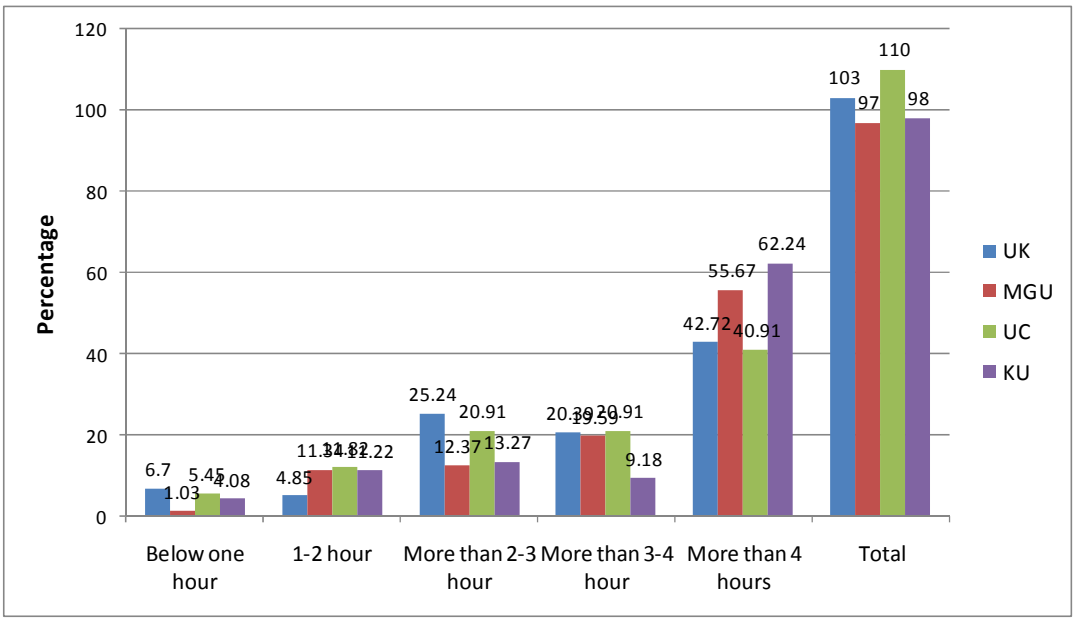

Figure 5

Time spent on using web information resources and services (University-wise)

Subject-wise analysis of the time spent for using web information resources and services is given below in Table No. 16

Table 16

Time spent on using web information resources and services (Subject-wise)

Time	Science	Arts	Social Science
Below one hour	1 (0.73)	13 (9.70)	4 (2.92)
1-2 hour	9 (6.57)	13 (9.70)	18 (13.14)
More than 2-3 hour	24 (17.52)	30 (22.39)	20 (14.59)
More than 3-4 hour	13 (9.49)	28 (20.89)	31 (22.63)
More than 4 hours	90 (65.69)	50 (37.31)	64 (46.72)
Chi-square value=38.0	df=8		p=0.000

(Figures in brackets indicate respective percentage)

Subject-wise analysis shows that a significant percentage (65.69 per cent) of science researchers uses web-based information resources and services for more than 4 hours a day. They are followed by social science scholars (46.72 per cent) and finally by arts scholars among whom the percentage (37.31 per cent) who spend that much time is quite low.

The percentage of those who spend up to more than 3-4 hours on using these services is lower, being 22.63 per cent of social science scholars, 20.89 per cent of arts scholars and 9.49 of science scholars. Coming to those who spend more than 2-3 hours on using them, it is lesser among social science scholars (14.59 per cent) but more among science scholars and arts scholars, being 17.52 per cent and 22.39 per cent respectively. The overall percentage of those who use these services for less than one hour is quite low, but among arts students, it is 9.70 per cent. The chi-square value of 38 and p-value zero indicate a significant difference between science, arts and social science scholars with respect to the time spent on using web information resources and services.

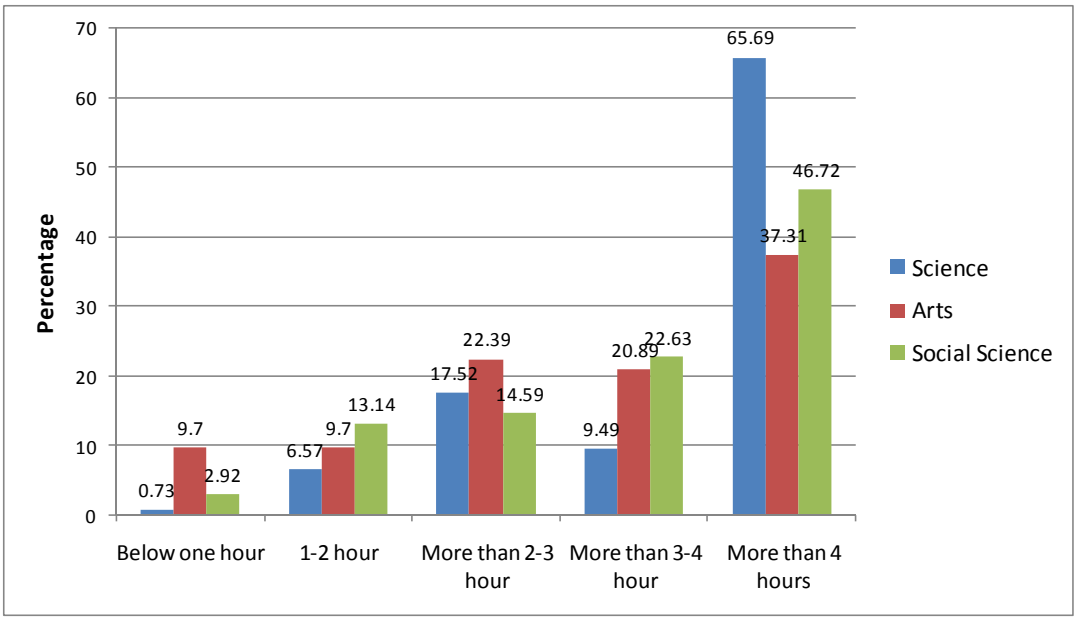

Figure 6

Time spent on using web information resources and services (Subject-wise)

It is seen from both university-wise and subject-wise analyses that a fairly high percentage of scholars use web information services for more than four hours. In university-wise analysis, a higher portion of Kannur University scholars are seen using web information resources and services for more than four hours, compared to those of other universities. In the case of more than 3-4 hours category, a higher percentage of Calicut University scholars are seen to stick to this time schedule than those of the other universities. In subject-wise analysis, most of the researchers of all faculties are seen using web information resources and services for more than four hours though more science scholars are seen doing so than the rest. Overall, it is clearly seen that most of the research scholars in Kerala are using web information resources and services for more than 3 hours. Both university-wise and subject-wise analyses reveal that there exists a significant difference among scholars in the case of time spent for using web information resources and services. In a study conducted by Swain (2010), it was found that a good number of scholars were using e-resources for more than four hours. This result shows that students are serious in their studies and research.

5.4.5 Use of web resources and services through library portal

Library portal acts as a gateway to the resources and services of the library. Use of the resources and services through this gateway is analyzed below.

Table 17

Use of web resources and services through the library portal (University-wise)

Information services/resources	UK	MGU	UC	KU
E-journal	100 (97.09)	91 (93.81)	107 (97.27)	83 (84.69)
E-books	86 (83.50)	80 (82.47)	97 (88.18)	73 (74.49)
Online databases	64 (62.14)	66 (68.04)	68 (61.81)	53 (54.08)
Institutional repository	39 (37.86)	32 (32.98)	43 (39.09)	31 (31.63)
ETD (Electronic thesis and dissertation)	64 (62.14)	66 (68.04)	72 (65.45)	46 (46.94)
Others	7 (6.80)	4 (4.12)	5 (4.55)	5 (5.10)

(Figures in brackets indicate respective percentage; this is a multiple answer question)

The services provided through the library portal and its use is discussed in Table No. 17. It is clear from the table that most of the respondents from all universities of Kerala are using e-journals through library portal. 97. 09 per cent of Kerala University scholars, 97.27 per cent of Calicut University scholars, 93.81 per cent of MG University scholars and 84.69 per cent of Kannur University scholars access e-journals via the university library portal. The percentages of e-books users are slightly less but still the average percentage comes to more than 82.00 per cent as Calicut University scholars have 88.18 per cent users, Kerala University has 83.50 per cent users and MG University has 82.47 per cent users, with only Kannur University having a slightly lower, 74.49 per cent users.

Majority of scholars from all the universities are seen to use ETDs, with the user percentages being 68.04 per cent for MG University 65.45 per cent for Calicut University, 62.14 per cent for Kerala University, and 46.94 per cent for Kannur University. The use of institutional repositories is comparatively less, with only an average of 35.00 per cent scholars relying on them.

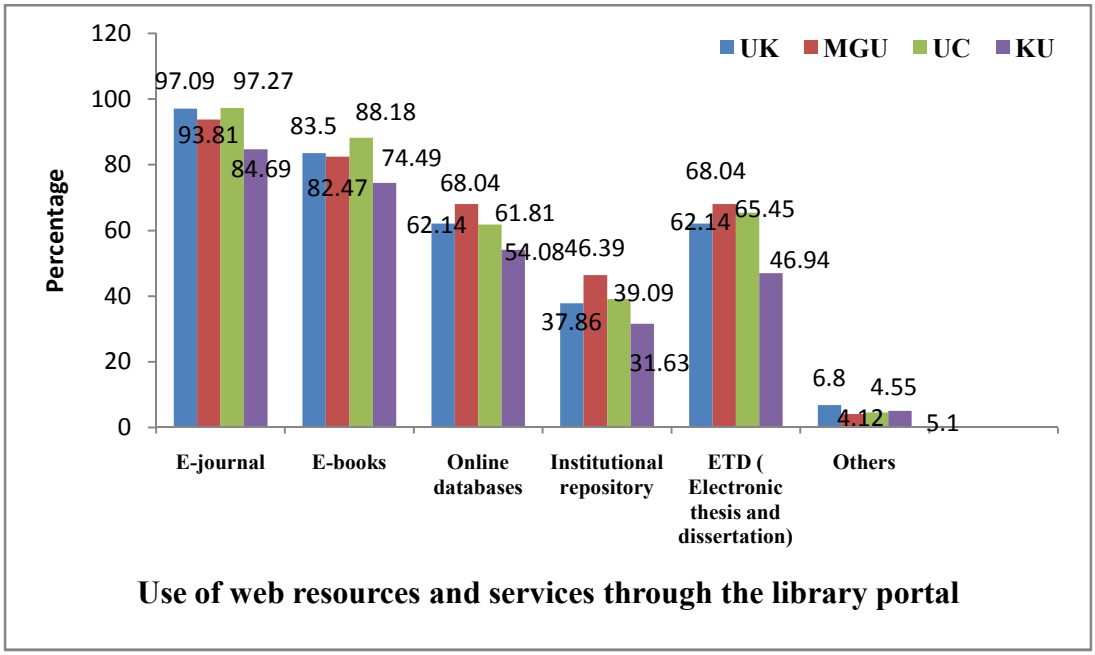

Figure 7

Use of web resources and services through the library portal (University wise)

Subject-wise analysis of data regarding the use of web resources and services through library portal is given in Table No. 18

Table 18

Use of web resources and services through the library portal (subject-wise)

Information resources/services	Science	Arts	Social Science
E-journal	126 (91.97)	127 (94.78)	128 (93.43)
E-books	117 (85.40)	107 (99.85)	112 (81.75)
Online databases	80 (58.39)	80 (59.70)	91 (66.42)
Institutional repository	59 (43.07)	46 (34.33)	53 (38.69)
ETD (Electronic thesis and dissertation)	80 (58.39)	67 (50.00)	101 (73.72)
Others	3 (2.19)	7 (5.22)	11 (8.03)

(Figures in brackets indicate respective percentage; this is a multiple answer question)

It is evident from the table that most scholars rely on e-journals than on other resources. Among arts scholars, the user percentage for e-journals is 94.78 per cent, followed by 93.43 per cent for social science scholars and 91.97 per cent for science scholars. In the case of e-books, 99.85 per cent of arts scholars use them and 85.40

per cent of science scholars use them, followed by 81.75 per cent of social science scholars. Reliance on databases is slightly less, with 66.42 per cent social science scholars using them and the user percentages of the other two groups being less than 60.00 per cent. Institutional repository is used by 43.07 per cent science, 34.33 per cent arts, and 38.69 per cent social science scholars. A significant percentage (73.72 per cent) of social science scholars rely on ETDs. Other resources are used by only a small number of scholars.

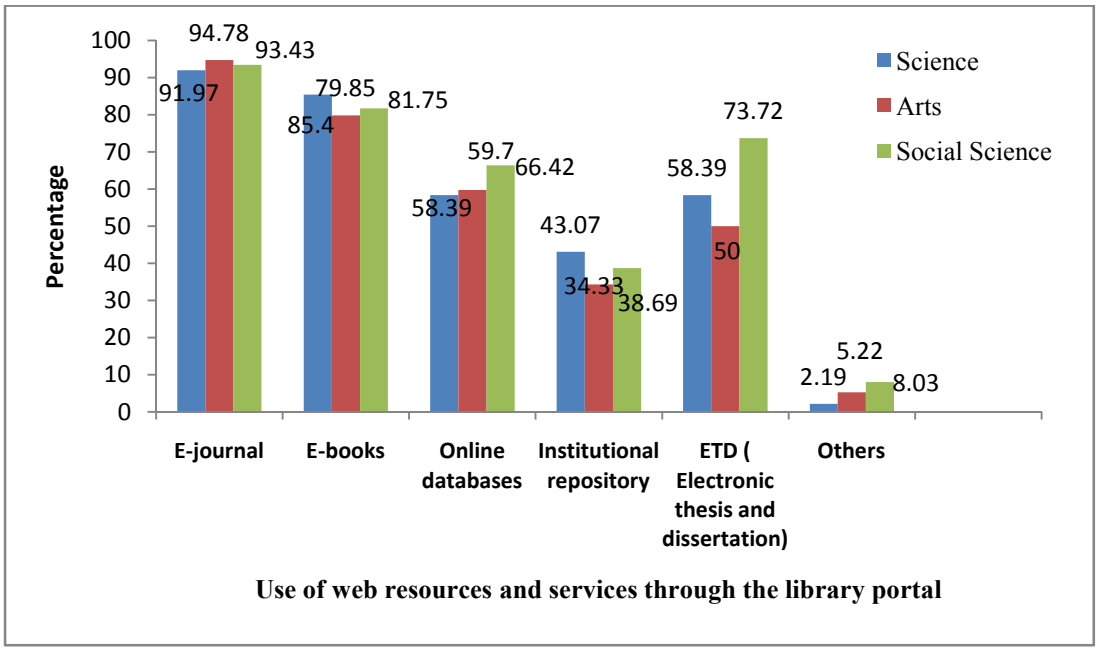

Figure 8

Use of web resources and services through the library portal (subject-wise)

Thus it is found that a good number of researchers in Kerala are using various information resources. University-wise analysis shows that e-journal is a source that scholars rely upon to a high extent. Studies have also confirmed that e-resources like e-journals and e-books are very popular among research scholars (Haridasan & Khan, 2009).

Calicut University scholars and Kerala University scholars are seen to rely on e-journals and e-books more than those of other universities. Online databases are also quite popular among scholars and its use is comparatively high among MG University scholars. Institutional repository is used in moderation by most and its use is seen to be comparatively higher among Calicut University scholars.

Use of ETDs is highest among MG University scholars and lowest among Kannur University scholars. Subject-wise analysis shows that reliance on e-journals and e-books is quite high and that arts scholars rely on this more than science scholars and social science scholars. Use of online database and ETDs is comparatively high among social science scholars. A good number of scholars also use institutional repository and science scholars seem to rely on it more than the rest.

5.4.6 Frequency of use of web-based information sources and services

Frequency of use of various web-based information sources and services in university libraries is discussed in Table No. 19. Assessment is made by calculating different categories of usages like daily, weekly, fortnightly, monthly, and quarterly.

Table 19
Frequency of use of web-based information sources and services (University wise)

Information sources	Frequency	UK	MGU	UC	KU
E-journal	Daily	50 (48.54)	63 (64.95)	51 (46.36)	56 (57.14)
	Weekly	34 (33.01)	20 (20.62)	36 (32.73)	21 (21.43)
	Fortnightly	6 (5.83)	2 (2.06)	4 (3.64)	1 (1.02)
	Monthly	5 (4.85)	10 (10.31)	10 (9.09)	7 (7.14)
	Quarterly	8 (7.77)	2 (2.06)	9 (8.18)	13 (13.27)
Total		103	97	110	98
E-books	Daily	35 (33.98)	35 (36.08)	33 (30.00)	26 (26.53)
	Weekly	39 (37.86)	34 (35.05)	50 (45.45)	43 (43.88)
	Fortnightly	8 (7.77)	8 (8.25)	7 (6.36)	-
	Monthly	9 (8.74)	6 (6.19)	11 (10.00)	8 (8.16)
	Quarterly	12 (11.65)	14 (14.43)	9 (8.18)	21 (21.43)
Total		103	97	110	98
Online databases	Daily	32 (31.07)	40 (41.24)	33 (30.00)	31 (31.63)
	Weekly	20 (19.42)	27 (27.84)	29 (26.36)	20 (20.41)
	Fortnightly	10 (9.71)	8 (8.25)	10 (9.09)	0
	Monthly	12 (11.65)	6 (6.19)	14 (12.73)	7 (7.14)
	Quarterly	29 (28.16)	16 (16.49)	24 (21.81)	40 (40.82)
Total		103	97	110	98
Institutional Repository	Daily	24 (23.30)	16 (16.49)	22 (20.00)	8 (8.16)
	Weekly	15 (14.56)	12 (12.37)	20 (18.18)	12 (12.24)
	Fortnightly	6 (5.83)	5 (5.15)	5 (4.55)	6 (6.12)
	Monthly	21 (20.39)	28 (28.87)	24 (21.81)	10 (10.20)
	Quarterly	37 (35.92)	36 (37.11)	39 (35.45)	62 (63.27)
Total		103	97	110	98
ETDs	Daily	13 (12.62)	14 (14.43)	12 (10.91)	14 (14.29)
	Weekly	6 (5.83)	24 (24.74)	15 (13.64)	14 (14.29)
	Fortnightly	8 (7.77)	9 (9.28)	6 (5.45)	2 (2.04)
	Monthly	23 (22.33)	16 (16.49)	28 (25.45)	9 (9.18)
	Quarterly	53 (51.46)	34 (35.05)	49 (44.55)	59 (60.20)
Total		103	97	110	98

(Figures in brackets indicate respective percentage)

Table No. 19 shows that 64.95 per cent of MG University scholars are using e-journals on a daily basis, followed by 57.14 per cent of Kannur University scholars, then by 48.54 per cent of Kerala University scholars and lastly by 46.36 per cent of Calicut University scholars. In the case of weekly use of e-books, Calicut University scholars top the list with 45.45 per cent in the weekly use of e-books. Kannur University scholars have 43.88 per cent of users in this category, Kerala University scholars have 37.86 per cent and MG University scholars have 35.05 per cent. 36.08 per cent MG University scholars are using e-books on a daily basis. A good number (41.24 per cent) of MG University scholars use online data bases every day while 40.82 per cent Kannur University scholars use it on a quarterly basis.

Daily use of IRs is rather low among scholars of all universities, with only 23.30 per cent of Kerala University scholars and 20 per cent of Calicut University scholars doing so. 63.27 per cent of Kannur University scholars, 37.11 per cent of MG University scholars, 35.92 per cent of Kerala University scholars, and 35.45 per cent of Calicut University scholars are using IRs on a quarterly basis. Daily reliance on ETDs is restricted to only a small percentage of scholars in all universities. Even weekly usage of ETDs is limited to 24.74 per cent of its scholars in MG University. 25.45 per cent Calicut University scholars and 22.33 per cent Kerala University scholars are using ETDs on a monthly basis. 59.60 per cent Kannur University scholars use these services quarterly.

Subject-wise analysis of frequency of use of web-based information sources and services is given in Table No. 20

Table 20

Frequency of use of web-based information sources and services (Subject-wise)

Information sources	Frequency	Science	Arts	Social Science
E-journal	Daily	95 (69.34)	60 (44.78)	66 (48.18)
	Weekly	31 (22.63)	40 (29.85)	40 (29.20)
	Fortnightly	0	8 (5.97)	5 (3.65)
	Monthly	3 (2.19)	10 (7.16)	19 (13.87)
	Quarterly	8 (5.84)	16 (11.94)	7 (5.11)
Total		137	134	137
E-books	Daily	66 (48.18)	43 (32.09)	37 (27.01)
	Weekly	40 (29.20)	51 (38.06)	58 (42.34)
	Fortnightly	8 (5.84)	7 (5.22)	8 (5.84)
	Monthly	7 (5.11)	14 (10.45)	13 (9.49)
	Quarterly	16 (11.68)	19 (14.18)	21 (15.33)
Total		137	134	137
Online databases	Daily	54 (39.42)	32 (26.87)	46 (33.58)
	Weekly	31 (22.63)	33 (24.63)	32 (23.36)
	Fortnightly	9 (6.57)	11 (8.21)	8 (5.84)
	Monthly	6 (4.38)	19 (14.18)	14 (10.22)
	Quarterly	37 (27.01)	35 (20.12)	37 (27.01)
Total		137	134	137
Institutional Repository	Daily	20 (4.59)	17 (12.69)	32 (23.36)
	Weekly	34 (24.82)	24 (17.91)	19 (13.87)
	Fortnightly	9 (6.57)	7 (5.22)	6 (4.38)
	Monthly	21 (15.33)	18 (13.43)	28 (20.44)
	Quarterly	53 (38.69)	68 (50.75)	52 (37.96)
Total		137	134	137
ETDs	Daily	21 (15.33)	12 (8.96)	21 (15.33)
	Weekly	27 (19.71)	15 (11.19)	19 (13.87)
	Fortnightly	7 (5.11)	11 (8.21)	7 (5.11)
	Monthly	31 (22.63)	20 (14.93)	24 (17.52)
	Quarterly	51 (37.23)	76 (56.72)	66 (48.18)
Total		137	134	137

(Figures in brackets indicate respective percentage)

Science scholars appear to rely on e-journals more because 69.34 per cent are seen using them on a daily basis while daily use among social science scholars and arts scholars are 48.18 per cent and 44.78 per cent respectively. 48.18 per cent science scholars use e-books daily while 42.34 per cent social science scholars use it weekly. Coming to databases, 39.42 per cent science scholars use them daily followed by 33.58 per cent social science scholars and 26.87 per cent arts scholars. In the case of institutional repository, its quarterly use appears to be fairly high. Half of the arts scholars (50.75 per cent) use institutional repository on a quarterly basis. The use of

ETDs is more on quarterly basis, with 55.97 per cent arts scholars, 48.18 per cent social science scholars and 37.23 per cent science scholars using them quarterly.

It can be seen from the above analysis that daily reliance on e-journals and e-books is quite high among scholars. University-wise analysis shows that though a higher percentage of MG University scholars are using e-journals on a daily basis, a significant number of scholars from Kerala, Calicut and Kannur universities are also doing so. Daily use of e-books is also more among MG University scholars than in the other universities. Weekly use of e-journals is comparatively high among Kerala University scholars. Weekly use of e-books is highest among Calicut University scholars. Daily use of online database is comparatively high among MG University scholars. Daily use of online databases is followed by its weekly and quarterly use. In the case of IRs, its daily use is comparatively high among Kerala University scholars and weekly use is high among Calicut University scholars. ETDs are used by a good number of MG University scholars on a weekly basis and by Kannur University scholars on a quarterly basis.

Subject-wise analysis shows that a significant percentage of science scholars are using e-journals, e-books, and online databases through library portals. In the case of IRs and ETDs, its weekly use is high among science scholars. Daily use of online databases also appears to be fairly widespread and it is also more among science scholars.

5.4.7 General information through the library portal

A library portal acts as a gateway to library services which include document delivery services and general information services. General information section gives information about the rules and regulations of the library. This particular question analyzed the general information provided by the university through the portal.

Table 21

General information through the library portal (University wise)

Services	UK	MGU	UC	KU
About the library	88 (85.44)	93 (95.88)	96 (87.27)	57 (58.16)
Postal Address	52 (50.49)	58 (59.79)	57 (51.82)	34 (34.69)
Contact number	59 (57.28)	57 (58.76)	61 (55.45)	35 (35.71)
Email IDs	69 (66.99)	61 (62.89)	66 (60.00)	33 (33.67)
Circulation Timing	63 (61.17)	51 (52.58)	63 (57.27)	27 (27.55)
Library Timing	79 (76.70)	62 (63.92)	79 (71.82)	47 (47.96)
Holidays	63 (61.17)	40 (41.24)	60 (54.55)	21 (21.43)
Membership	69 (66.99)	63 (64.95)	74 (67.27)	29 (29.59)
Borrowing privileges	43 (41.75)	45 (46.39)	50 (45.45)	14 (14.29)
General rules of library	53 (51.46)	54 (55.67)	61 (55.45)	43 (43.88)

(Figures in brackets indicate respective percentage; this is a multiple answer question)

Table No. 21 shows the general information services provided through libraries. It shows that information 'about the library' is given through all the library portals. 95.88 per cent of MG University scholars, 87.27 per cent of Calicut University scholars, 85.44 per cent of Kerala University scholars, and 58.16 per cent of Kannur University scholars have responded that their library portal is giving sufficient information 'about the library'. In the case of e-mail ID, more than 60 per cent scholars of Kerala, MG and Calicut universities confirm that it is available through the portal though only 33.67 per cent scholars of Kannur University say so.

Coming to library timing, majority of Kerala University scholars (76.70 per cent), 71.82 per cent of Calicut University scholars, and 63.92 per cent of MG University scholars are seen to get the information about 'library timing' through the library portal, though for Kannur University scholars the corresponding percentage is only 47.96 per cent. In the case of availing information about borrowing privileges, only

less than 50.00 per cent of scholars appear to get them through the portal as the user percentage is 41.73 per cent for Kerala University, 46.39 per cent for MG University and 45.45 per cent for Calicut University. The percentage in this case is way below in the case of Kannur University being only 14.14 per cent.

The analysis shows that about more than half of the users avail the general rules of the library through the library portal because the user percentages are 51.46 per cent for Kerala University, 55.67 per cent for MG University, 55.45 per cent for Calicut University and 43.43 per cent for Kannur University.

Subject-wise analysis of the general information available through the portal is illustrated in Table No. 22

Table 22

General information through the library portal (Subject-wise)

Services	Science	Arts	Social Science
About the library	105 (76.64)	108 (80.59)	119 (86.86)
Postal Address	74 (54.01)	48 (35.82)	77 (56.20)
Contact number	77 (56.20)	60 (44.78)	75 (54.74)
Email IDs	85 (62.04)	68 (50.75)	76 (55.47)
Circulation Timing	72 (52.55)	59 (44.03)	73 (53.28)
Library Timing	84 (61.31)	88 (65.67)	95 (69.34)
Holidays	56 (40.88)	61 (45.52)	67 (48.91)
Membership	74 (54.01)	84 (62.69)	77 (56.20)
Borrowing privileges	43 (31.39)	57 (42.54)	52 (37.96)
General rules of library	63 (45.99)	70 (52.24)	78 (56.93)

(Figures in brackets indicate respective percentage; this is a multiple answer question)

Subject-wise analysis of general information services through the library portal shows that most of the scholars know 'about the library' through the portal because 76.64 per cent science scholars, 80.59 per cent arts scholars and 86.86 per cent social science scholars get the information through this channel. More than half of the science scholars (54.01 per cent) and social science scholars (56.20 per cent) get the 'postal addresses' through the portal, while 56.20 per cent science scholars, 54.74 per cent social science scholars and 44.78 per cent arts scholars retrieve contact numbers the same way. For availing e-mail IDs, the portal appears to have come in handy for an average of about 56.00 per cent scholars of all disciplines.

Half of the (52.55 per cent) science scholars, 53.28 per cent of social science scholars, and 44.03 per cent of arts scholars know about the 'circulation timing', library 'holidays' etc. 54.01 per cent of science scholars and 56.20 per cent of social science scholars know about 'membership details'. A good number of scholars know about the 'borrowing privileges' of the library also. More than half of social science (56.93 per cent) and arts scholars (52.24 per cent), and almost half of (45.99 per cent) science scholars know about the 'general rules of the library'.

Altogether, it is evident from the analysis that researchers have sufficient knowledge of general information. University-wise analysis clearly shows that majority of MG University scholars have noticed 'about the library' compared to those of other universities. Other pieces of information like 'circulation timing, library timing, holidays and membership' have been availed through the portals more by Kerala University scholars than the rest. General information has been comparatively less noticed by Kannur University scholars. Subject-wise analysis also shows that most of the scholars have the awareness 'about the library', whatever their subject of study is.

5.4.8 Links in Library Portal

Some university library portals are providing links to some other websites which is useful for the student community. The links include UGC-Infonet, UPSA and PSC, shodganga and other websites.

Table 23

Links in Library Portal (University wise)

Links	UK	MGU	UC	KU
Yes	80 (77.67)	57 (58.76)	56 (50.91)	68 (68.39)
No	5 (4.85)	10 (10.31)	10 (9.09)	2 (2.04)
Don't know	18 (17.48)	30 (30.93)	44 (40)	28 (28.57)

(Figures in brackets indicate respective percentage)

Table No. 23 shows the results about the awareness of the external links provided through the library portal. The result shows that 77.67 per cent of Kerala University scholars know about these external links, followed by 68.39 per cent of Kannur University scholars. The percentages for MG University and Calicut University for the same are 58.76 per cent and 50.91 per cent respectively. On an average, less than 7.00 per cent do not seem to use the portal for these external links but a significant percentage apparently does not seem to know whether the library provides such links or not.

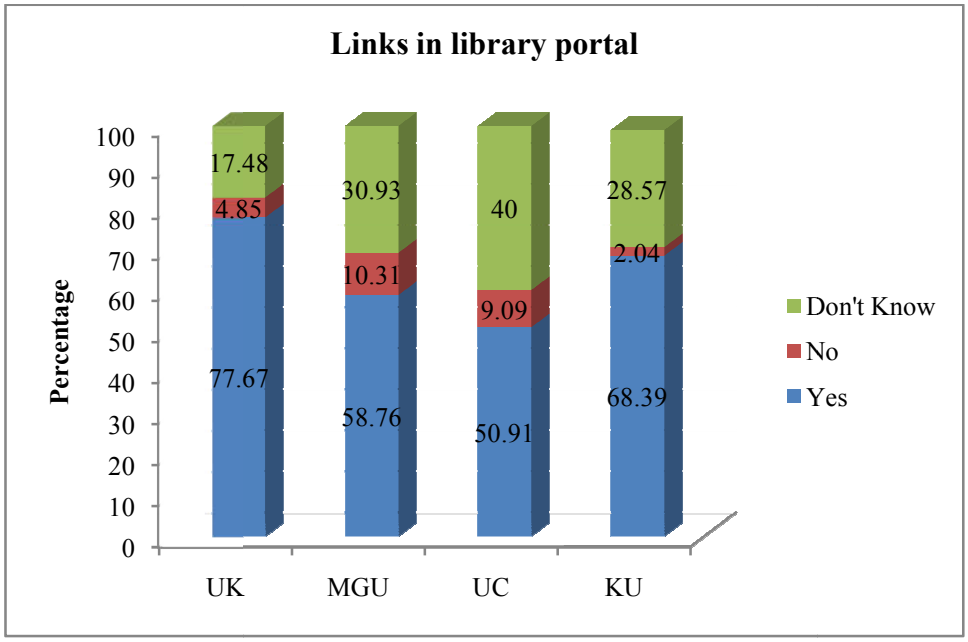

Figure 9

Links in library portal

Subject-wise analysis of links to the library portal is given in Table No. 24

Table 24

Links in Library Portal (Subject-wise)

Links	Science	Arts	Social Science
Yes	90 (65.69)	72 (53.73)	99 (72.26)
No	7 (5.10)	14 (10.44)	6 (4.37)
Don't know	40 (29.19)	48 (35.82)	32 (23.35)

(Figures in brackets indicate respective percentage)

Subject-wise analysis shows that a good per cent of scholars have awareness about the external inks available through the library portal. Majority of social science (72.26 per cent) scholars know about these links, followed by 65.69 per cent science and 53.73 per cent arts scholars. A small percentage like 5.10 per cent science scholars, 10.44 per cent arts scholars, and 4.37 per cent social science scholars do not use these external links. Nearly 30.00 per cent of researchers do not seem to know whether the library provides such links or not.

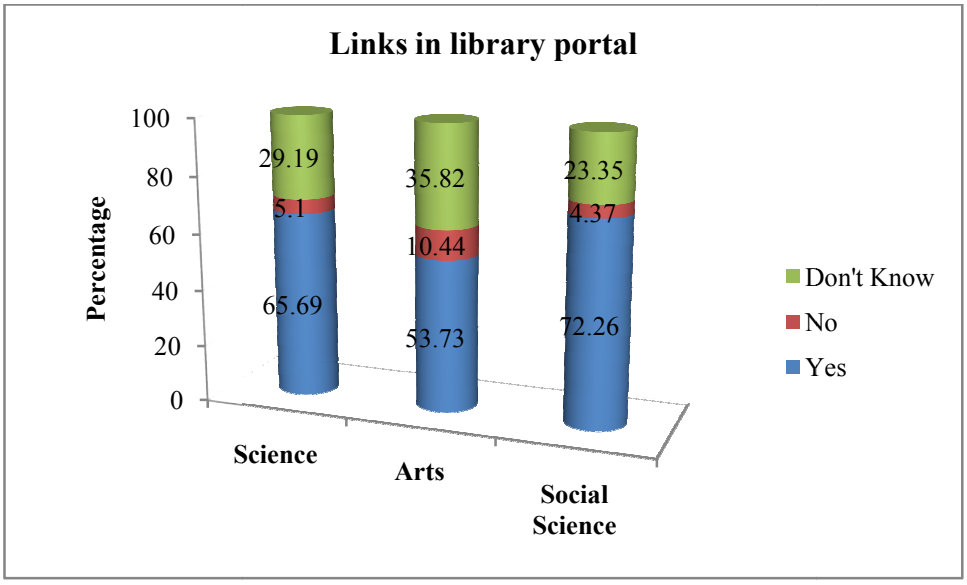

Figure 9

Links in library portal (Subject-wise)

Overall, the university library portal's providing of useful external links is noticed by majority of the scholars. University-wise analysis shows that Kerala University has the largest percentage of scholars who have the awareness of these links, compared to the rest. Subject-wise analysis shows that majority of science and social science scholars know about the availability of these external links than arts scholars.

5.4.8.1 External links to Library Portal

Links or hyperlinks are a connection from one web resource to another. Links allow users to navigate effortlessly from one page to another. These can also lead to other websites. Library portal provides many external links to the portal like educational supporting sites, job specific sites and so on. Table No. 25 shows responses of researchers regarding these useful external links.

Table 25

External Links in Library Portal (University wise)

Specific links	UK	MGU	UC	KU
Educational	76 (73.79)	50 (51.55)	69 (62.73)	26 (26.53)
Recreational	12 (11.65)	12 (12.37)	14 (12.73)	0
Job specific	15 (14.56)	15 (15.46)	15 (13.64)	4 (4.08)
Communication	20 (19.42)	11 (11.34)	17 (15.45)	6 (6.12)
Any other	6 (5.83)	1 (1.03)	5 (4.55)	0

(Figures in brackets indicate respective percentage)

The analysis in Table No. 25 shows that majority of (73.79 per cent) Kerala University scholars get the educational sites links through the library portal. 62.73 per cent of Calicut University scholars and 51.55 per cent of MG University scholars have also been of the same opinion. In the case of Kannur University students, the corresponding percentage is very low, being only 26 .53 per cent.

12.73 per cent of Calicut University scholars confirmed that they get the recreational sites but none of the Kannur University scholar responded positively to it. 15.46 per cent of MG University scholars, 14.56 per cent of Kerala University scholars and 13.64 per cent of Calicut University scholars have responded that they get job-specific site links. However, only 4.04 per cent of Kannur University scholars have responded that they get job specific sites. University-wise analysis also shows that 19.42 per cent of Kerala University scholars get links for communication. 15.45 per cent of Calicut University scholars and 11.34 per cent of MG University scholars also responded the same way.

Subject-wise analysis of external links provided in the library portal is given in Table No. 26

Table 26

External Links in Library Portal (Subject-wise)

Specific links	Science	Arts	Social science
Educational	71 (51.09)	60 (44.78)	91 (66.42)
Recreational	12 (8.76)	7 (5.22)	19 (13.87)
Job specific	14 (10.22)	19 (14.18)	16 (11.68)
Communication	12 (8.76)	22 (16.42)	20 (14.60)
Any other	8 (5.84)	2 (1.49)	2 (1.46)

(Figures in brackets indicate respective percentage)

The analysis in Table No. 26 reveals that 51.09 per cent science scholars, 44.78 per cent arts scholars and 66.42 per cent arts scholars get the educational link. Those who access job-specific links available through the library portal consists of only 10.22 per cent science scholars, 14.18 per cent arts scholars and 11.68 per cent social science scholars.

Overall, the analyses show that the external links available through the library portal are accessed by many scholars. University-wise analysis shows that a large majority

of scholars make use of links that support education while a lesser number of them make use of job-specific links. Compared to other universities, a higher percentage of Kerala University scholars gain access to educational links available through the portal. Subject-wise analysis shows that social science scholars have a larger percentage using external links which support education and lesser percentages of those who make use of job-specific and communication links.

5.4.9 Extent of use of Library portal

Library portal is the gateway to library services and resources. It helps the users in getting speedy access to library services. Here the researchers were asked as to what extent they use the library portal. The responses of the researchers are shown in Table No. 27.

Table 27

Extent of use of Library portal (University wise)

Extent of use	UK	MGU	UC	KU
To great extent	25 (24.27)	32 (32.98)	28 (25.45)	6 (6.12)
To large extent	16 (15.53)	23 (23.71)	17 (15.45)	14 (14.29)
To somewhat extent	24 (23.30)	14 (14.43)	21 (19.09)	33 (33.67)
To small extent	24 (23.30)	7 (7.22)	12 (10.90)	7 (7.14)
To very small extent	13 (12.62)	21 (21.65)	32 (29.09)	38 (38.78)
Chi-square value= 59.9		df=12		P=0.000

(Figures in brackets indicate respective percentage)

According to the analysis in Table No. 27, 32.98 per cent MG University scholars, 24.47 per cent Kerala University scholars and 25.45 per cent Calicut University scholars use the library portal to a 'great extent', though the user percentage of Kannur University scholars is way below at 6.12 per cent. 33.67 per cent Kannur University scholars and 23.30 per cent Kerala University scholars use the portal to 'somewhat extent', with the user percentages of the other two universities being less than 20.00 per cent.

In the case of MG University scholars, 23.71 per cent are using it to a 'large extent' and 21.65 per cent are using it to a 'very small extent'. Coming to Calicut University, 29.09 per cent scholars are using it to a 'very small extent'. 23.30 per cent Kerala University scholars using the portal to a 'small extent'. The chi-square value of 59.9 and p value zero shows that there is a significant difference among the researchers from different universities with respect to the extent of use of library portal.

Subject-wise analysis of the extent of use of library portal is given in Table No. 28

Table 28

Extent of use of Library portal (Subject-wise)

Extend of use	**Science**	**Arts**	**Social Science**
To great extent	21 (15.33)	33 (24.63)	38 (27.74)
To large extent	26 (18.98)	22 (16.42)	22 (16.06)
To somewhat extent	37 (27.01)	23 (17.16)	31 (22.63)
To small extent	13 (9.49)	10 (7.46)	16 (11.67)
To very small extent	40 (29.20)	46 (34.33)	30 (21.89)
Chi-square value= 13.4	df=8	P=0.099	

(Figures in brackets indicate respective percentage)

Subject-wise analysis of the extent of use of the library portal shows that 27.74 per cent social science scholars use the library portal to a 'great extent' followed by 24.63 per cent arts scholars and 15.33 per cent science scholars. 27.01 per cent science scholars, 22.63 per cent social science scholars and 17.16 per cent arts scholars use the library portal to 'somewhat extent'.

34.33 per cent arts scholars use the library portal to a very 'small extent' followed by 29.20 per cent science scholars and 21.89 per cent social science scholars. The chi-square value of 13.4 and p value 0.09 shows that there is no significant difference between science, arts and social science scholars with respect to the extent of use of the library portal.

Thus it is found that a good number of MG University scholars use the library portal to a 'great extent' than those of other universities in Kerala, followed by Calicut University scholars. However, a good number of Kannur University scholars use it to 'somewhat extent', followed by Kerala University scholars. Subject-wise analysis shows that social science scholars are ahead in using the library portal to a 'great extent' compared to scholars of other subjects. A good number of science scholars also use it to 'somewhat extent'. From the above interpretation it is clear that there is a significant difference in usage of the library portal in university-wise analysis. At the same time, subject-wise analysis produced p-value of 0.09 which indicate no significant association, since it is greater than 0.05.

5.4.10 Institutional repository resources

An institutional repository is an archive of digital collections of the intellectual output of an institution. It contains collections of articles, question papers, theses etc. The data regarding the use of collections from institutional repository is given in Table No. 29.

Table 29

Institutional repository resources (University wise)

IRs resources	UK	MGU	UC	KU
Question paper	51 (49.51)	33 (34.02)	56 (50.90)	26 (26.53)
Syllabi	56 (54.37)	39 (40.21)	50 (45.45)	29 (28.57)
Electronic thesis and dissertation	76 (73.79)	91 (93.81)	90 (81.82)	63 (64.29)
Seminar paper	58 (56.31)	38 (39.18)	50 (45.45)	55 (56.12)
Articles	53 (51.46)	35 (36.08)	46 (41.82)	39 (39.80)
Others	10 (9.71)	4 (4.12)	10 (9.09)	6 (6.12)

(Figures in brackets indicate respective percentage; this is a multiple answer question)

Analysis of the data presented in Table 29 shows that majority of the researchers are using electronic thesis and dissertation. These two appear to be the most popular institutional repository resource with 93.81 per cent MG University scholars, 81.82 per cent Calicut University scholars, 73.79 per cent Kerala University scholars, and 64.29 per cent Kannur University scholars using them. Articles appear to be rather popular among Kerala University scholars (51.46 per cent) and a good percentage also uses seminar papers (56.31 per cent). In the case of question papers, 50.90 per cent Calicut University scholars obtain it through IRs and it is seen that 54.37 per cent Kerala University scholars get various course syllabi through institutional repositories.

Subject-wise analysis of data regarding the availability of various resources through the institutional repository is given in Table No. 30

Table 30

Institutional repository resources (Subject-wise)

IRs resources	Science	Arts	Social science
Question paper	56 (40.88)	53 (39.55)	57 (41.61)
Syllabi	62 (45.26)	58 (43.28)	53 (36.69)
Electronic thesis and dissertation	105 (76.46)	99 (73.88)	116 (84.67)
Seminar paper	71 (51.82)	58 (43.28)	72 (52.55)
Articles	70 (51.09)	48 (35.82)	55 (40.15)
Others	13 (9.49)	10 (7.46)	7 (5.11)

(Figures in brackets indicate respective percentage; this is a multiple answer question)

Table No. 30 illustrates that 76.46 per cent science scholars know about the availability of electronic theses and dissertations and 51.82 per cent know about seminar papers. 73.88 per cent arts scholars appear to know about the availability of ETDs through institutional repository. Most of the social science scholars (84.67 per

cent) know about electronic theses and dissertations and 52.55 per cent social science scholars know about seminar papers through IRs.

Thus from the tables we get an idea about the different types of IR resources used by the scholars of different universities in Kerala. About half of the Calicut University scholars use IRs for question papers. Among the rest, syllabi use is high among Kerala University scholars. Overall, a significant majority of scholars are using ETDs but its use is comparatively high among MG University scholars. In the case of seminar papers and articles, they are more used by Kerala University scholars. In the case of social science scholars, more scholars are using question papers, ETDs and seminar papers. Use of articles and syllabi are comparatively high among science scholars. Altogether, the analysis indicates that ETDs are the most-used resource availed through IRs.

5.4.11 Frequency of use of resources through IRs

Table No. 33 shows the frequency of use of institutional repository resources like ETDs, question papers etc. by researchers in the universities of Kerala.

Table 31

Frequency of use of resources through IRs (University wise)

Resources	Frequency	UK	MGU	CU	KU
Electronic theses and dissertation	Always	32(31.07)	40(41.24)	34(30.91)	20(20.41)
	Very often	26(25.24)	34(35.05)	26(23.64)	20(21.41)
	Sometimes	25(24.27)	16(16.49)	34(30.91)	29(29.59)
	Rarely	17(16.50)	3 (3.09)	11(10.00)	4 (4.08)
	Never	3 (2.91)	4 (4.12)	5 (4.55)	25(25.51)
Total		103	97	110	98
Articles	Always	38(36.89)	55(56.70)	39(35.45)	31(31.61)
	Very often	25(24.27)	18(18.56)	24(21.82)	20(20.20)
	Sometimes	15(14.56)	5 (5.15)	20(18.18)	14(14.29)
	Rarely	16(15.53)	4 (4.12)	13(11.82)	4 (4.08)
	Never	9 (8.74)	15(15.46)	14(12.73)	30(30.61)
Total		103	97	110	98
Seminar paper	Always	29(28.16)	21(21.65)	26(23.64)	12(12.24)
	Very often	27(26.21)	22(22.68)	22(20.00)	16(16.33)
	Sometimes	14(13.59)	22(22.68)	16(14.55)	22(22.45)

	Rarely	17(16.50)	10(10.31)	25(22.73)	12(12.24)
	Never	16(15.53)	22(22.68)	21(19.09)	36(36.73)
Total		103	97	110	98
Question paper	Always	14(13.59)	12(12.37)	11(10.00)	10(10.20)
	Very often	19(18.45)	7 (7.22)	18(16.36)	7 (7.14)
	Sometimes	25(24.27)	23(23.71)	24(21.82)	20(20.41)
	Rarely	35(33.98)	26(26.80)	40(36.36)	20(20.40)
	Never	10 (9.71)	29(29.90)	17(15.45)	41(41.84)
Total		103	97	110	98
Syllabus	Always	10 (9.71)	11(11.34)	8 (7.27)	8 (8.16)
	Very often	24(23.30)	7 (7.22)	20(18.18)	11(11.22)
	Sometimes	25(24.27)	25(25.77)	21(19.09)	22(22.45)
	Rarely	29(28.16)	27(27.84)	34(30.91)	16(16.33)
	Never	15(14.56)	27(27.84)	27(24.55)	41(41.84)
Total		103	97	110	98
Others	Always	6 (5.83)	3 (3.09)	5 (4.55)	-
	Very often	3 (2.91)	-	4 (3.64)	2 (2.04)
	Sometimes	9 (8.74)	6 (6.19)	7 (6.36)	6 (6.12)
	Rarely	9 (8.74)	11(11.34)	12(10.91)	4 (4.08)
	Never	76(73.79)	77(79.38)	82(74.55)	86(87.76)
Total		103	97	110	98

(Figures in brackets indicate respective percentage)

Table No.31 illustrates the frequency of use of major IR resources like question papers, electronic theses and dissertations, syllabi and so on by the researchers of various universities in Kerala. Electronic theses and dissertations appear to be the most commonly-used resources through the IRs.

University-wise analysis reveals that 41.24 per cent MG University scholars 'always' use electronic theses and dissertations from IRs. More than half of MG University scholars (56.70per cent) 'always' use articles. A good number of scholars from other selected universities also use 'articles' through IRs. 28.16 per cent Kerala University scholars 'always' obtain seminar papers from the IRs. In the case of question paper collections, 36.36 per cent Calicut University scholars and 33.98 per cent Kerala University scholars 'rarely' access them. In Calicut University, 30.91 per cent scholars 'rarely' make use of syllabi and they are followed by 28.16 per cent Kerala University scholars.

Subject-wise analysis of the frequency of use of resources through institutional repository is given in Table No. 32

Table 32

Frequency of use of resources through IRs (Subject-wise)

Resources	Frequency	Science	Arts	Social Science
Electronic theses and dissertation	Always	49 (10.95)	40 (29.85)	37 (27.01)
	Very often	29 (21.17)	31 (23.13)	46 (33.58)
	Sometimes	38 (27.74)	31 (23.13)	35 (25.55)
	Rarely	6 (4.38)	16 (11.94)	13 (9.49)
	Never	15 (10.95)	16 (11.94)	6 (4.38)
Total		**137**	**134**	**137**
Articles	Always	74 (54.01)	43 (32.09)	45 (32.85)
	Very often	20 (14.60)	32 (23.88)	35 (25.55)
	Sometimes	20 (14.60)	18 (13.43)	16 (11.68)
	Rarely	3 (2.19)	17 (12.69)	17 (12.41)
	Never	20 (14.60)	24 (17.91)	24 (17.52)
Total		**137**	**134**	**137**
Seminar paper	Always	39 (28.47)	24 (17.91)	25 (18.25)
	Very often	24 (17.52)	24 (17.91)	39 (28.47)
	Sometimes	29 (21.17)	26 (19.40)	19 (13.87)
	Rarely	17 (12.41)	24 (17.91)	23 (16.79)
	Never	28 (20.44)	36 (26.87)	31 (22.63)
Total		**137**	**134**	**137**
Question paper	Always	21 (15.33)	3 (2.24)	26 (18.98)
	Very often	14 (10.22)	27 (20.15)	11 (8.03)
	Sometimes	31 (22.63)	24 (17.91)	34 (24.82)
	Rarely	38 (27.74)	38 (28.36)	44 (32.12)
	Never	33 (24.09)	42 (31.34)	22 (16.06)
Total		**137**	**134**	**137**
Syllabus	Always	19 (13.87)	3 (2.24)	16 (11.68)
	Very often	12 (8.76)	26 (19.40)	27 (19.71)
	Sometimes	40 (29.20)	25 (18.66)	25 (18.25)
	Rarely	29 (21.17)	39 (29.10)	37 (27.01)
	Never	37 (27.01)	41 (30.60)	32 (23.36)
Total		**137**	**134**	**137**
Others	Always	5 (3.65)	2 (1.49)	9 (6.57)
	Very often	4 (2.92)	2 (1.49)	4 (2.92)
	Sometimes	10 (7.30)	9 (6.72)	5 (3.65)
	Rarely	8 (5.84)	14 (10.45)	14 (10.22)
	Never	110 (80.29)	107 (79.85)	105 (76.64)
Total		**137**	**134**	**137**

(Figures in brackets indicate respective percentage)

Subject-wise analysis shows that 29.85 per cent arts scholars and 27.01 per cent social science scholars are 'always' using electronic theses and dissertations but only

10.95 science scholars are doing so. 27.74 per cent science scholars, 23.13 per cent arts scholars and 25.55 per cent social science scholars use electronic theses and dissertations 'sometimes'. There are also those who never access electronic thesis and dissertation through IRs.

About half of the science scholars (54.01 per cent) are seen to 'always' use articles through IRs. 32.09 per cent arts scholars and 32.85 per cent social science scholars also fall in the same category. There are also scholars who never search for articles through IRs. A good number of scholars make use of institutional repositories for finding seminar papers (28.47 per cent science scholars, 17.91 per cent arts scholars and 18.25social science scholars).

In the case of question papers, 27.74 per cent science scholars, 28.36 per cent arts scholars and 32.12 per cent social science scholars 'rarely' search for them. 28.47 per cent science scholars 'sometimes' use IRs to find syllabi while 29.10 per cent arts scholars and 27.01 per cent social science scholars 'rarely' use IRs for the same purpose.

Overall analysis demonstrates that institutional repository use is comparatively low among scholars. University-wise analysis shows that a good number of scholars 'always' use ETDs and it is comparatively high among the scholars of MG University, followed by those of Kerala and Calicut universities. More than half of MG University scholars (56.70per cent) 'always' use articles. A good number of scholars from other selected universities also use articles through IRs. Other resources like seminar papers, question papers etc. are comparatively less used by scholars and a good number of scholars 'rarely' use question papers and syllabi. Subject-wise analysis shows that use of ETDs is comparatively high among arts scholars. A good number of science scholars 'always' use articles, seminar papers etc. compared to other subject scholars.

It is clearly seen that the frequency of visit to institutional repositories depends on its collections and maintenance. It appears that latest and up-to-date collections are not properly maintained in the selected libraries. Proper maintenance of latest

collections and creating awareness of it among respondents will lead to better use of institutional repositories among scholars.

5.4.12 Extent of Use of Institutional Repository

Researchers were asked to state their opinion regarding the extent of use of IRs and the choices given were great extent, large extent, somewhat extent, small extent and a very small extent. The details are given in Table No. 33

Table 33

Extent of Use of Institutional Repository (University wise)

Extent of Use	UK (N=103)	MGU (N=97)	UC (N=110)	KU (N=98)
To great extent	13 (12.62)	36 (37.11)	19 (17.27)	8 (8.16)
To large extent	29 (28.16)	28 (28.87)	27 (24.55)	16 (16.33)
To somewhat extent	20 (19.42)	13 (13.40)	16 (14.55)	33 (33.67)
To small extent	23 (22.33)	12 (12.37)	24 (21.82)	13 (13.27)
To a very small extent	18 (17.48)	8 (8.25)	24 (21.82)	28 (28.57)
Chi-square value=58.6		df=12		p=0.000

(Figures in brackets indicate respective percentage)

Table No. 33 clearly shows that 37.11 per cent MG University scholars use institutional repositories to a 'great extent'. 28.16 per cent Kerala University scholars use them to a 'large extent'. 24.55 per cent Calicut University scholars also use IRs to a 'large extent'. 28.57 per cent Kannur University scholars and 21.82 per cent Calicut University scholars use them to a 'very small extent'.

The chi-square value of 58.6 and p value zero indicate that there is a significant difference between the scholars of selected universities with respect to the extent of use of institutional repository.

Subject-wise analysis of the extent of use of institutional repository is given in Table No. 34

Table 34

Extent of Use of Institutional Repository (Subject-wise)

Extent of Use	Science (N=137)	Arts (N=134)	Social science (N=137)
To great extent	20 (14.60)	28 (14.60)	28 (20.44)
To large extent	38 (27.74)	28 (14.60)	34 (24.82)
To somewhat extent	31 (22.63)	26 (22.63)	25 (18.25)
To small extent	24 (17.52)	21 (17.52)	27 (19.71)
To a very small extent	24 (17.72)	31 (23.13)	23 (16.79)
Chi-square value= 6.14		df=8	p=0.632

(Figures in brackets indicate respective percentage)

Table No. 34 reveals that 20.44 per cent social science scholars use institutional repository to a 'great extent'. 27.74 per cent science scholars use IR to a 'large extent'. 22.63 per cent science and arts scholars use institutional repository to 'somewhat extent'. 17.72 per cent science scholars, 17.52 per cent arts scholars and 16.79 per cent social science scholars use it to a 'very small extent'. The chi-square value of 6.14 and p value 0.632 shows that there is no significant difference between the science, arts and social science scholars with respect to the extent of use of institutional repository.

It is seen that institutional repository use is of medium level among the researchers of different universities of Kerala. MG University researchers use institutional repository 'to great extent' compared to other universities, followed by Calicut University scholars. Kannur University scholars use IR to a 'very small extent'. A higher number of social science scholars use IR to a 'great extent' than science scholars and arts scholars. A good number of science scholars use it to a 'large extent'. The chi-square value and p-value of zero indicate that there is a significant difference among the universities in IR use. Since the p-value is .632, it can be assessed that the association between the extent of use of IRs and discipline is statistically non-significant at the level of 0.05.

5.4.13 Availability of E-resources through the UGC-INFONET Consortium

Changes are taking place very fast nowadays in the modes of education and application of academic curricula. Sharing of library resources is the best practice in the academic community to overcome these challenges. The UGC-infonet digital library consortium is an ambitious program of UGC to facilitate free access to resources for majority of universities in the country. All universities under the study come under the UGC-Infonet consortium. Data obtained from the researchers regarding the availability of e-resources is analyzed in this section.

Table 35

Availability of E-resources through the UGC-INFONET Consortium (University wise)

E-resources	UK	MGU	UC	KU
E-journal	96 (93.2)	97 (100)	107 (97.27)	83 (82.65)
E-book	77 (74.76)	69 (71.13)	98 (89.09)	51 (52.04)
Full text Databases	50 (48.54)	51 (52.58)	56 (50.90)	35 (35.71)
Bibliographic databases	61 (59.22)	47 (48.45)	89 (80.90)	16 (16.33)
others	3 (2.91)	3 (3.09)	4 (3.64)	2 (2.04)

(Figures in brackets indicate respective percentage; this is a multiple answer question)

Table No. 35 shows the availability of e-resources in the universities. All scholars from MG University opined that they get the e-journals through UGC-Infonet consortium. A high percentage of Calicut University (97.27%) and Kerala University scholars (93.2 per cent), and 82.65 per cent Kannur University scholars also access e-journals the same way. 89.09 per cent Calicut University scholars get e-books through the consortium. A significant percentage of Kerala University (74.76 per cent) scholars and MG University scholars (71.13 per cent) also access e-books through the consortium.

About half of the scholars of MG University (52.58 per cent), 50.90 per cent scholars of Calicut University, and 48.54 per cent scholars of Kerala University say

that full text databases are available to them. But only 35.71 per cent of Kannur University scholars say that they get access to full text databases. Majority of (80.90 per cent) Calicut University scholars avail bibliographic databases through the consortium. Only 16.33 per cent Kannur University scholars responded positively to bibliographic databases availability.

Subject-wise analysis of data regarding availability of e-resources through the UGC-Infonet consortium is given in Table 36

Table 36

Availability of E-resources through the UGC-INFONET Consortium (Subject-wise)

E-resources	Science	Arts	Social science
E-journal	123 (89.78)	123 (91.79)	135 (98.54)
E-book	98 (71.53)	101 (75.37)	96 (70.07)
Full text Databases	68 (49.64)	50 (37.31)	74 (54.01)
Bibliographic databases	72 (52.55)	59 (44.03)	82 (59.85)
others	1 (0.73)	6 (4.48)	5 (3.65)

(Figures in brackets indicate respective percentage; this is a multiple answer question)

It is clear from the table that majority of the scholars of these three subjects know about the availability of e-journals (89.78 per cent science, 91.79 per cent Arts and 98.54 per cent social science). E-books are the next available e-resources through the UGC-Infonet consortium. 75.37 per cent arts scholars use e-books followed by 71.53 per cent science and 70.07 per cent social science scholars. 54.01 per cent and 59.85 per cent social science scholars use full text and bibliographic databases respectively. 49.64 per cent and 52.55 per cent science scholars also use full text and bibliographic databases respectively.

It is evident from the above discussion that the main resource used through the UGC-Infonet is the e-journal service. University-wise analysis shows that all MG University scholars use e-journal services. Most of the scholars of Kerala, Calicut

and Kannur universities also use e-journals. E-journal use is followed by e-book use. Calicut University scholars use e-books more than those of other universities. 52.58 per cent MG University scholars use full text databases. Bibliographic database use is comparatively high among Calicut University scholars. Subject-wise analysis shows that a very high percentage of social science scholars (98.54 per cent) use e-journals. This user percentage is very much higher than in the case of scholars of other subjects. Arts scholars use e-books more than those of other disciplines. Overall, the use of bibliographic and full text databases is on the average though it is comparatively high among social science scholars.

5.4.14 Use of different e-resources

UGC-Infonet provides full text and bibliographic databases for academic fraternity. This particular question analyzed the level of use of different e-resources.

Table 37

Use of different e-resources (University wise)

E-resources	UK	MGU	UC	KU
ACS Publication	87 (84.47)	54 (55.67)	84 (76.36)	86 (87.76)
AIP (American Institute of physics)	94 (91.26)	71 (73.20)	92 (83.64)	86 (87.75)
Annual reviews	59 (57.28)	67 (69.07)	80 (72.72)	71 (72.44)
APS Physics	79 (76.70)	76 (78.35)	90 (81.81)	76 (77.55)
Cambridge Journal	61 (59.22)	65 (67.01)	68 (61.82)	72 (73.47)
Economic and political weekly	61 (59.22)	71 (73.20)	66 (60.00)	66 (67.35)
Emerald	73 (70.87)	72 (74.23)	92 (83.63)	75 (76.53)
ISID	72 (69.90)	83 (85.57)	82 (74.55)	83 (84.69)
JSTOR	50 (48.54)	43 (44.33)	48 (43.64)	66 (67.35)
OXFORD Journal	61 (59.22)	52 (53.61)	57 (51.82)	70 (71.43)
Project Euclid	74 (71.84)	84 (86.60)	85 (77.27)	96 (97.96)
Science Direct	73 (70.87)	39 (40.21)	73 (66.36)	60 (61.22)
Springer link	62 (60.19)	48 (49.48)	66 (60.00)	48 (48.98)
Taylor and Francis	73 (70.87)	47 (48.45)	73 (66.36)	66 (67.35)
ISI web of knoweledge	92 (89.32)	85 (87.63)	96 (87.27)	88 (89.79)
Jgate	94 (91.26)	92 (94.85)	100 (90.91)	89 (90.81)
Other	82 (79.61)	81 (83.51)	88 (80.00)	80 (81.63)

(Figures in brackets indicate respective percentage; this is a multiple answer question)

Table No. 37 shows that majority of scholars from all the universities use different types of e-resources. 87.76 per cent Kannur University scholars use ACS publication

followed by 84.47 per cent Kerala University scholars and 76.36 per cent Calicut University scholars. AIP is used by 91.26 per cent Kerala University scholars followed by 83.64 percent Calicut University scholars. Majority of Calicut University (72.72 per cent) and Kannur University (72.44 per cent) scholars are seen using Annual reviews. 73.47 percent Kannur University scholars use Cambridge journal and 73.20 percent MG University scholars use EPW.

83.63 percent Calicut University scholars are seen using Emerald while 67.35 per cent Kannur University scholars use JSTOR. Majority of Kannur University scholars (72.72 per cent) utilize OXFORD Journal and 97.96 per cent Kannur University scholars use Project Euclid. About 60 percent of both Kerala and Calicut University scholars use Springer link and 70.87 per cent Kerala University scholars use Taylor and Francis. Majority of scholars use ISI web of knowledge and more than 90 per cent scholars are seen using J-gate. A good number of scholars use other databases also.

Table 38

Use of different e-resources (Subject-wise)

E-resources	Science	Arts	Social Science
ACS Publication	125 (91.24)	114 (85.07)	72 (52.55)
AIP (American Institute of physics)	129 (94.16)	122 (91.04)	92 (67.15)
Annual reviews	99 (72.26)	77 (57.46)	101 (73.72)
APS Physics	117 (85.40)	116 (86.57)	97 (70.80)
Cambridge Journal	100 (72.99)	93 (69.40)	73 (53.28)
Economic and political weekly	53 (38.69)	91 (67.91)	120 (87.59)
Emerald	94 (68.61)	92 (68.66)	126 (91.97)
ISID	114 (83.21)	110 (82.09)	96 (70.07)
JSTOR	34 (24.82)	69 (51.49)	126 (91.97)
OXFORD Journal	94 (68.61)	75 (55.97)	71 (51.82)
Project Euclid	111 (81.02)	108 (80.60)	120 (87.59)
Science Direct	108 (78.83)	91 (67.91)	46 (33.58)
Springer link	62 (45.26)	82 (61.19)	80 (58.39)
Taylor and Francis	99 (72.26)	89 (66.42)	71 (51.82)
ISI web of knoweledge	119 (86.86)	123 (91.79)	126 (91.97)
Jgate	123 (89.78)	126 (94.03)	133 (97.08)
Other	95 (69.34)	120 (89.55)	126 (91.97)

(Figures in brackets indicate respective percentage; this is a multiple answer question)

Table No. 38 shows subject-wise analysis of e-resources use. This reveals that 91.24 per cent science scholars use ACS publications. AIP is used by 94.16 per cent science scholars. Majority of science (72.26 per cent) and social science (73.72 per cent) scholars use annual reviews, 87.59 per cent social science scholars use EPW, and 91.97 per cent social science scholars use Emerald. Above 80.00 per cent scholars rely on project Euclid and a high percentage of scholars prefer to use ISI web of knowledge and J-gate.

In general, the findings demonstrate that majority of scholars use different e-resources which are available through the consortia.

5.4.15 Preferable type of e-resources

Electronic information resources are an integral part of libraries in this decade. E-resources are available in different types like full text, abstract etc. Table 39 illustrates the different types of e-resources preferred by scholars.

Table 39

Preferable type of e-resources (University wise)

E-resources	UK	MGU	UC	KU
Full text	87 (84.47)	92 (94.85)	100 (90.91)	88 (89.80)
Abstract	58 (56.31)	42 (43.20)	63 (57.27)	38 (36.73)
Bibliography	37 (35.92)	28 (28.87)	60 (54.55)	27 (25.51)
Others	5 (4.85)	-	2 (1.82)	-

(Figures in brackets indicate respective percentage; this is a multiple answer question)

Table No. 39 demonstrates that majority of scholars from all universities prefer full text contents. University-wise analysis shows that 90.91 per cent of Calicut University scholars, 94.85 per cent MG University scholars and 89.80 per cent Kannur University scholars prefer full text resources. 84.47 per cent scholars of Kerala University also use full text resources.

57.27 per cent Calicut University scholars use abstract and this percentage is more than that of Kerala University (56.31 per cent) and MG University (43.20 per cent) scholars. 36.73 per cent Kannur University scholars also use the abstract. Table 41 also reveals that 54.55 per cent Calicut University scholars use bibliography followed by 35.92 per cent Kerala University scholars. The bibliography use is comparatively less in other universities like MGU (28.87 per cent) and Kannur University (25.51 per cent).

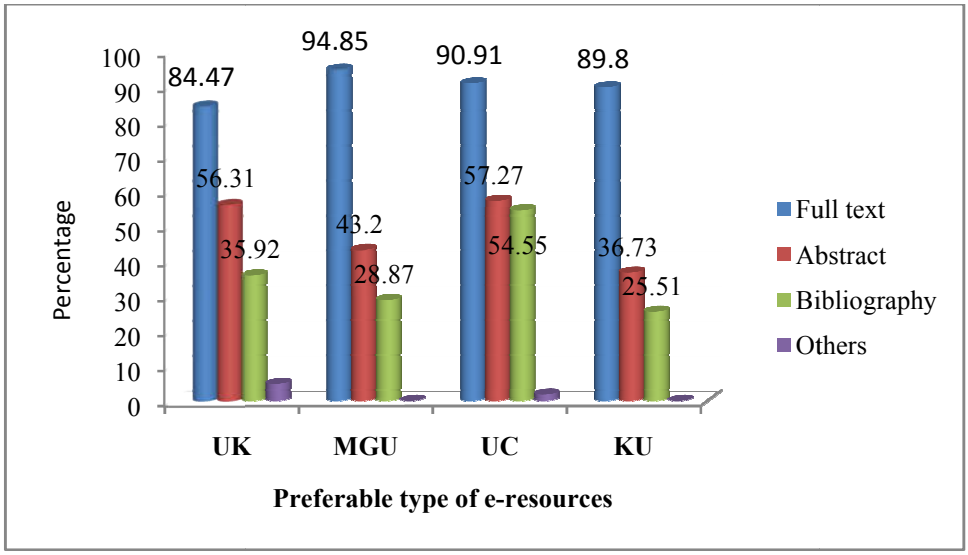

Figure 11

Preferable type of e-resources (University wise)

The data regarding the preferable type of e-resources are analyzed subject-wise and results are shown in Table 40.

Table 40
Preferable type of e-resources (Subject-wise)

E-resources	Science	Arts	Social science
Full text	130 (94.89)	114 (85.07)	123 (89.78)
Abstract	50 (36.50)	76 (56.72)	73 (53.28)
Bibliography	47 (34.31)	40 (29.85)	63 (45.99)
Others	1 (0.73)	-	6 (4.38)

(Figures in brackets indicate respective percentage; this is a multiple answer question)

Table No. 40 articulates that a lion share of (94.89 per cent) science scholars and most of the arts scholars (85.07 per cent) and social science scholars (89.78 per cent) prefer full text e-resources. In the case of abstract use, 56.72 per cent arts scholars and 53.28 per cent social science scholars prefer abstract. A good number of (45.99 per cent) social science scholars, 34.31 per cent science scholars and 29.85 per cent arts scholars prefer bibliographic details. Only a few per cent of social science scholars prefer other types of e-resources.

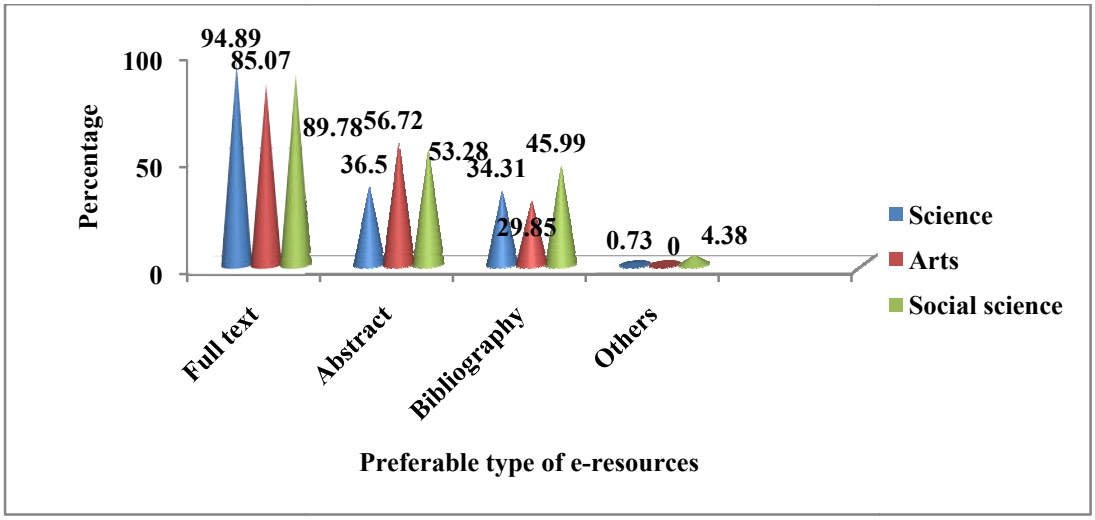

Figure 12

Preferable type of e-resources (Subject wise)

Overall, the analysis indicates that more number of scholars prefer full text e-resources. A study by Swain & Panda (2009) shows that among the faculty members of business schools libraries in Orissa (India) also the majority of respondents prefer contents of full text resources. University-wise analysis shows that full text data base use is high among MG University scholars compared to scholars of other universities. Abstract and bibliographic use is comparatively more among Calicut University scholars. Subject-wise analysis shows that full text database use is highest among science scholars. Abstract use is more among arts scholars and about half of the social science scholars use bibliography more than other subject scholars.

5.4.16 Preferable format of e-resources

There are several formats of documents available through the internet. Through this question the researcher can understand each group's preferred format of e-resources. Table 41 shows the opinion regarding the preferable format of e-resources.

Table 41

Preferable format of e-resources (University wise)

Format	UK	MGU	UC	KU
PDF	101 (98.06)	96 (98.97)	108 (98.18)	94 (95.92)
HTML	24 (23.30)	19 (19.59)	78 (70.91)	2 (2.04)
SGML	4 (3.88)	0	1 (0.91)	-
DOC	44 (42.72)	27 (27.84)	67 (60.91)	23 (22.45)
Other	7 (6.70)	3 (3.09)	4 (3.64)	-

(Figures in brackets indicate respective percentage; this is a multiple answer question)

Table 41 shows that majority of scholars from all the universities prefer the PDF format to other formats.

University-wise analysis shows that 98.97 per cent MG University scholars prefer PDF format, followed by Calicut University (98.18 per cent) and Kerala University (98.06 per cent) scholars. 95.92 per cent Kannur University scholars also prefer PDF format. 70.91 per cent Calicut University scholars prefer HTML format. But only a few per cent scholars of Kerala University (23.30 per cent) and MG University (19.57 per cent) prefer the HTML format. Only a negligible percentage of Kannur University scholars (2.04) use HTML format. In the case of DOC format, 60.91 per cent scholars of Calicut University use it and 42.72 per cent scholars of Kerala University also use it. In the case of SGML format only a negligible percentage of scholars use it.

Subject-wise analysis of data related to preferable format of e-resources by the users is shown in Table 42

Table 42

Preferable format of e-resources (Subject-wise)

Format	Science	Arts	Social Science
PDF	137 (100.00)	132 (98.54)	130 (94.89)
HTML	37 (27.01)	37 (27.61)	49 (35.77)
SGML	-	1 (0.75)	4 (2.92)
DOC	39 (28.47)	53 (39.55)	68 (49.64)
Other	6 (4.38)	4 (2.99)	4 (2.92)

(Figures in brackets indicate respective percentage; this is a multiple answer question)

Table No. 42 illustrates the preferred format of e-sources among the researchers of different subjects. Hundred per cent of science scholars, 98.54 per cent of arts scholars and 94.89 per cent of social science scholars prefer PDF format. A good number of scholars like 27.01 per cent science scholars, 27.61 per cent arts scholars and 35.77 per cent social science scholars seem to prefer HTML format. 49.64 per cent social science scholars, 39.55 per cent arts scholars and 28.47 per cent science scholars prefer DOC format and there is a small percentage of scholars who rely on other resources.

The overall analysis shows that PDF is the most-favoured format among the researchers and SGML is the least-favoured format. University-wise analysis shows that a substantial number of scholars prefer PDF format in which more MG University scholars prefer PDF than those of other universities. DOC format is seen to be the favourite of Calicut university scholars. Subject-wise analysis shows that all the science scholars prefer PDF format. HTML and DOC formats are used more among social science scholars.

5.4.17. Priority of e-resources

There are so many e-resources available now like e-journals, e-books, e-databases, ETDs, and audio/video recordings. The user preference of these e-resources among scholars may vary according to their personal interest or subject area. Hence here the investigator tries to understand various e-resources on the basis of users' priority. Data regarding the priority of e-resources are presented in Tables 45 and 46.

Table 43

Priority of e-resources (University wise)

E-resources	UK	MGU	UC	KU	Weighted Mean	Rank
E-Journal	7.13	6.53	7.47	6.60	6.93	1
E-book	5.44	5.17	5.87	5.28	5.44	2
E-databases	4.12	3.88	4.40	3.88	4.07	3
ETDs	2.77	2.59	2.96	2.64	2.74	4
Audio/Video recording	1.32	1.28	1.43	1.32	1.34	5

Table 45 shows the weighted mean score of the preference of e-resource. E-journal is found to be used by scholars very highly (Mean=6.93). This is followed by e-book use with the mean 5.44. It can be seen that researchers from universities under study give third preference to e-database use (Mean=4.07). ETDs are in the fourth position (Mean=2.74). The least-favoured e-resource appears to be audio/video recording (Mean=1.34).

E-journals are used in Calicut University very highly (Mean=7.13) followed by Kerala University (Mean=7.47), then MG University (Mean= 6.53), and finally Kannur University (Mean=6.60). E-books are used in Calicut University (Mean= 5.87) highly and it is followed by Kerala University (Mean=5.44). Calicut University has highest mean in e-databases use (Mean=4.40) followed by Kerala University (Mean=4.12). In the case of ETDs, Calicut University (Mean=2.96) has the highest mean. Audio/video recordings use is highest among Calicut University scholars (Mean value= 1.43) and lowest among MG University scholars (Mean=1.28).

Subject-wise analysis of data regarding the priority of e-resources use among researchers is given in Table 46

Table 44

Priority of e-resources (Subject-wise)

E-resources	Science	Arts	Social Science	Weighted Mean	Rank
E-Journal	9.07	9.27	9.33	9.223333	1
E-book	9.13	7.15	7.31	7.863333	2
E-databases	9.2	5.28	5.48	6.653333	3
ETDs	9.33	3.57	3.65	5.516667	4
Audio/Video recording	9.2	1.72	1.81	4.243333	5

Table No. 46 shows the weighted mean score of the preference of e-resources. E-journal is seen to be used by scholars very highly (Mean=9.22). This is followed by e-book use (Mean= 7.86) and then by e-database use (Mean=6.65). ETDs come in the fourth position (Mean=5.51) in user preference and the least-preferred e-resource appears to be audio/video recording (Mean=4.24).

The use of ETDs among science scholars is seen to be quite high (Mean=9.07) followed by the use of e-databases and audio/video records (Mean=9.2). This is followed by the use of e-books (Mean=9.13) and e-journals (Mean=9.07). In the case of arts scholars, the use of e-journals is the highest (Mean= 9.27), followed by the use of e-books (Mean=7.15) and then by that of e-databases (Mean=5.28). Audio/Video records are the least-used resources (Mean= 1.72) among arts scholars.

Like that of arts scholars, the use of e-journals among social science scholars is also high (Mean= 9.33), followed by the use of e-books (Mean= 9.33) and e-databases (Mean=5.48). The least-used e-resource among social science scholars is audio/video records (Mean=1.81).

In the analysis of e-resources use, users of all the universities are seen to give first preference to e-journal use and least preference to audio/video clips. Subject-wise analysis shows that science scholars give first preference to the use of ETDs followed by the use of audio/video clips and e-databases. But arts and science

scholars are seen to give the highest preference to e-journals and least preference to audio/video clips.

5.4.18. Print facility in libraries

An impactful learning depends upon both print-based and e-text reading. This particular query analyzed the availability of print facility in libraries. Table 43 presents the result of availability of printing facility in libraries.

Table 45

Print facility in libraries (University wise)

Responses	UK	MGU	UC	KU
Positive	37 (35.92)	22 (22.68)	14 (12.73)	4 (4.08)
Negative	66 (77.32)	75 (77.32)	96 (87.27)	94 (95.92)
Total	103	97	110	98

(Figures in brackets indicate respective percentage)

In university-wise analysis, most of the scholars have responded negatively to the availability of print facility in libraries. It shows that 95.92 per cent Kannur University scholars and 87.27 per cent Calicut University scholars are not satisfied with the level of availability of printing facility in their libraries. 77.32 per cent of both MG and Kerala University scholars also have the same opinion.

Subject-wise analysis of print facility in libraries is given in Table 44.

Table 46

Print facility in libraries (Subject-wise)

Responses	Science	Arts	Social Science
Positive	24 (17.51)	27 (20.14)	26 (18.97)
Negative	113 (82.48)	107 (79.85)	111 (81.02)
Total	137	134	137

(Figures in brackets indicate respective percentage)

Subject-wise analysis shows that majority of the researchers have a negative response to the question of availability of print facility in their libraries. A high

percentage of science (82.48 per cent), 79.85 per cent of arts and 81.02 per cent of social science scholars have claimed that print facility is not available in the libraries. Among those whose response is positive, 17.51 per cent are science scholars, 20.14 per cent are arts scholars and 18.97 per cent are social science scholars.

Thus it is clear that most of the scholars are not satisfied with the printing facilities available in the libraries. University-wise analysis shows that most of the scholars of all universities find the level of availability of print facilities quite unsatisfactory. Subject-wise analysis also shows that most of the research scholars feel the same way, with a considerable percentage of science scholars finding the available printing facilities insufficient. E-text reading has many advantages like bookmarking, highlighting etc. However, even in this digitally advanced times, many people like to have easy access to traditional printed materials along with e-texts. If the libraries provide print facility, it will be more convenient to the students.

5.4.19 Extent of use of Library Consortia

Library consortia help to deliver quality resources and services to academic libraries. Use of library consortia will increase the quality of research output of the scholars who frequent these libraries. Tables 47 to 48 show the responses of research scholars on the extent of use of library consortia.

Table 47

Extent of use of Library Consortia (University wise)

Use	UK	MGU	UC	KU
To great extent	23 (22.33)	34 (35.05)	47 (42.73)	4 (4.08)
To large extent	23 (22.33)	22 (22.68)	22 (20.00)	18 (18.37)
To somewhat extent	24 (23.30)	14 (14.43)	16 (14.55)	30 (30.61)
To small extent	18 (17.48)	15 (15.46)	22 (20.00)	13 (13.27)
To very small extent	15 (14.56)	12 (12.37)	3 (2.73)	33 (33.67)
Pearson chi-square =46	df=12		p value=0.000	

(Figures in brackets indicate respective percentage)

Table 47 shows that 42.73 per cent Calicut University scholars are using library consortia to a 'great extent'. A good number of scholars of MG (35.05 per cent) and Kerala (22.33 per cent) universities are also using it to a 'great extent'. But only 4.08 per cent of Kannur University scholars are using library consortia to a 'great extent'. 2.73 per cent Calicut University scholars use it to a 'very small extent' and 33.33 per cent Kannur University scholars are also using it a 'very small extent'. 30 61 per cent Kannur University scholars use it to 'somewhat extent' and 23.30 per cent and 14.43 per cent scholars from UK and MGU respectively also use library consortia to 'somewhat extent'.

The chi-square value of 46 and p-value of zero shows the significant difference among the researchers in various universities at 5% level of significance.

Subject-wise analysis of responses regarding the extent of use of library consortia is given in Table No. 48

Table 48

Extend of use of Library Consortia (Subject-wise)

Use	**Science**	**Arts**	**Social science**
To great extent	28 (20.44)	46 (34.33)	34 (24.82)
To large extent	24 (17.52)	20 (14.93)	41 (29.93)
To somewhat extent	35 (25.55)	23 (17.16)	26 (18.98)
To small extent	27 (19.71)	18 (13.43)	23 (16.79)
To very small extent	23 (16.79)	27 (20.15)	13 (9.49)
Pearson chi-square =23.0	df=8		p value=0.003

(Figures in brackets indicate respective percentage)

The analysis in Table No. 48 demonstrates the responses of scholars of different subjects. Only 20.44 per cent of science scholars are using library consortia to a 'great extent' while 25.55 per cent of them are using it to 'somewhat extent' and

16.79 per cent are using it to a 'very small extent'. In the case of arts scholars, 34.33 per cent use library consortia to a 'great extent' and 17.16 per cent use it to 'somewhat extent'.

It can be observed that 29.93 per cent social science scholars use library consortia to a 'large extent'. 18.98 per cent of them use it to 'somewhat extent' and only 9.49 per cent of them use it to a 'very small extent'. The chi-square value is 23.0 and p value is 0.003 which is less than 0.05. As such, it is clear that there is a significant difference between the scholars of different subjects regarding the extent of use of library consortia.

Thus it is found that most of the scholars in Kerala are using library consortia. University-wise analysis shows that a good number of Calicut University scholars use library consortia to a 'great extent' than those of other universities and it is followed by MG University scholars. The number of Kannur University scholars using library consortia to a 'great extent' is comparatively small. A good number of scholars also use library consortia services to a 'large extent'. Subject-wise analysis shows that a high percentage of arts scholars use library consortia to a 'great extent' compared to scholars of other subjects. A good number of scholars also use the consortia services to a 'large extent'. The chi-square value and p-value indicate that there exists a significant difference on the extent of use of library consortia among scholars of different universities and researchers of different subjects. Hence the libraries of different universities should provide more attention to increasing the use of library consortia by scholars. It will help to produce good quality of research outputs in the institution.

5.4.20 OPAC use

Online public access catalogue, also known as OPAC, maintain all the resources and materials held by a particular library. Users are able to search OPAC for locating the resources in a particular library. It assists the user to easily find the physical location of the material. All universities under the study maintain OPAC facility in their libraries. Through the particular question the investigator asked whether the scholars are using the library OPAC or not.

Table 49

OPAC use (University wise)

Responses	UK	MGU	UC	KU
Yes	85 (82.52)	65 (67.01)	101 (91.82)	40 (40.82)
No	18 (17.48)	32 (32.99)	9 (8.18)	58 (59.18)
Total	103	97	110	98
Pearson chi-square =74.4		df=3		p=0.000

(Figures in brackets indicate respective percentage)

Table No. 49 shows the rate of OPAC use by the respondents. A considerably large majority (91.82 per cent) of Calicut University scholars responded positively to the question of OPAC use and 82.52 per cent of Kerala University scholars and 67.01 per cent of MGU scholars also responded the same way.

58.59 per cent Kannur University scholars do not make use of OPAC services. Similarly, 32.99 per cent MGU scholars, 17.48 per cent Kerala University scholars and 8.18 per cent Calicut University scholars also do not make use of OPAC services. The chi-square value of 74.4 and p-value zero indicate that there exists a significant difference in the rate of use of OPAC among the scholars of selected universities.

Subject-wise analysis of responses regarding OPAC use is given in Table No. 50

Table 50

OPAC use (Subject-wise)

Responses	Science	Arts	Social science
Yes	87 (63.50)	103 (76.87)	101 (73.72)
No	50 (36.50)	31 (23.13)	36 (26.28)
Total	137	134	137
Pearson chi-square =64.9		df=2	p=0.039

(Figures in brackets indicate respective percentage)

It is seen that 63.50 per cent science scholars, 76.87 per cent arts scholars and 73.72 per cent social science scholars have responded positively to the question of OPAC use. A good number of (36.50 per cent) science scholars, 23.13 per cent arts scholars and 26.28 per cent social science scholars have responded negatively to the question of OPAC use. The chi-square value of 64.9 and p value 0.03 imply significant difference in use of OPAC among researchers in different subjects.

The analysis shows that most of the scholars depend on OPAC for searching documents in the library. University-wise analysis shows that more Calicut University scholars use OPAC than scholars of other universities. Comparatively low use is seen among Kannur University scholars. Subject-wise analysis indicates that more arts scholars use OPAC than scholars of science and social science. The chi-square value and p value indicate that there exists a significant difference among the researchers of different universities and different subjects with respect to OPAC use in libraries. These findings also correspond with the results of the study by Naik & Nikam (2014) where it has been seen that most of the respondents make use of OPAC services.

5.4.21 Mode of access to online catalogue

OPAC systems in libraries have changed the traditional way of accessing information resources as the Web OPAC provides global access to the database of a particular library. Researchers were asked whether they got the OPAC through the web or not and their responses are given in Tables 51 to 52.

Table 51

Mode of access to Online Catalogue (University wise)

Mode of access	UK	MGU	UC	KU
LAN	33 (31.07)	32 (31.96)	37 (32.73)	16 (16.33)
Web OPAC	18 (17.48)	21 (21.65)	31 (28.18)	16 (16.33)

(Figures in brackets indicate respective percentage)

Table No. 51 shows that 32.73 per cent of Calicut University scholars, 31.96 per cent of MG University scholars and 31.07 per cent of Kerala University scholars access the online catalogue through LAN. Slightly lesser percentages, namely, 28.18 per cent Calicut University scholars, 21.65 per cent MG University scholars, and 17.48 per cent Kerala University scholars access the catalogue through Web OPAC facility. In the case of Kannur University, the same percentages (16.33 per cent) of scholars make use of the different modes of access.

Subject-wise analysis of data from researchers about mode of access to online catalogue is given in Table 52.

Table 52

Mode of access to Online Catalogue (Subject-wise)

Mode of access	Science	Arts	Social science
LAN	35 (25.55)	39 (29.10)	16 (16.33)
Web OPAC	24 (17.52)	18 (13.43)	44 (32.12)

(Figures in brackets indicate respective percentage)

Table No. 52 demonstrates that a good number of science (25.55 per cent) and arts (29.10 per cent) scholars access online catalogue through LAN. 16.33 per cent social science scholars also do so. 32.12 per cent social science scholars, 17.52 per cent science scholars, and 13.43 arts scholars prefer to access it through Web OPAC.

The analyses in the tables above clarify that the awareness of Web OPAC is comparatively low among scholars of different universities and different subject streams. It may be due to lack of proper user education programs. Notably, a good number of Calicut University scholars know about Web OPAC facility compared to scholars of other universities. Subject-wise analysis shows that more social science scholars know about Web OPAC than the rest.

5.4.22 Search methods used in OPAC

Computerized catalogue system helps to locate documents in an easy and convenient way. OPAC provides different search methods, catering to the different skills and interests of the users to search documents. It is necessary to know about scholars' familiarity with different search mechanisms. Tables 53 to 54 give the information about the various search methods used by the scholars of various universities in Kerala.

Table 53

Search method used in OPAC (University wise)

Methods	UK	MGU	UC	KU
Author	79 (76.70)	60 (61.86)	82 (74.55)	33 (33.67)
Subject	79 (76.70)	58 (59.79)	77 (70.00)	33 (33.67)
Title	72 (69.90)	59 (60.82)	75 (68.18)	35 (35.71)
Boolean search	51 (49.51)	39 (40.21)	54 (49.09)	18 (18.37)
Publisher	12 (11.65)	13 (13.40)	19 (17.27)	4 (4.08)
Class number	18 (17.48)	13 (13.40)	19 (17.27)	10 (10.20)
Key words	55 (53.40)	30 (30.93)	61 (55.45)	25 (25.25)
ISBN	14 (13.59)	17 (17.53)	17 (15.45)	10 (10.10)
Any other	2 (1.94)	2 (2.06)	3 (2.73)	-

(Figures in brackets indicate respective percentage; this is a multiple answer question)

Table No. 53 depicts a clear picture of the search methods used in the library OPAC. The same percentage (76.70 per cent) of Kerala University scholars search OPAC using the methods 'author' as well as 'subject'. 74.55 per cent Calicut University scholars use the 'author' search and 70.00 per cent rely on 'subject' search.

69.90 per cent Kerala University scholars use the 'title' search followed by 68.18 per cent Calicut and 60.82 per cent MG University scholars. About half of the scholars

of both Kerala (49.51 per cent) and Calicut University (49.09 per cent) make use of Boolean search methods. Only 18.37 per cent Kannur University scholars rely on Boolean search methods. Keyword search is another preferred method of search for many scholars. More than half of Calicut University scholars (55.45 per cent) and 53.40 per cent of Kerala University scholars rely on this method. Other search options are not used by any significant percentage of scholars.

Subject-wise analysis of the various search methods used in OPAC by scholars to locate files is given in Table No. 54

Table 54

Search method used in OPAC (Subject-wise)

Methods	Science	Arts	Social Science
Author	76 (55.47)	90 (67.16)	88 (64.23)
Subject	51 (37.23)	43 (32.09)	68 (49.64)
Title	72 (52.55)	89 (66.42)	86 (62.77)
Boolean search	13 (9.49)	14 (10.45)	33 (24.09)
Publisher	70 (51.09)	80 (59.70)	91 (66.42)
Class number	50 (36.50)	47 (35.07)	74 (54.01)
Key words	16 (11.68)	19 (14.18)	13 (9.49)
ISBN	16 (11.68)	13 (9.70)	29 (21.17)
Any other	-	6 (4.48)	1 (0.73)

(Figures in brackets indicate respective percentage; this is a multiple answer question)

Table 54 establishes that majority of users (67.16 per cent arts scholars and 64.23 per cent social science scholars) consider 'author' method for their search. 55.47 per cent science scholars also rely on the same method. On the other hand, about half of the social science scholars search OPAC using 'subject' option. A good number of science and arts scholars also prefer the 'subject' option for their search. Majority of arts scholars (66.42 per cent) and 62.77 per cent social science scholars prefer the 'title' method. Nearly 66.42 per cent social science scholars prefer the 'publisher' option followed by 59.70 per cent arts scholars.

The use of Boolean search, keyword search, and ISBN search are comparatively low among scholars. Only about one-fourth of social science scholars prefer Boolean search (24.09 per cent) and ISBN search (21.17 per cent). 54.01 per cent social science scholars prefer the option 'class numbers' for their search queries.

It can be seen clearly from the above discussion that most of the scholars prefer 'author' and 'title' options for their OPAC search. University-wise analysis shows that more Kerala University scholars prefer 'author, subject and title' search options than scholars of other universities. Comparatively less-used options are 'Boolean' and 'keyword' searches. Subject-wise analysis shows that most of the arts scholars prefer 'author' and 'title' search options and 'publisher' option as well.

5.4.23 Frequency of use of Library OPAC

The data related to the frequency of use of OPAC is illustrated in Tables 55 and 56. The options in frequencies are 'always', 'very often', 'sometimes', 'rarely' and 'never'.

Table 55

Frequency of use of Library OPAC (University wise)

Frequency	UK	MGU	UC	KU
Always	16 (15.53)	32 (32.99)	28 (25.45)	14 (14.29)
Very often	31 (24.27)	8 (8.25)	25 (22.73)	5 (5.10)
Sometimes	25 (19.42)	28 (28.87)	27 (24.55)	18 (18.37)
Rarely	20 (19.42)	17 (17.53)	16 (14.55)	57 (58.16)
Never	11 (10.68)	12 (12.37)	14 (12.73)	4 (4.08)
Pearson chi-square =89.8		df=12		p value=0.000

(Figures in brackets indicate respective percentage)

As per the analysis in Table No. 55, it is clear that some scholars are frequently checking the library OPAC for the material they want while some others are rarely using this service.

University-wise analysis shows that 32.99 per cent MG University scholars 'always' use OPAC service. 24.27 per cent Kerala University scholars and 22.73 per cent Calicut University scholars use this service 'very often'. 58.16 per cent Kannur University scholars 'rarely' use the library OPAC while a considerable number of scholars 'never' use it. The chi-square value of 89.8 and p value zero indicate that there is significant difference between the scholars of different universities with respect to their frequency of use of OPAC.

Subject-wise analysis of frequency of use of library OPAC is done in Table 56.

Table 56

Frequency of use of Library OPAC (Subject-wise)

Frequency	Science	Arts	Social science
Always	8 (5.84)	11 (8.21)	36 (26.28)
Very often	22 (16.06)	20 (14.93)	10 (7.30)
Sometimes	25 (18.25)	31 (23.13)	41 (29.93)
Rarely	57 (41.61)	38 (28.36)	24 (17.75)
Never	25 (18.25)	34 (35.37)	26 (18.98)
Pearson chi-square =49.8		df=8	p value=0.000

(Figures in brackets indicate respective percentage)

The data given in Table 56 illustrates that only a few scholars (5.84 per cent science scholars, 8.21 per cent arts scholars and 26.28 per cent social science scholars) 'always' use the library OPAC. A good number of science scholars (18.25 per cent), 23.13 per cent arts scholars and 29.93 per cent social science scholars 'sometimes' use the library OPAC.

The table also shows that a fairly good number of science scholars (41.61 per cent), 28.36 per cent arts scholars and 17.75 per cent social science scholars 'rarely' use library OPAC. Some of the scholars 'never' use the library OPAC. Those who 'never' use the service include 18.25 per cent science, 35.37 per cent arts and 18.98 per cent social science scholars. The test produced a p-value zero which indicates a significant association between the variable, since the p-value is less than 0.05.

It can be seen through both university-wise and subject-wise analysis that relatively medium level use ('sometimes') of OPAC is prevalent among scholars. In university-wise analysis a reasonable number of MG University scholars (32.99 per cent) 'always' use OPAC services followed by Calicut University scholars. A good number of social science scholars (26.28 per cent) 'always' use OPAC services.

Chi-square test result also confirms that there exists a significant difference in both university-wise and subject-wise analysis of frequency of use of OPAC.

5.4.24 Bibliographic information

Fast growth of web-based services has changed the information retrieval pattern in libraries. By gathering bibliographic information, basic information about the documents like author, title, and publication details become available to users. In a web-based environment, libraries accommodate most of the MARC fields in normal data entry. The investigator checked how often researchers use the bibliographic information available through OPAC.

Table 57

Bibliographic information use (University wise)

Frequency	**UK**	**MGU**	**UC**	**KU**
Always	18 (17.48)	19 (19.59)	22 (20.00)	2 (2.04)
Very often	18 (17.48)	22 (22.68)	22 (20.00)	19 (19.39)
Sometimes	21 (20.39)	21 (21.65)	16 (14.55)	24 (24.49)
Rarely	32 (31.07)	5 (5.15)	29 (26.36)	8 (8.16)
Never	14 (13.59)	30 (30.93)	21 (19.09)	45 (45.92)
chi-square =69.1		df=12		p value=0.000

(Figures in brackets indicate respective percentage)

Researchers have varying opinions regarding the retrieval of bibliographic information through OPAC. As per the data in Table No.57, 20.00 per cent Calicut University scholars 'always' retrieve bibliographic information through OPAC followed by 19.59 per cent MG University scholars. 22.68 per cent MG University scholars retrieve bibliographic information the same way 'very often'.

17.48 per cent Kerala University scholars 'always' get bibliographic information through the library OPAC while 31.07 per cent Kerala University scholars do so only 'rarely'. 45.92 per cent Kannur University scholars confirmed that they 'never' access bibliographic information through OPAC. The chi-square value of 69.1 at 5% level significance shows a significant variation among the researchers in different universities regarding the frequency of use of bibliographic information.

The data regarding the use of bibliographic information is analyzed subject-wise and results are shown in Table No. 58

Table 58

Bibliographic information use (Subject-wise)

Frequency	**Science**	**Arts**	**Social science**
Always	15 (10.95)	22 (16.42)	28 (20.44)
Very often	32 (23.36)	14 (10.45)	34 (24.82)
Sometimes	48 (35.04)	32 (23.38)	29 (21.17)
Rarely	28 (20.44)	28 (20.90)	17 (12.41)
Never	14 (10.22)	38 (28.36)	29 (21.17)
Chi-square=32.9		df=8	p=0.000

(Figures in brackets indicate respective percentage)

Table No. 58 shows that 10.95 per cent science scholars, 16.42 per cent arts scholars and 20.44 per cent social science scholars 'always' use bibliographic information. 35.04 per cent science scholars, 23.38 per cent arts scholars and 21.17 per cent social science scholars 'sometimes' retrieve bibliographic information through OPAC.

It can be seen that 10.22 per cent science scholars, 28.36 per cent arts scholars and 21.17 per cent social science scholars 'never' retrieve bibliographic information through OPAC. A good number of scholars confirmed that they 'rarely' retrieve bibliographic information this way. The chi-square value and p value indicate that

there is significant difference between the science, arts and social science scholars with respect to the accessing of bibliographic information.

Altogether the analysis shows that around one-fifth of the scholars 'always' access bibliographic information. University-wise analysis shows that more Calicut University scholars 'always' retrieve bibliographic information compared to those of other universities. 31.07 per cent Kerala University scholars 'rarely' do so. Subject-wise analysis reveals that a reasonable percentage of scholars 'sometimes' retrieve bibliographic information through OPAC. The practice is comparatively high among science scholars. The chi-square test reveals that there exists a significant variation in both university-wise and subject-wise analyses. It indicates that research scholars are by and large retrieving bibliographic information through OPAC only moderately ('sometimes'). It is due to the fact that most of the scholars do not have sufficient knowledge on the methods of accessing information this way.

5.4.25 Difficulties while using the library OPAC

Researchers were asked to mention about their difficulties while using the library OPAC

Table 59

Difficulties while using the library OPAC (University wise)

Difficulty	UK	MGU	UC	KU
Lack of multi language support	23 (22.33)	21 (21.65)	21 (19.09)	18 (18.37)
Incomplete entries	20 (19.42)	22 (22.68)	25 (22.73)	19 (19.39)
Wrong entries	17 (16.50)	10 (10.31)	12 (10.91)	2 (2.04)
Lack of standards	23 (22.33)	10 (10.31)	21 (19.09)	8 (8.16)
Spelling errors	32 (31.07)	41 (42.27)	41 (37.27)	63 (63.29)

(Figures in brackets indicate respective percentage; this is a multiple answer question)

Table 59 shows that the main difficulty of 22.33 per cent Kerala University scholars in using the library OPAC is the lack of multi-language support. They are followed by MG University scholars (21.65 per cent), then Calicut University scholars (19.09 per cent), and finally by Kannur University scholars (18.37 per cent). 'Incomplete entries' is the problem faced by 22.73 per cent Calicut University scholars, followed by MG University scholars (22.68 per cent) and then by Kerala University scholars (19.42 per cent).

16.50 per cent Kerala University scholars face the difficulty of 'wrong entries' while for 22.33 per cent Kerala University scholars the problem is 'lack of standards'. 63.29 per cent Kannur University scholars find it difficult to use OPAC because of 'spelling errors'. A good number of scholars from MG University (42.27 per cent) and Calicut University (37.27 per cent) also find 'spelling errors' the big issue.

The result of subject-wise analysis on the difficulties faced while using the library OPAC is presented in Table 60.

Table 60

Difficulties while using the library OPAC (Subject-wise)

Difficulty	Science	Arts	Social science
Lack of multi language support	20 (14.60)	28 (20.90)	35 (25.55)
Incomplete entries	18 (13.14)	30 (22.39)	38 (27.74)
Wrong entries	8 (5.84)	19 (14.18)	14 (10.22)
Lack of standards	27 (19.71)	22 (16.42)	13 (9.49)
Spelling errors	74 (54.01)	52 (38.81)	51 (37.23)

(Figures in brackets indicate respective percentage; this is a multiple answer question)

Table 60 shows that 54.01 per cent science scholars find 'spelling errors' as the main difficulty in OPAC use. 19.71 per cent of them find the 'lack of standards' as a difficulty and a small percentage (5.84 per cent) find 'wrong entries' a problem.

In the case of arts scholars, 38.81 per cent find 'spelling errors' a difficulty, 20.90 per cent find 'lack of multi-language support' the issue and 16.42 are inconvenienced by 'lack of standards'. According to 27.24 per cent social science scholars, the difficulty is 'incomplete entries' while 25.55 per cent social science scholars are inconvenienced by 'lack of multi-language support' and 37.23 per cent feel that the problem is 'spelling errors'. A small percentage of social science scholars (9.49 per cent) are put into difficulties because of 'lack of standards'.

Hence it can be concluded that 'spelling errors' is the major difficulty for a significant number of scholars. University-wise analysis shows that more Kannur University scholars find 'spelling errors' as the problem than those of other universities. A considerable number of scholars are inconvenienced by other difficulties like 'lack of multi-language support' and 'incomplete entries'. Subject-wise analysis shows that more science scholars find 'spelling errors' as the hurdle than those of other subject scholars. A good number of social science and arts scholars feel that 'lack of multi-language support' and 'incomplete entries' are big issues. As different from this, Kumar (2012) pointed out that very few unsuccessful searches are the result of typographical or spelling errors on the part of users.

5.4.26 Extent of use of OPAC

OPAC helps to easily locate the library resources. Evaluation of extent of use of library OPAC is described in Tables 61 and 62.

Table 61

Extent of use of OPAC (University wise)

OPAC use	UK	MGU	UC	KU
To great extent	8 (7.77)	6 (6.19)	4 (3.64)	-
To large extent	14 (13.59)	18 (18.56)	20 (18.18)	12 (12.24)
To somewhat extent	22 (21.36)	24 (24.74)	24 (21.82)	19 (19.34)
To small extent	35 (33.98)	13 (13.40)	29 (26.36)	12 (12.24)
To very small extent	24 (23.30)	36 (37.11)	33 (30.00)	55 (56.12)

(Figures in brackets indicate respective percentage)

Table 61 shows that a 'great extent' of use of OPAC is comparatively low among the scholars. University-wise analysis indicates that 18.56 per cent MG University scholars use library OPAC to a 'large extent' followed by Calicut University scholars (18.18 per cent). 24.74 per cent scholars of MG University are using the library OPAC to 'somewhat extent'. 33.98 per cent Kerala University scholars use library OPAC to a 'small extent'. 56.12 per cent Kannur University scholars, 37.11 per cent MG University scholars and 30 per cent Calicut University scholars use library OPAC to a 'very small extent'.

Subject-wise analysis of data regarding the extent of use of OPAC is shown in Table 62.

Table 62

Extent of use of OPAC (Subject-wise)

OPAC use	Science	Arts	Social science
To great extent	2 (1.46)	5 (3.73)	8 (5.84)
To large extent	20 (14.60)	15 (11.19)	28 (20.44)
To somewhat extent	24 (17.52)	30 (22.39)	36 (26.28)
To small extent	25 (18.25)	35 (26.16)	31 (22.63)
To very small extent	66 (48.18)	49 (36.57)	34 (24.82)
	137	134	137

(Figures in brackets indicate respective percentage)

In the case of analyzing on the basis of subject, it is seen that a few percentage of science scholars (17.52 per cent), 22.39 per cent of arts scholars and 26.28 per cent of social science scholars are using OPAC to 'somewhat extent'. A good number of scholars (48.18 per cent science scholars, 36.57 per cent arts scholars and 24.82 per cent social science scholars) use OPAC services to a 'very small extent'. 14.60 per cent science scholars, 11.19 per cent arts scholars and 20.44 per cent social science scholars use library OPAC to a 'large extent'.

It is clear from the analysis that a considerable number of scholars use OPAC only to a 'small extent'. A survey conducted by Islam (2010) found that most of the respondents use library catalogue only occasionally. This low user percentage is confirmed in this analysis also.

5.4.27 Alerting services in libraries

Now-a-days libraries are providing a number of alerting services. SMS services, email services, and RSS feed are some of them. Tables 63 and 64 show the scholars' awareness about the alerting services provided through the libraries.

Table 63

Alerting services in libraries (University wise)

Opinion	UK	MGU	UC	KU
Yes	47 (45.63)	15 (15.46)	44 (40.00)	22 (21.43)
No	48 (46.60)	20 (20.62)	30 (27.27)	54 (55.10)
Don't know	8 (7.77)	62 (63.92)	36 (32.73)	23 (23.47)

(Figures in brackets indicate respective percentage)

Table 63 gives the university-wise analysis of researchers' awareness about alerting services. 45.63 per cent Kerala University scholars know about the alerting services provided in the libraries, followed by 40.00 per cent Calicut University scholars. 21.43 per cent Kannur University scholars and 15.46 per cent MG University scholars also know about it.

46.60 per cent of Kerala University scholars, 55.10 per cent of Kannur University scholars, 20.62 per cent of MG University scholars and 27.27 per cent of Calicut University scholars are not aware that the library is providing any type of alerting services. Majority of (63.92 per cent) MGU scholars do not know whether such services are provided in the library or not. They are followed by 32.73 per cent Calicut and 23.47 per cent Kannur University scholars.

Subject-wise analysis of data on alerting services in libraries is given in Table 64.

Table 64

Alerting services in libraries (Subject-wise)

Opinion	Science	Arts	Social Science
Yes	44 (32.12)	52 (38.81)	63 (45.99)
No	42 (30.66)	44 (32.84)	38 (27.74)
Don't know	51 (37.23)	38 (28.36)	36 (26.28)
Total	137	134	137

(Figures in brackets indicate respective percentage)

Subject-wise analysis of data reveals that a good number of social science scholars (45.99 per cent) know about alerting services. Likewise, 38.81 per cent arts scholars and 32.12 per cent science scholars also know about alerting services.

30.66 per cent science scholars, 32.84 per cent arts scholars and 27.74 per cent social science scholars say that the library is not providing alerting services. A good number of scholars (37.23 per cent science, 28.36 per cent arts and 26.28 per cent social science scholars) do not know whether the library provides alerting services or not.

It is seen that more of Kerala University scholars know about alerting services than those of other universities. Subject-wise analysis indicates that a good number of social science scholars know about alerting services.

54.28 Types of alerting services

There are many types of alerting services available now like publisher alert, database alert, and website alert and so on. In the case of libraries, they offer alerting services for many processes like renewal and reservation of books, overdue information, new arrivals, RSS feed through website of libraries and so on. Tables 65 and 66 show the different alerting services used by the research community.

Table 65

Types of alerting services (University wise)

Alerting services	UK	MGU	UC	KU
To know about new arrivals	20 (19.42)	30 (30.93)	27 (24.55)	6 (6.12)
Renewal of book	9 (8.74)	60 (61.86)	24 (21.82)	20 (20.41)
Giving fine details	10 (9.71)	32 (32.99)	15 (13.64)	4 (4.08)
Instant messages	1 (0.97)	2 (2.06)	2 (1.82)	-
E-mail	6 (5.83)	27 (27.84)	12 (10.91)	10 (10.20)
RSS feed	-	4 (4.12)	2 (1.82)	-
Other	-	1 (1.03)	-	-

(Figures in brackets indicate respective percentage)

Table 65 highlights the alerting services used by the scholars in the various universities of Kerala. 30.93 per cent MGU scholars get the information about 'new arrivals' via alerts, followed by 24.55 per cent Calicut University scholars. 61.86 per cent MGU scholars rely on alerts for 'renewal of books', followed by 21.82 per cent Calicut university scholars. But only 8.74 per cent Kerala University scholars use alerting services for their 'book renewal'.

In the case of e-mail services, 27.84 per cent MGU scholars make use of e-mail alerts. Alerts for RSS feed and instant messages are the least-used services among the research community.

Subject-wise analysis of different alerting services is given in Table 66

Table 66

Types of alerting services (Subject-wise)

Alerting services	Science	Arts	Social science
To know about new arrivals	26 (18.98)	27 (20.15)	30 (21.90)
Renewal of book	45 (32.85)	38 (28.36)	30 (21.90)
Giving fine details	21 (15.33)	22 (16.42)	18 (13.14)
Instant messages	2 (1.46)	2 (1.49)	1 (0.73)
E-mail	24 (17.52)	18 (13.43)	13 (9.49)
RSS feed	4 (2.92)	2 (1.49)	-
other	-	-	1 (0.73)

(Figures in brackets indicate respective percentage)

It is revealed that alert for 'renewal of book' is availed by 32.85 per cent science scholars, 28.36 per cent arts scholars and 21.90 per cent social science scholars. A good number of scholars (21.90 per cent social science scholars, 20.15 per cent arts scholars and 18.98 per cent science scholars) get the information about 'new arrivals' to the libraries through alerts. 17.52 per cent science scholars make use of e-mail alerts. Alerts for RSS feed are used by a significantly small number of researchers. Reliance on 'other alerting services', which include SMS alerts, is extremely low.

Thus it is found that alerts for 'renewal of book' and 'new arrival' to libraries are the popular services among scholars. University-wise analysis reveals that majority of MG University scholars make use of alerts for renewal of books. Overall, the analyses underscore the need to improve alerting services in libraries. Proper guidance from the authorities will accelerate the utilization of alerting services.

Extent of use of alerting services

Tables 67 and 68 are intended to determine the extent of use of alerting services by respondents.

Table 67

Extent of use of alerting services (University wise)

Use	UK	MGU	UC	KU
To great extent	-	10 (10.31)	8 (7.27)	-
To large extent	-	26 (26.80)	13 (11.82)	11 (11.11)
To somewhat extent	-	15 (15.46)	10 (9.09)	6 (6.06)
To small extent	7 (6.80)	10 (10.31)	12 (10.91)	5 (5.05)
To very small extent	96 (93.20)	36 (37.11)	67 (60.91)	77 (77.78)

(Figures in brackets indicate respective percentage)

Table 67 depicts the university-wise analysis of the extent of use of alerting services in libraries. The table clearly shows that it is the least-used services in libraries. Only 10.31 per cent MGU scholars and 7.27 per cent Calicut University scholars use alerting services to a 'great extent'. 26.80 per cent scholars of MGU use it to a 'large extent' and 11. 82 per cent Calicut University scholars also use it to a 'large extent'.

93.20 per cent Kerala University scholars use it to a 'very small extent' followed by Kannur University (77.78 per cent) and Calicut University (60.91 per cent) scholars.

Subject-wise analysis of the extent of use of alerting services is given in Table 68.

Table 68

Extent of use of alerting services (Subject-wise)

Use	Science	Arts	Social science
To great extent	9 (6.57)	6 (4.48)	5 (3.65)
To large extent	24 (17.52)	13 (9.70)	12 (8.76)
To somewhat extent	7 (5.11)	11 (8.21)	14 (10.22)
To small extent	12 (8.76)	8 (5.97)	13 (9.49)
To very small extent	85 (62.04)	96 (71.64)	93 (67.88)
Total	137	134	137

(Figures in brackets indicate respective percentage)

Table 68 shows the extent of use of alerting services. It shows that a significant percentage of scholars use alerting services to a 'very small extent'. 62.04 percent science scholars, 71.64 per cent arts scholars and 67.88 per cent social science scholars use this service to a 'very small extent'. The percentage of researchers who use the alerting services to a 'large extent' are 17.52 per cent among the science stream, 9.70 per cent among the arts stream and 8.76 per cent among the social science stream. It is clear from the table that not a very significant percentage of scholars are using alerting services to a 'great extent'.

The overall analysis shows that alerting services are not much popular among scholars. Most of them are using the services to a very 'small extent'. University-wise analysis shows that the use of alerting services is comparatively high among MG University scholars. Subject-wise analysis also points at a very limited use of this service.

5.5 Search pattern of web resources and services

Normally users seek information from a variety of sources to satisfy their needs. The ease of seeking and retrieving depends on several aspects like searching pattern, subject relevance and so on. This particular section focuses on the different aspects that determine the selection process of web resources.

5.5.1 Criteria for selecting e-resources

There are many criteria that determine the selection practice of e-resources. Table 69 shows the university-wise list of criteria for selecting e-resources.

Table 69

Criteria for selecting e-resources (University-wise)

Criteria	UK	MGU	UC	KU
Subject relevance	74 (71.84)	85 (87.63)	87 (79.09)	88 (89.80)
Authenticity of information	53 (51.46)	43 (44.43)	67 (69.91)	23 (23.47)
Ease of accessibility	42 (40.78)	25 (25.77)	36 (32.73)	19 (19.39)
Year of Publication	33 (32.04)	30 (30.93)	33 (30.00)	17 (17.35)

(Figures in brackets indicate respective percentage; this is a multiple answer question)

Table 69 is the university-wise analysis of criteria used in the selection of e-resources. The table shows that a large majority of (89.90 per cent) Kannur University scholars, 87.63 per cent MGU scholars, 79.09 per cent Calicut University scholars and 71.84 per cent Kerala University scholars use e-resources based on 'subject relevance'. 69.91 per cent Calicut University scholars, 51.46 per cent Kerala University scholars and 44.43 per cent MG University scholars select e-resources according to 'authenticity of information'. Islam and Panda (2007) conducted a survey among the researchers in Sambalpur University concerning the retrieval trends of web-based information. The results showed that over half of the respondents believed in the authenticity of web-based information. The study also showed that the respondents believed that web-based information was of crucial importance for their research work.

A good number (40.78 per cent) of Kerala University scholars select e-resources according to their 'ease of accessibility'. 32.04 per cent Kerala University scholars and 30.00 per cent scholars from both MGU and Calicut University prefer web resources according to the 'year of publication'. Only 19.19 per cent Kannur University scholars prefer its 'ease of accessibility' and 17.17 per cent scholars from the same university prefer the 'year of publication'.

Subject-wise analysis of criteria for selecting e-resources is given in Table 70

Table 70

Criteria for selecting e-resources (Subject wise)

Criteria	Science	Arts	Social science
Subject relevance	114 (83.21)	109 (81.34)	111 (81.02)
Authenticity of information	65 (47.45)	56 (41.79)	65 (47.45)
Ease of accessibility	37 (27.01)	34 (25.37)	51 (37.23)
Year of Publication	59 (43.07)	33 (24.63)	21 (15.33)

(Figures in brackets indicate respective percentage; this is a multiple answer question)

Table 70 provides a clear picture of the criteria used for selecting e-resources. Most of the researchers prefer the 'subject relevance' of the resources. It is clear from the table that a large majority (83.21 per cent) of science scholars, 81.34 per cent of arts scholars and 81.02 per cent of social science scholars prefer 'subject relevance'. Less than 50.00 per cent (47.45 per cent) scholars from science and social science streams prefer 'authenticity of information'. A good number (43.07 per cent) of science scholars choose according to the 'year of publication'. 24.63 per cent arts scholars and 15.33 per cent social science scholars also have the 'year of publication' as their search criterion.

It is clear from the discussion that most of the scholars prefer 'subject relevance' as their criterion for searching e-resources followed by 'authenticity of information'. University-wise analysis shows that more Kannur University scholars base their choice on 'subject relevance' than those of other universities. And more of Calicut University scholars select according to 'authenticity of information' than those of other universities. 'Ease of accessibility' and 'year of publication' are the preferred criteria of Kerala University scholars. In subject-wise analysis, more science scholars prefers 'subject relevance', 'authenticity of information' and 'year of publication' than scholars of other streams.

5.5.2 Search method

There are a number of search methods available for searching documents. Table 71 shows university-wise analysis of different search methods.

Table 71

Search method (University-wise)

Search method	UK	MGU	UC	KU
Simple search	73 (70.87)	57 (58.76)	74 (67.27)	48 (48.98)
Advanced search	64 (62.14)	54 (55.67)	70 (63.64)	54 (55.10)
Restricted search	9 (8.74)	5 (5.15)	5 (4.55)	6 (6.12)
Keyword search	55 (53.40)	55 (56.70)	61 (55.45)	67 (68.37)

(Figures in brackets indicate respective percentage; this is a multiple answer question)

Table 71 shows that majority of Kerala University scholars (70.87 per cent), followed by 67.27 percent Calicut University scholars, 58.76 per cent MG University scholars, and 55.10 per cent Kannur University scholars use simple search methods. Majority of Calicut University scholars (63.64 per cent) prefer advanced search methods, followed by 62.14 per cent Kerala University scholars. More than average scholars of both MG and Kannur University also prefer advanced search methods. Keyword search is another preference for more than half of the scholars of all universities. Majority (68.37 per cent) of Kannur University scholars use keyword search and 56.70 per cent MG University scholars and 55.45 per cent Calicut University scholars also rely on keyword search.

Subject-wise analysis of data related to search methods for web resources is given in Table 72

Table 72

Search method (Subject wise)

Search method	Science	Arts	Social science
Simple search	83 (60.58)	95 (70.90)	74 (54.01)
Advanced search	108 (78.83)	51 (37.23)	83 (61.94)
Restricted search	4 (2.92)	6 (4.48)	15 (10.95)
Keyword search	108 (78.83)	66 (49.25)	64 (46.72)

(Figures in brackets indicate respective percentage; this is a multiple answer question)

Table 72 establishes that most of the scholars are using simple search methods. It includes 70.90 per cent arts scholars, 60.58 per cent science scholars and 54.01 per cent social science scholars. A fairly high percentage (78.83 per cent) science scholars use advanced search methods. 61.94 per cent social science scholars and 37.23 per cent arts scholars also use advanced search methods. About half of the arts scholars (49.25 per cent) prefer keyword search option. In the case of social science researchers, majority (78.83 per cent) prefer simple search methods and 54.01 per

cent prefer advanced search method and a good number of the scholars (46.72 per cent) prefer keyword search.

The overall analysis indicates that most of the scholars prefer simple search methods. University-wise analysis shows that more of Kerala University scholars prefer simple search methods than of other university scholars. Advanced search is used by majority of Calicut University scholars. Subject-wise analysis shows that a substantial number of science scholars prefer both keyword search and advanced search. The preference of arts scholars is seen to be for simple search while the preference of more social science scholars is seen to be for advanced search.

5.5.3 Orientation programs in libraries

Abundant availability of information may create confusion among users on how to access the right information at the right time. Orientation programs in libraries familiarize members with the various resources and services of the library. As a rule, most of the libraries offer orientation programs during every academic year but many libraries provide such orientation programs and workshops from time to time. The programs facilitate effective use of resources and services by the user. This question was designed by the investigator to analyze whether the scholars get proper orientation programs from the libraries or not.

Table 73

Orientation programs in libraries (University wise)

Response	UK	MGU	UC	KU
Yes	48 (46.60)	32 (32.99)	46 (41.82)	21 (21.43)
No	20 (19.42)	11 (11.34)	26 (23.64)	18 (18.37)
Don't know	35 (55.67)	54 (55.67)	38 (34.55)	59 (60.20)
Total	103	97	110	98
chi-square=27.3		df=6	p=0.000	

(Figures in brackets indicate respective percentage)

Table 73 illustrates the research community's opinions on orientation programs in libraries. It shows that 46.60 per cent Kerala University scholars get sufficient orientation programs followed by research scholars of Calicut University (41.82 per cent). 23.64 per cent Calicut University scholars are of the opinion that they do not get the necessary orientation programs. 19.42 percent Kerala and 18.37 Kannur University scholars are also of the same opinion.

60.20 per cent Kannur University scholars do not know at all whether such programs are available in the library or not. They are followed by 55.67 per cent Kerala and the same percentage of MG University scholars. The chi-square value of 27.3 and p value zero indicate that there is a significant difference in university-wise analysis of orientation programs in libraries.

Subject-wise analysis of data regarding the orientation programs provided by the libraries is given in Table 74

Table 74

Orientation programs in libraries (Subject-wise)

Response	Science	Arts	Social science
Yes	50 (36.50)	52 (38.81)	45 (32.85)
No	27 (19.71)	28 (20.90)	20 (14.60)
Don't know	60 (43.80)	54 (40.30)	72 (52.55)
Total	137	134	137
chi-square=4.72		df=4	p=0.318

(Figures in brackets indicate respective percentage)

Table 74 illustrates subject-wise analysis of the awareness about orientation programs in libraries. It shows that more than half of the scholars of social science (52.55 per cent) do not know whether the library is providing orientation programs or not. 43.80 per cent science scholars and 40.30 per cent arts scholars also have the same opinion. A reasonable percentage of science scholars (36.50 per cent), 38.81

per cent arts scholars and 32.85 per cent social science scholars have confirmed the availability of orientation programs.

A good number of scholars have said that they have not got any orientation program, and this includes 19.71 per cent science scholars, 20.90 per cent arts scholars and 14.60 per cent social science scholars. Through the chi-square test it is clear that there is no significant association between the variables, since p value is .318 which is greater than 0.05. As the percentage of difference between the three disciplines is small, it indicates that there is no significant difference among the scholars of different subjects with regard to orientation programs in libraries.

The overall analysis indicates that a considerable number of scholars are not familiar with any type of library orientation program. University-wise analysis shows that about half of Kerala University scholars are aware of such programs. Subject-wise analysis indicates that a good number of arts scholars (38.81 per cent) know about library orientation programs. The chi-square value of 27.3 and p value zero indicate that there is a significant difference in university-wise analysis of orientation programs in libraries. Through the chi-square test it is clear that there is no significant association between the different disciplines, since the p value is .318 which is greater than 0.05. Library professionals should instruct library users to utilize library resources effectively. User education from time to time and category-wise user education can help to improve utilization of library facilities and resources. If a library is providing any type of program, the authorities should concentrate on admitting the maximum number of scholars from that university to the program.

5.5.4 Need for advanced level orientation

User orientation facilitates and enhances effective usage of the library. Orientation may be provided in different types like resource-specific training, discipline-specific training, and information about reference work and so on. Once the user gets an orientation they get an opening to a vast collection of information and its proper utilization methods. Tables 75 and 76 show the responses of scholars in this matter.

Table 75

Need for advanced level orientation (University-wise)

Response	UK	MGU	UC	KU
Yes	96 (93.20)	86 (88.66)	101 (91.82)	94 (94.95)
No	7 (6.80)	11 (11.34)	9 (8.18)	4 (4.08)
Total	103	97	110	98

(Figures in brackets indicate respective percentage)

Table 75 portrays the responses of users about the need for advanced level orientation. It shows that majority of scholars of all universities are of the opinion that they want advanced level orientation programs. 93.20 per cent Kerala University scholars, 88.66 per cent MG University scholars, 91.82 per cent Calicut University scholars and 94.95 per cent Kannur University scholars want to have advanced orientation.

However, some of the scholars have responded negatively to the question. This includes 6.80 per cent Kerala University scholars, 11.34 per cent MG University scholars, 8.18 per cent Calicut University scholars and 4.08 per cent Kannur University scholars.

Subject-wise analysis of opinion regarding the need for advanced orientation programs in library is presented in Table 76

Table 76

Need for advanced level orientation (Subject-wise)

Response	Science	Arts	Social Science
Yes	129 (92.70)	116 (86.57)	132 (96.35)
No	8 (5.84)	18 (13.43)	5 (3.65)
Total	137	134	137

(Figures in brackets indicate respective percentage)

It is evident from Table 76 that majority of research scholars of different disciplines prefer to get advanced orientation programs. 92.70 per cent science scholars, 86.57 per cent arts scholars and 96.35 per cent social science scholars have responded positively to the question, though small percentages of scholars from all disciplines have responded negatively.

On the whole, the analyses indicate that there is need for advanced orientation programs for research scholars so that they can make full use of what the libraries have to offer. A significant majority of scholars, as seen from university-wise as well as subject-wise analyses have expressed their desire to have advanced level of orientation. Advanced level user education/orientation increases users' familiarity with various resources and services offered by the library. The libraries can provide orientation programs based on resource-specific, discipline-specific, and reference work-based training. If more attention is provided through orientation or individual support, the services of the libraries will be better accessible to the entire user community.

5.5.5 Assistance for using web information services

For using web services some people need assistance. Through this question the investigator asked whether the scholars get assistance for using web information services.

Table 77

Assistance for using web information services (University-wise)

Assistance	UK	MGU	UC	KU
Yes	65 (63.12)	73 (75.26)	68 (61.82)	43 (43.43)
No	25 (24.27)	15 (15.46)	30 (27.27)	37 (37.76)
Don't know	13 (12.62)	9 (9.28)	12 (10.91)	18 (18.37)

(Figures in brackets indicate respective percentage)

Table 77 shows that a good number of scholars agree that they get assistance for using web information services. A significant percentage (75.26 per cent) of MG University scholars agree that they get assistance for using web information services. They are followed by Kerala University scholars (63.12 per cent), Calicut University scholars (61.82 per cent) and then by 43.43 per cent Kannur University scholars who also concur that they get assistance for using web information services. 37.76 per cent Kannur University scholars are of the opinion that they do not get assistance for using web information services. The study also found that 24.27 per cent Kerala University scholars and 27.27 per cent Calicut University scholars are also of the same opinion. It is worth pointing out that some of the respondents (18.18 per cent Kannur University scholars, 12.62 per cent Kerala University scholars and 10.91 per cent Calicut University scholars) are not even aware whether such assistance is available through the library.

Subject-wise analysis of data regarding the assistance for using web information services is given in Table 78

Table 78

Assistance for using web information services (Subject-wise)

Assistance	Science	Arts	Social science
Yes	87 (63.50)	82 (61.19)	80 (58.39)
No	38 (27.74)	31 (23.13)	38 (27.74)
Don't know	12 (8.76)	21 (15.67)	19 (13.87)

(Figures in brackets indicate respective percentage)

Data mentioned in Table 78 shows that most of the scholars (63.50 per cent science scholars, 61.19 per cent arts scholars and 58.39 per cent social science scholars respectively) agree that they get the necessary assistance for using web information services.

A good number of scholars from all the disciplines, which include 27.74 per cent science scholars, 23.13 per cent arts scholars and 27.74 per cent social science

scholars, say that they are not getting any assistance for using web information services. And a small percentage of respondents do not even know if such assistance is available or not.

The overall analysis points out that majority of scholars get the required assistance for using web information resources and services except Kannur University scholars. University-wise analysis shows that more of MG University scholars get the necessary assistance than those of other universities. And more of science scholars get the assistance for using web information services than those of other disciplines.

5.5.6 Personal assistance for using web information services

For accessing web-based information, researchers may require assistance in some cases. People who are not very tech-savvy may sometimes get stuck behind technical problems and this will deprive them of easy access to web resources and services. Researchers were asked about who was assisting them for using web information services. Tables 79 and 80 give explanations on the likely persons by whom the scholars can get assisted in using web resources and services.

Table 79

Personal assistance for using web information services (University-wise)

Assistance	UK	MGU	UC	KU
Faculty	22 (21.36)	23 (23.71)	27 (24.55)	4 (4.04)
Library Staff	47 (45.63)	74 (76.29)	57 (51.82)	43 (43.43)
Friends/ colleague	28 (27.18)	26 (26.80)	32 (29.09)	16 (16.16)
Any other	2 (1.94)	2 (2.06)	2 (1.82)	0

(Figures in brackets indicate respective percentage)

Data given in Table 79 reflects that 76.29 per cent MG University scholars are being helped by the library staff in using web information services. 51.82 per cent Calicut University scholars and 45.63 per cent Kerala University scholars and 43.43 per cent Kannur University scholars are also being helped in the same way. A good number

of scholars except those of Kannur University say that they get assistance from the faculty members and friends. 29.09 per cent Calicut University scholars get help from their friends/colleagues followed by 27.18 per cent Kerala University scholars.

Subject-wise analysis of data regarding the assistance available for using web information services is illustrated in Table 80

Table 80

Personal assistance for using web information services (Subject-wise)

Assistance	Science	Arts	Social science
Faculty	25 (18.25)	35 (26.12)	16 (11.68)
Library Staff	82 (59.85)	64 (47.76)	75 (54.74)
Friends/ colleague	33 (24.09)	33 (24.63)	36 (26.28)
Any other	3 (2.19)	0	3 (2.19)

(*Figures in brackets indicate respective percentage)*

It is seen that majority of science scholars (59.85 per cent) get assistance from the library staff. 54.74 per cent social science scholars and 47.76 per cent arts scholars are also seen to concur that they get assistance the same way. A good numbers of scholars (24.09 per cent science scholars, 24.63 per cent arts scholars and 26.28 per cent social science scholars respectively) say that they get assistance from friends/colleagues.

A few number of science scholars (18.25 per cent) point out that they get assistance from faculty members. 26.12 per cent arts scholars and 11.68 per cent social science scholars also get help the same way.

Researchers need updated information in their respective fields. The various web services help the users to find the resources easily. The above table shows that most of the scholars get assistance from the library staff. University-wise analysis shows that more of MG University scholars get assistance from the library staff than those

of other universities. Subject-wise analysis shows that more science scholars get assistance than those of other disciplines.

5.6 Advantages of web information services

There are so many advantages in getting web information services. To assess these advantages, information was sought and collected from users and is presented in Tables 81 and 82.

Table 81

Advantages of web information services (University-wise)

Advantages	UK (N=103)	MGU (N=97)	UC (N=110)	KU (N=98)
Improved quality of work	97 (94.17)	93 (95.88)	106 (96.36)	94 (95.92)
Get library facility round the clock	50 (48.54)	37 (38.14)	48 (43.64)	23 (23.47)
Get compound access	50 (48.54)	44 (45.36)	45 (40.91)	19 (19.39)
Get maximum retrieval speed	60 (58.25)	54 (55.67)	61 (55.45)	28 (28.57)
Print and downloading facility	68 (66.02)	69 (71.13)	67 (60.91)	34 (34.69)
Comprehensive information coverage	66 (64.08)	62 (63.92)	71 (64.55)	45 (45.92)
Time saving	72 (69.90)	69 (71.13)	79 (71.82)	72 (73.47)
Reduced amount of browsing	57 (55.34)	59 (60.82)	66 (60.00)	35 (35.71)
Environment friendly	49 (47.57)	54 (55.67)	48 (43.64)	37 (37.76)
Access to recent thoughts	67 (65.05)	68 (70.10)	81 (73.64)	56 (57.14)
Physical movement reduced	64 (62.14)	63 (64.95)	72 (65.45)	50 (51.02)
Any other	14 (13.59)	1 (1.03)	12 (10.91)	0

(Figures in brackets indicate respective percentage; this is a multiple answer question)

Table 81 demonstrates that 96.36 per cent Calicut University scholars have confirmed that web-based information services help to improve their quality of work. 95.88 per cent MG University scholars and 95.92 per cent Kannur University scholars have also responded the same way. 48.54 per cent Kerala University scholars have revealed that they get the library facility round the clock followed by 43.64 per cent Calicut University scholars. 23.47 per cent Kannur University scholars also say that they get the library facility round the clock.

48.54 per cent Kerala University scholars say that they get compound access facility. 45.36 per cent MG University scholars and 40 .91 per cent Calicut University scholars also have the same opinion. Print and downloading is another advantage of web information services. 71.13 MG University scholars and 66.02 per cent Kerala University scholars have cited print and downloading facility as an advantage. Majority of scholars from all the universities (64.08 per cent from Kerala University, 64.55 per cent from Calicut University and 63.92 per cent from MG University respectively) have mentioned that comprehensive information coverage is an advantage of web information services.

A significant percentage of respondents from all the universities have agreed that saving of time is the main advantage in using web-based services. 73.47 per cent Kannur University scholars and nearly 71.00 per cent scholars from both MG University and Calicut University have the same opinion. 60.00 per cent Calicut University scholars and 60.82 per cent MG University scholars say that their browsing time is reduced much. A good number of scholars from all the universities agree that the process is environment-friendly.

73.64 per cent and 70.10 per cent from Calicut University and MG University respectively are of the opinion that they are inspired by new thoughts. Higher than average of scholars also agree that their physical movements have been significantly curtailed.

Subject-wise analysis of advantages of web information services is given in Table 82

Table 82

Advantages of web information services (Subject-wise)

Advantages	Science	Arts	Social Science
Improved quality of work	131 (95.62)	128 (95.52)	131 (95.62)
Get library facility round the clock	63 (45.99)	36 (26.87)	59 (43.07)
Get compound access	55 (40.15)	44 (32.84)	59 (43.07)
Get maximum retrieval speed	71 (51.82)	62 (46.27)	70 (51.09)
Print and downloading facility	86 (62.77)	74 (55.22)	78 (56.93)
Comprehensive information coverage	81 (59.12)	76 (56.72)	87 (63.50)
Time saving	98 (71.53)	91 (67.91)	103 (75.18)
Reduced amount of browsing	82 (59.85)	59 (44.03)	76 (55.47)
Environment friendly	67 (48.91)	60 (44.78)	61 (44.53)
Access to recent thoughts	88 (64.23)	87 (64.93)	97 (70.80)
Physical movement reduced	82 (59.85)	88 (65.67)	79 (57.66)
Any other	9 (6.57)	11 (8.21)	7 (5.11)

(Figures in brackets indicate respective percentage; this is a multiple answer question)

The analysis in Table 82 shows that a high percentage of science, arts and social science scholars (95.62 per cent) are of the opinion that web services have 'improved their quality of work'. About one third of science and social science scholars speak of round-the-clock availability as their advantage. 26.87 per cent arts scholars have the same opinion. Nearly 40.15 per cent science scholars and 43.07 per cent social science scholars say that through web services they get compound access facility.

About half of (51.82 per cent) science and 51.09 per cent of social science scholars say that they get the resources at maximum retrieval speed. Majority of scholars (62.77 per cent science scholars, 55.22 per cent arts scholars and 63.50 per cent social science scholars) say that print and downloading facility is another advantage of web-based services.

63.50 per cent social science scholars agree that they get comprehensive information coverage through web information services. Majority of (75.18 per cent) social science scholars are of the opinion that time-saving is another advantage and this

number is followed by 71.53 per cent science scholars and 67.91 per cent arts scholars. About 59.85 per cent science scholars state that their amount of browsing has also reduced. Nearly 65.67 per cent arts scholars say that their physical movement has reduced a lot because of these facilities.

From the data gathered, the conclusion can be drawn that most of the scholars, in both university-wise and subject-wise analyses, are of the opinion that web services have many advantages like compound access facility, time saving, and comprehensive information coverage and so on. A substantial percentage of scholars from both university-wise and subject-wise analyses have the view that web services have improved their quality of work. More of Calicut University scholars than those of other universities are of the viewpoint that web information services have improved their quality of work. Most of the scholars have come to the conclusion that 'time saving' has been another main advantage for them. Majority of scholars also concur on the fact that 'print and downloading facility' and 'comprehensive information coverage' are other important advantages of web resources and services. Subject-wise analysis also shows that a high percentage of science and social science scholars (95.62 per cent) feel that web resources and services have 'improved their quality of work'. Another advantage, namely 'time saving', has been highly (75.18 per cent) mentioned by social science scholars.

5.7 Impact of web information services for academic efficiency

There are many web information services which help scholars in improving their academic efficiency. The survey showed that web information services have a good level of positive influence on researchers' academic efficiency. Opinions of users were gathered and the same are tabulated and presented in Tables 83 to 86.

Table 83

Impact of web information services for academic efficiency (University wise)

Descriptions		UK	MGU	UC	KU
Helps to find the material	Strongly agree	63 (61.17)	59 (60.82)	58 (52.73)	52 (53.06)
	Agree	33 (32.04)	27 (27.84)	42 (38.18)	38 (38.78)
	Neutral	4 (3.88)	5 (5.15)	6 (5.45)	4 (4.08)
	Disagree	1 (0.97)	4 (4.12)	2 (1.82)	2 (2.04)
	Somewhat disagree	2 (1.94)	2 (2.06)	2 (1.82)	2 (2.04)
Total		103	97	110	98
Easier to get hold the material	Strongly agree	32 (31.07)	50 (51.55)	37 (33.64)	47 (47.96)
	Agree	48 (46.60)	32 (32.99)	54 (49.09)	43 (43.88)
	Neutral	14 (13.59)	11 (11.34)	13 (11.82)	3 (3.06)
	Disagree	8 (7.77)	3 (3.09)	5 (4.55)	3 (3.06)
	Somewhat disagree	1 (0.97)	1 (1.03)	1 (0.91)	2 (2.04)
Total		103	97	110	98
Easier to find the development in my own field	Strongly agree	28 (27.18)	51 (52.58)	30 (27.27)	37 (37.76)
	Agree	48 (46.60)	29 (29.90)	55 (50.00)	43 (43.88)
	Neutral	21 (20.39)	10 (10.31)	20 (18.18)	11 (11.22)
	Disagree	4 (3.88)	4 (4.12)	3 (2.73)	3 (3.06)
	Somewhat disagree	2 (1.94)	3 (3.09)	2 (1.82)	4 (4.08)
Total		103	97	110	98
Inspired new thinking	Strongly agree	43 (41.75)	33 (34.02)	35 (31.82)	43 (43.88)
	Agree	39 (37.86)	41 (42.27)	53 (48.18)	36 (36.73)
	Neutral	19 (18.45)	15 (15.46)	19 (17.27)	11 (11.22)
	Disagree	1 (0.97)	3 (3.09)	2 (1.82)	3 (3.06)
	Somewhat disagree	1 (0.97)	5 (5.15)	1 (0.91)	5 (5.10)
Total		103	97	110	98
Reduced amount of browsing time	Strongly agree	18 (17.48)	27 (27.84)	21 (19.09)	36 (36.73)
	Agree	45 (43.69)	40 (41.24)	42 (38.18)	32 (32.65)
	Neutral	31 (30.10)	17 (17.53)	42 (38.18)	22 (22.45)
	Disagree	8 (7.77)	8 (8.25)	4 (3.64)	6 (6.12)
	Somewhat disagree	1 (0.97)	5 (5.15)	1 (0.91)	2 (2.04)
Total		103	97	110	98
Reduced working time	Strongly agree	27 (26.21)	36 (37.11)	26 (23.64)	29 (29.59)
	Agree	38 (36.89)	33 (34.02)	38 (34.55)	39 (39.80)
	Neutral	18 (17.48)	14 (14.43)	22 (20.00)	16 (16.33)
	Disagree	17 (16.50)	12 (12.37)	20 (18.18)	12 (12.24)
	Somewhat disagree	3 (2.91)	2 (2.06)	4 (3.64)	2 (2.04)
Total		103	97	110	98

(Figures in brackets indicate respective percentage)

Table 83 presents the various degrees of concurrence about the impact of web information services on academic efficiency. Majority of (61.17 per cent) Kerala University scholars and 60.82 per cent MG University scholars 'strongly agree' that

web information services 'helps to find the material'. 53.06 per cent Kannur University scholars and 52.73 per cent Calicut University scholars also 'strongly agree' that web information services 'help to find the material'. About half (51.55 per cent) of MG University scholars 'strongly agree' that through web information services they can 'easily get hold of the material'.

About half of MG University scholars (52.58 per cent) 'strongly agree' that it is 'easier to find the development in my own field'. 50.00 per cent Calicut University scholars also 'agree' with it. 43.88 per cent Kannur University scholars 'strongly agree' that web information services 'inspire new thinking'. 48.18 per cent Calicut University scholars and 42.27 per cent MG University scholars agree that web information services 'inspire new thinking'. A good number of scholars from all the universities agree that the amount of browsing required in libraries has decreased because of the help of web information services. 43.69 per cent Kerala University scholars and 41.24 per cent MG University scholars 'agree' that their 'amount of browsing time has reduced' by using web information services. A good number of scholars agree that their working time has come down because of the use web information services.

Table 84

ANOVA test for Impact of web information services for academic efficiency (University-wise)

	N	Mean	Std. Deviation	F Value	P value
Kerala	103	3.9935	.63311		
MG	97	4.1065	.71935		
CALICUT	110	3.9697	.64300	1.210	.306
KANNUR	98	4.1156	.78225		
Total	408	4.0433	.69525		

Analysis of variance is further applied for the discussion. It points out that as the ANOVA value is 1.210, and p value is .306 which is greater than .05, the university-wise analysis of influence of web information services for academic efficiency is statistically identified as not significant.

Subject-wise analysis of the influence of web information services on academic efficiency is given in Table 85

Table 85

Impact of web information services for academic efficiency (subject-wise)

Efficiency		Science	Arts	Social Science
Helps to find the material	Strongly agree	84 (61.31)	71 (52.99)	77 (56.20)
	Agree	44 (32.12)	47 (35.07)	49 (35.77)
	Neutral	6 (4.38)	7 (5.22)	6 (4.38)
	Disagree	1 (0.73)	5 (3.73)	3 (2.19)
	Somewhat disagree	2 (1.46)	4 (2.99)	2 (1.46)
Total		137	134	137
Easier to get hold the material	Strongly agree	52 (37.96)	58 (43.28)	56 (40.88)
	Agree	57 (41.61)	56 (41.79)	64 (46.72)
	Neutral	19 (13.87)	13 (9.70)	9 (6.57)
	Disagree	8 (5.84)	5 (3.73)	6 (4.38)
	Somewhat disagree	1 (0.73)	2 (1.49)	2 (1.46)
Total		137	134	137
Easier to find the development in my own field	Strongly agree	46 (33.58)	55 (41.04)	45 (32.85)
	Agree	55 (40.15)	58 (43.28)	62 (45.26)
	Neutral	29 (21.17)	12 (8.96)	21 (15.33)
	Disagree	5 (3.65)	5 (3.73)	4 (2.92)
	Somewhat disagree	2 (1.46)	4 (2.99)	5 (3.65)
Total		137	134	137
Inspired new thinking	Strongly agree	51 (45.26)	43 (32.09)	60 (43.80)
	Agree	57 (41.61)	61 (45.52)	51 (37.23)
	Neutral	21 (15.33)	25 (18.66)	18 (13.14)
	Disagree	2 (1.46)	4 (2.99)	5 (2.19)
	Somewhat disagree	6 (4.38)	1 (0.75)	5 (3.65)
Total		137	134	137
Reduced amount of browsing time	Strongly agree	28 (20.44)	31 (23.13)	43 (31.39)
	Agree	60 (43.88)	54 (40.30)	45 (32.85)
	Neutral	35 (25.55)	39 (29.10)	38 (27.74)
	Disagree	11 (8.03)	6 (4.48)	9 (6.57)
	Somewhat disagree	3 (2.19)	4 (2.99)	2 (1.46)
Total		137	134	137
Reduced working time	Strongly agree	38 (27.74)	44 (32.84)	36 (26.28)
	Agree	51 (37.23)	44 (32.84)	53 (38.69)
	Neutral	23 (16.79)	22 (16.42)	25 (18.25)
	Disagree	22 (16.06)	20 (14.93)	19 (13.87)
	Somewhat disagree	3 (2.19)	4 (2.99)	4 (2.92)
Total		137	134	137

(Figures in brackets indicate respective percentage)

Table 85 gives the subject-wise analysis to check the influence of web information services on academic efficiency. Majority of the scholars opine that 'it helps them to find materials'. 61.31 per cent science scholars, 52.99 per cent arts scholars and 56.20 per cent social science scholars 'strongly agree' to the statement. 40.88 per cent social science scholars, 43.28 per cent arts scholars and 37.96 per cent science scholars 'strongly agree' to the statement 'easier to get hold of the material'. A good number of researchers (40.15 per cent science scholars, 43.28 per cent arts scholars and 45.26 per cent social science scholars) 'agree' to the opinion 'easier to find the development in their own field'.

'Inspiration for new thinking' is another statement agreed to by a good number of scholars. 45.26 per cent science scholars, 32.09 per cent arts scholars and 43.80 per cent social science scholars 'strongly agree' to it.

43.88 per cent science scholars 40.30 per cent arts scholars and 32.85 per cent social science scholars opine that they agree with the idea of 'reduced amount of browsing time'. 33.58 per cent science scholars 'strongly agree' to the opinion 'easier to find the development in my own field'. 43.28 per cent arts scholars and 45.26 per cent social science scholars also agree to it.

Table 86

ANOVA test for Impact of web information services for academic efficiency (Subject-wise)

	N	Mean	Std. Deviation	F Value	P value
SCIENCE	137	4.1533	.68690		
ARTS	134	3.9440	.67660		
SOCIAL SCIENCE	137	4.0304	.71063	3.136	.045
Total	408	4.0433	.69525		

Analysis of variance is applied for further discussion. Computer ANOVA value is 3.136 which is greater than its p value (.045) at five per cent significance. Hence there is a significant variation among the subject-wise distribution of impact of web information services on academic efficiency.

Analysis

The overall analysis shows that most of the research scholars have the belief that web-based information services positively influence their studies and help them to reduce their searching and working time. Most of the scholars replied positively ('strongly agree' and 'agree') to the query. More of Kerala University scholars than those of other universities 'strongly agree' to the statement that web resources 'helps to find material'. More of Calicut University scholars than those of other universities agree to the statement 'easier to get hold of the material'. The findings show that 46.60 per cent Kerala University scholars 'agree' with the statement 'easier to find the development in my own field' and their percentage is more compared to other university scholars. More number of Kannur University scholars than the rest 'strongly agree' to the option 'inspires new thinking'. The findings of university-wise distribution also reveal that majority of Kerala University scholars 'strongly agree' to the statement 'helps to find the material'. They are followed by a significant percentage of MG University scholars. About half of MG University scholars feel that it is 'easier to find the development in their own field'.

In the case of subject-wise analysis, science scholars have the highest percentage who thinks that it 'helps to find the material'. Most of the social science scholars 'agree' to the statement of 'easier to find the development in my own field'. Subject-wise distribution also shows that more number of science scholars 'strongly agree' to the statement 'inspires new thinking'. Analysis of variance indicates that there exists a significant difference in the mean scores of impact of web information services for academic efficiency in relation to subject-wise analysis whereas it is not significant in the case of university-wise analysis.

5.8 Level of satisfaction of web-based information services

Different web-based information services, and the satisfaction level among researchers due to those, are shown in Tables 87 to 92.

Table 87

Level of satisfaction of web based information services (University wise)

Information services	Satisfaction level	UK	MGU	UC	KU
Library Portal	Very satisfied	20 (19.42)	29 (29.90)	30 (27.27)	4 (4.08)
	Fairly satisfied	74 (71.84)	49 (50.52)	62 (56.36)	40 (40.82)
	Don't know	6 (5.83)	11 (11.34)	9 (8.18)	18 (18.37)
	Fairly dissatisfied	2 (1.94)	5 (5.15)	5 (4.55)	5 (5.10)
	Very dissatisfied	1 (0.97)	3 (3.09)	4 (3.64)	31 (31.63)
Total		103	97	110	98
Institutional Repository	Very satisfied	16 (15.53)	32 (32.99)	6 (5.45)	4 (4.08)
	Fairly satisfied	55 (53.40)	46 (47.42)	59 (53.64)	18 (18.37)
	Don't know	28 (27.18)	8 (8.25)	30 (27.27)	17 (17.35)
	Fairly dissatisfied	2 (1.94)	8 (8.25)	12 (10.91)	60 (60.61)
	Very dissatisfied	2 (1.94)	3 (3.09)	3 (2.73)	3 (3.06)
Total		103	97	110	98
E-resources	Very satisfied	38 (36.89)	53 (54.64)	69 (62.73)	27 (27.55)
	Fairly satisfied	36 (34.95)	28 (28.87)	31 (28.18)	52 (52.53)
	Don't know	21 (20.39)	5 (5.15)	4 (3.64)	12 (12.24)
	Fairly dissatisfied	4 (3.88)	7 (7.22)	3 (2.73)	3 (3.06)
	Very dissatisfied	4 (3.88)	4 (4.12)	3 (2.73)	4 (4.08)
Total		103	97	110	98
OPAC	Very satisfied	13 (12.62)	20 (20.62)	14 (12.73)	10 (10.20)
	Fairly satisfied	34 (33.01)	37 (38.14)	83 (75.45)	24 (24.49)
	Don't know	50 (48.54)	32 (32.99)	10 (9.09)	57 (58.16)
	Fairly dissatisfied	3 (2.91)	7 (7.22)	2 (1.82)	3 (3.06)
	Very dissatisfied	3 (2.91)	1 (1.03)	1 (0.91)	4 (4.08)
Total		103	97	110	98
Alerting services	Very satisfied	7 (6.80)	23 (23.71)	3 (2.73)	8 (8.16)
	Fairly satisfied	9 (8.74)	32 (32.99)	26 (23.64)	8 (8.16)
	Don't know	47 (45.63)	26 (26.80)	23 (20.91)	56 (57.14)
	Fairly dissatisfied	19 (18.45)	11 (11.34)	50 (45.45)	8 (8.16)
	Very dissatisfied	21 (20.39)	5 (5.15)	8 (7.27)	18 (18.37)
Total		103	97	110	98
E-book	Very satisfied	40 (38.83)	46 (47.42)	39 (35.45)	35 (35.71)
	Fairly satisfied	50 (48.54)	36 (37.11)	52 (47.27)	36 (36.73)
	Don't know	9 (8.74)	5 (5.15)	8 (7.27)	13 (13.27)
	Fairly dissatisfied	3 (2.91)	8 (8.25)	8 (7.27)	12 (12.24)
	Very dissatisfied	1 (0.97)	2 (2.06)	3 (2.73)	2 (2.04)
Total		103	97	110	98
E-journals	Very satisfied	47 (45.63)	58 (59.79)	50 (45.45)	39 (39.80)
	Fairly satisfied	44 (42.72)	27 (27.84)	51 (46.36)	48 (48.98)
	Don't know	6 (5.83)	5 (5.15)	3 (2.73)	5 (5.10)
	Fairly dissatisfied	2 (1.94)	6 (6.19)	3 (2.73)	2 (2.02)
	Very dissatisfied	4 (3.88)	1 (1.03)	3 (2.73)	4 (4.08)
Total		103	97	110	98

(Figures in brackets indicate respective percentage)

It is seen from the table that majority (71.84 per cent) of Kerala University scholars and 56.36 per cent of Calicut University scholars are fairly satisfied with the library portal. 31.63 per cent Kannur University scholars are quite dissatisfied with the library portal. About half of the Kerala, MG and Calicut University scholars are fairly satisfied with institutional repository but 60.61 per cent Kannur University scholars are fairly dissatisfied with institutional repository.

In the case of e-resource services, majority of Calicut University scholars (62.73 per cent) are very satisfied with the e-resources followed by MG University (54.64 per cent) and Kannur University (52.53 per cent) scholars. Most of the respondents of Calicut University (75.45 per cent) are fairly satisfied with the OPAC. In the case of alerting services, 23.71 per cent MG University scholars are very satisfied. A good number of Calicut University scholars (45.45 per cent) are fairly dissatisfied with the alerting services.

The table also reveals that 47.42 per cent MG University scholars are very satisfied about e-books and 48.54 per cent Kerala University scholars are fairly satisfied about e-books. Majority of MG University scholars (59.79 per cent) are very satisfied about e-journals. 45.63 per cent Kerala University scholars, 45.45 per cent Calicut University scholars and 39.80 per cent Kannur University scholars are also very satisfied about e-journals.

Table 88

ANOVA test for Level of satisfaction of web based information services (University-wise)

	N	Mean	Std. Deviation	F Value	P value
Kerala	103	3.7725	.51989		
MG	97	4.0118	.63610		
CALICUT	110	3.8481	.49950	22.984	.000
KANNUR	98	3.3776	.56931		
Total	408	3.7549	.59973		

Analysis of variance is carried out to test university-wise analysis of level of satisfaction with web-based information services in university libraries in Kerala.

The p value is zero which shows that satisfaction level of web-based information services on the basis of university is statistically significant.

The data are further analyzed by using Scheffe test to know the significance of variation in level of satisfaction of users with respect to web-based information services in university libraries in relation to each other. The result of the scheffe test is presented in Table 89

Table 89

Variation in level of satisfaction with web based information services (University-wise)

University	Kerala	MG	Calicut	Kannur
KERALA	1	.027	.806	.000
MG	.027	1	.217	.000
CALICUT	.806	.217	1	.000
KANNUR	.000	.000	.000	1

Table 89 indicates that in the case of Kerala University users, the variation found is significant between Kannur University and MG university users since the p value is less than five per cent. At the same time, there is significant variation between Kerala University and Calicut University users as the respective p value is greater than five per cent level. Moreover, the variation found is significant between MG University scholars and scholars of Kerala and Kannur universities as the p value is significant at five per cent level. In the case of Calicut University, significant difference is only with Kannur University since the p value is zero. In the case of Kannur University, the variation found in level of satisfaction of users with web-based services is significant with Kerala, MG and Calicut University.

Subject-wise analysis of level of satisfaction is presented in Table 90.

Table 90

Level of satisfaction of web-based information services (Subject-wise)

Information services	Satisfaction level	Science	Arts	Social Science
Library Portal	Very satisfied	32 (23.36)	33 (24.63)	18 (13.14))
	Fairly satisfied	87 (63.50)	83 (61.94)	55 (40.15)
	Don't know	11 (8.03)	10 (7.46)	23 (16.79)
	Fairly dissatisfied	3 (2.19)	2 (1.49)	34 (24.82)
	Very dissatisfied	3 (2.19)	2 (1.49)	34 (24.82)
Total		137	134	137
Institutional Repository	Very satisfied	31 (22.63)	21 (15.67)	6 (4.38)
	Fairly satisfied	68 (49.64)	71 (52.99)	39 (28.47)
	Don't know	32 (23.36)	25 (18.66)	26 (18.98)
	Fairly dissatisfied	4 (2.92)	13 (9.70)	61 (44.53)
	Very dissatisfied	2 (1.46)	4 (2.99)	5 (3.65)
Total		137	134	137
E-resources	Very satisfied	57 (41.61)	82 (61.19)	.48 (35.04)
	Fairly satisfied	46 (33.58)	38 (28.36)	63 (45.99)
	Don't know	24 (17.52)	3 (2.24)	15 (10.95)
	Fairly dissatisfied	6 (4.38)	7 (5.22)	4 (2.92)
	Very dissatisfied	4 (2.92)	4 (2.99)	7 (5.11)
Total		137	134	137
OPAC	Very satisfied	23 (16.79)	20 (14.93)	14 (10.22)
	Fairly satisfied	44 (32.12)	80 (59.70)	54 (39.42)
	Don't know	61 (44.53)	27 (20.15)	61 (44.53)
	Fairly dissatisfied	6 (4.38)	6 (4.48)	3 (2.19)
	Very dissatisfied	3 (2.19)	1 (0.75)	5 (3.65)
Total		137	134	137
Alerting services	Very satisfied	15 (10.95)	18 (13.43)	8 (5.84)
	Fairly satisfied	18 (13.14)	45 (33.58)	12 (8.76)
	Don't know	57 (41.61)	33 (24.63)	62 (45.26)
	Fairly dissatisfied	23 (16.79)	31 (23.13)	34 (24.82)
	Very dissatisfied	24 (17.52)	7 (5.22)	21 (15.33)
Total		137	134	137
E-book	Very satisfied	56 (40.88)	54 (40.30)	50 (36.50)
	Fairly satisfied	64 (46.72)	57 (42.54)	53 (38.69)
	Don't know	13 (9.49)	4 (2.99)	18 (13.14)
	Fairly dissatisfied	3 (2.19)	14 (10.45)	14 (10.22)
	Very dissatisfied	1 (0.73)	5 (3.73)	2 (1.46)
Total		137	134	137
E-journals	Very satisfied	66 (48.18)	73 (54.48)	55 (40.15)
	Fairly satisfied	54 (39.42)	51 (38.06)	65 (47.45)
	Don't know	11 (8.03)	1 (0.75)	7 (5.11)
	Fairly dissatisfied	2 (1.46)	8 (5.95)	3 (2.19)
	Very dissatisfied	4 (2.92)	1 (0.75)	7 (5.11)
Total		137	134	137

(Figures in brackets indicate respective percentage)

Table 90 depicts the subject-wise opinion of respondents about the level of satisfaction with respect to web-based information services. By analyzing the answers, it's clear that majority of science (63.50 per cent) and arts scholars (61.94 per cent) are fairly satisfied with the library portal. 40.15 per cent social science scholars also have the same opinion. In the case of institutional repository, half of the (52.99 per cent) arts scholars are satisfied with it. 49.64 per cent science scholars and 28.47 per cent social science scholars are also satisfied with IRs. Majority of arts scholars (61.19 per cent) are very satisfied with e-resources. 41.61 per cent science scholars and 35.04 per cent social science scholars also have the same opinion.

59.70 per cent arts scholars are fairly satisfied with OPAC. 32.12 per cent science scholars and 39.42 per cent social science scholars also are of similar opinion. 33.58 per cent arts scholars are fairly satisfied with alerting services. Only 13.14 per cent science scholars and 8.76 per cent social science scholars are fairly satisfied with alerting services.

A good number of scholars are very satisfied with e-book availability (40.88 per cent science scholars and 40.30 per cent arts scholars and 36.50 per cent social science scholars respectively). It is seen from the table that 48.18 per cent science scholars, 54.48 per cent arts scholars and 40.15 per cent social science scholars are very satisfied with e-journals also.

Table 91

ANOVA test for Level of satisfaction of web based information services (Subject-wise)

	N	Mean	Std. Deviation	F Value	P value
Science	137	3.8551	.55138		
Arts	134	3.6567	.59229		
Social Science	137	3.7508	.64006	3.760	.024
Total	408	3.7508	.59973		

Analysis of variance is carried out to test subject-wise analysis of level of satisfaction with web-based information services in university libraries in Kerala. The p value is .024 which shows that satisfaction level of web-based information services on the basis of subject is statistically significant.

The data are further analyzed by using Scheffe test to know the significance of variation in level of satisfaction of users with respect to subject. The result of the scheffe test is presented in Table 92

Table 92

Variation in level of satisfaction with web based information services (Subject-wise)

	Science	Arts	Social science
Science	1	.024	.351
Arts	.024	1	.431
Social Science	.351	.431	1

Table 92 shows that in the case of science scholars, the variation found is significant with arts scholars since the p value is .024. Arts scholars found five per cent significance with science scholars. In case of social science scholars no significant variation is found with science and arts scholars.

The overall analysis shows that users are fairly satisfied with the web resources regardless of university and subject. Analyses identified that alerting services is the least satisfactory web service in universities. At the same time, it is found that e-journal is the most appreciated service among the various scholars. Statistical analysis shows that significant variation is found in both university-wise and subject-wise analyses in level of satisfaction of web-based information services. It can also be found that significant variation is seen among Kerala University with MG University and Kannur University, among MG University with Kerala University and Kannur University, among Calicut University with Kannur University, and among Kannur University with all other universities. Subject-wise analysis has found that the variation is significant among science scholars with arts scholars and arts scholars with science scholars, but no significant variation is found among social science scholars with scholars of other subjects.

5.9 Difficulties while using web-based information services

Through the particular question, the investigator analyzed the problems of web-based information usage. It is mainly divided into two types, namely, Institutional problems and Personal problems. The results are presented in Tables 93 to 98.

Table 93

Difficulties while using web-based information services (University wise)

Difficulties	Frequency	UK	MGU	UC	KU
Institutional Problem					
Inadequate ICT infrastructure	Always	11 (10.68)	3 (3.09)	8 (7.27)	11 (11.22)
	Very often	16 (15.53)	3 (3.09)	10 (9.09)	47 (47.96)
	Sometimes	45 (43.69)	41 (42.27)	47 (42.73)	19 (19.39)
	Rarely	17 (16.50)	46 (42.27)	30 (27.27)	14 (14.29)
	Never	14 (13.59)	4 (4.12)	15 (13.64)	7 (7.14)
Total		**103**	**97**	**110**	**98**
No availability of materials	Always	4 (3.88)	1 (1.03)	3 (2.73)	14 (14.29)
	Very often	23 (22.33)	12 (12.37)	23 (20.91)	44 (44.90)
	Sometimes	35 (33.98)	46 (47.42)	41 (37.27)	32 (32.65)
	Rarely	35 (33.98)	35 (36.08)	41 (37.27)	5 (5.10)
	Never	6 (5.83)	3 (3.09)	2 (1.82)	3 (3.06)
Total		**103**	**97**	**110**	**98**
Do not get support from library staff	Always	7 (6.80)	1 (1.03)	5 (4.55)	21 (21.43)
	Very often	16 (15.53)	2 (2.06)	13 (11.82)	40 (40.82)
	Sometimes	22 (21.36)	15 (15.46)	49 (44.55)	16 (16.33)
	Rarely	32 (31.07)	63 (64.95)	33 (30.00)	11 (11.22)
	Never	26 (25.24)	16 (16.49)	10 (9.09)	10 (10.20)
Total		**103**	**97**	**110**	**98**
Lack of user education programs	Always	48 (46.60)	21 (21.65)	17 (15.45)	13 (13.27)
	Very often	30 (29.13)	19 (19.59)	39 (35.45)	53 (54.08)
	Sometimes	16 (15.53)	25 (25.77)	43 (39.09)	23 (23.47)
	Rarely	5 (4.85)	23 (23.71)	8 (7.27)	5 (5.10)
	Never	4 (3.88)	9 (9.28)	3 (2.73)	4 (4.08)
Total		**103**	**97**	**110**	**98**
Slow response of network	Always	21 (20.39)	5 (5.15)	25 (22.73)	20 (20.41)
	Very often	19 (18.45)	20 (20.62)	23 (20.91)	44 (44.90)
	Sometimes	33 (32.04)	23 (23.71)	30 (27.27)	21 (21.43)
	Rarely	21 (20.39)	42 (43.30)	30 (27.27)	6 (6.12)
	Never	9 (8.74)	7 (7.22)	2 (1.82)	7 (7.14)
Total		**103**	**97**	**110**	**98**
Limited working time	Always	20 (19.42)	15 (15.46)	26 (23.64)	13 (13.27)
	Very often	20 (19.42)	56 (57.73)	39 (35.45)	50 (50.02)
	Sometimes	22 (21.36)	12 (12.37)	19 (17.27)	12 (12.24)
	Rarely	22 (21.36)	5 (5.15)	18 (16.36)	10 (10.20)
	Never	19 (18.45)	9 (9.28)	8 (7.27)	13 (13.27)
Total		**103**	**97**	**110**	**98**
Personal problems					
I am not sufficiently familiar with the resources	Always	8 (7.77)	3 (3.09)	12 (10.91)	4 (4.08)
	Very often	22 (21.36)	12 (12.37)	24 (21.82)	11 (11.22)

	Sometimes	35 (33.98)	29 (29.09)	31 (28.18)	62 (63.27)
	Rarely	19 (18.45)	25 (25.77)	22 (20.00)	7 (7.14)
	Never	19 (18.45)	28 (28.87)	21 (19.09)	14 (14.29)
Total		**103**	**97**	**110**	**98**
I am not sufficiently familiar with the gadgets	Always	2 (1.94)	3 (3.09)	6 (5.45)	3 (3.06)
	Very often	26 (25.24)	7 (7.22)	16 (14.55)	18 (18.37)
	Sometimes	31 (30.10)	22 (22.68)	35 (31.82)	46 (46.94)
	Rarely	22 (21.36)	28 (28.87)	24 (21.82)	20 (20.41)
	Never	22 (21.36)	37 (38.14)	29 (26.36)	11 (11.22)
Total		**103**	**97**	**110**	**98**
I don't know how to search	Always	1 (0.97)	2 (2.06)	2 (1.82)	6 (6.12)
	Very often	14 (13.59)	2 (2.06)	10 (9.09)	21 (21.43)
	Sometimes	21 (20.39)	7 (7.22)	22 (20.00)	41 (41.84)
	Rarely	33 (32.04)	32 (32.99)	30 (27.27)	17 (17.35)
	Never	34 (33.01)	54 (55.67)	46 (41.82)	13 (13.27)
Total		**103**	**97**	**110**	**98**
Inconvenience in using different format	Always	6 (5.83)	5 (5.15)	4 (3.64)	2 (2.04)
	Very often	14 (13.59)	5 (5.15)	11 (10.00)	13 (13.27)
	Sometimes	34 (33.01)	11 (11.34)	31 (28.18)	57 (58.16)
	Rarely	32 (31.07)	36 (37.11)	39 (35.45)	13 (13.27)
	Never	17 (16.50)	40 (41.24)	25 (22.73)	13 (13.27)
Total		**103**	**97**	**110**	**98**
Difficult to read from the screen	Always	2 (1.94)	1 (1.03)	2 (1.82)	4 (4.08)
	Very often	17 (16.50)	5 (5.15)	15 (13.64)	3 (3.06)
	Sometimes	22 (21.36)	15 (15.46)	21 (19.09)	63 (64.29)
	Rarely	26 (25.24)	27 (27.84)	29 (26.36)	12 (12.24)
	Never	36 (34.95)	49 (50.52)	43 (39.09)	16 (16.33)
Total		**103**	**97**	**110**	**98**
I get alternative sources	Always	10 (9.71)	9 (9.28)	10 (9.09)	8 (8.16)
	Very often	13 (12.62)	16 (16.49)	13 (11.82)	17 (17.35)
	Sometimes	27 (26.21)	24 (24.74)	32 (29.09)	59 (60.20)
	Rarely	25 (24.27)	29 (29.90)	28 (25.45)	6 (6.12)
	Never	28 (27.18)	19 (19.59)	27 (24.55)	8 (8.16)
Total		**103**	**97**	**110**	**98**

(Figures in brackets indicate respective percentage)

Table 93 demonstrates that there exist some institutional and personal problems while using web-based information services and resources. In the case of institutional problems, 43.69 per cent Kerala University scholars 'sometimes' face 'inadequacy of ICT tools' and it is followed by Calicut University (42.73 per cent) and MG University (42.27 per cent) scholars. 44.90 per cent Kannur University scholars reveal that they very often face the problem of 'no availability of the material'. In the case of 'lack of user education programs', 54.08 per cent Kannur University scholars are seen to very often face the problem. 39.09 per cent Calicut University scholars sometimes face it. 44.90 per cent Kannur University scholars very often face the institutional problem of 'slow response network'. 32.04 per cent

Kerala University scholars sometimes face the same problem. Coming to the question of 'limited working time', 50.02 per cent Kannur University scholars very often face this difficulty. A good number of scholars of all the universities sometimes face 'limited working time' difficulty.

Some personal problems also happen while using web-based information services. In the problem of 'not sufficiently familiar with the resources', 63.64 per cent Kannur University scholars are seen to sometimes face it. 41.84 per cent of Kannur University scholars sometimes face 'searching difficulty'. Another personal problem is the 'inconvenience in using different formats' and 58.16 per cent Kannur University scholars sometimes face it. But 41.24per cent MG University scholars never face it. 'Reading from the screen' is another personal problem sometimes faced by Kannur University scholars (64.29 per cent) and 60.20 per cent Kannur University scholars are sometimes confronted with the problem of 'getting some alternative sources'. However, 19.59 per cent MG University scholars never get any alternative source.

Table 94

ANOVA test for Difficulties while using web based information services (University-wise)

	N	Mean	Std. Deviation	F Value	P value
KERALA	103	2.8002	.63597		
MG	97	2.4467	.43770		
CALICUT	110	2.7591	.57617	32.588	.000
KANNUR	98	3.1998	.45055		
Total	408	2.8011	.59374		

Analysis of variance has been carried out to test university-wise differences in difficulties while using web-based information services in university libraries in Kerala. The p value of zero shows that difficulties while using web information services on the basis of university is statistically significant.

The data is further analyzed by using Scheffe test to know the significance of variation in level of satisfaction of users with respect to university. The result of the scheffe test is presented in Table 95

Table 95

Variation in Difficulties while using web based information services (University-wise)

	Kerala	MG	Calicut	Kannur
Kerala	1	.000	.957	.000
MG	.000	1	.001	.000
Calicut	.957	.001	1	.000
Kannur	.000	.000	.000	1

Table 95 indicates that in the case of Kerala University, the variation found is significant with Kannur University and MG university users since the p value is zero. At the same time, in the case of Kerala University, no significant variation is found with Calicut University as its respective p value is greater than five per cent level. Moreover, the variation has been found to be significant among MG University with Kerala University, Calicut University and Kannur University as its p value is significant at five per cent level. In the case of Calicut University, the variation is found to be significant with MG University and Kannur University since the p value is zero. In the case of Kannur University, the variation is found to be significant with Kerala, MG and Calicut University.

Table 96

Difficulties while using web-based information services (Subject-wise)

Difficulties	Frequency	Science	Arts	Social science
Do not get adequate ICT infrastructure	Always	11 (8.03)	6 (4.48)	11 (11.68)
	Very often	16 (11.68)	9 (6.72)	20 (37.23)
	Sometimes	57 (41.61)	56 (41.79)	39 (28.47)
	Rarely	38 (27.74)	49 (36.57)	20 (14.60)
	Never	15 (10.95)	14 (10.45)	11 (8.03)
Total		**137**	**134**	**137**
No availability of materials	Always	5 (3.65)	1 (0.75)	16 (11.68)
	Very often	30 (21.90)	19 (14.18)	53 (38.69)
	Sometimes	48 (35.04)	61 (45.52)	45 (32.85)
	Rarely	47 (34.31)	50 (37.31)	19 (13.87)
	Never	7 (5.12)	3 (2.24)	4 (2.92)
Total		**137**	**134**	**137**
Do not get support from library staff	Always	8 (5.84)	1 (0.75)	25 (18.25)
	Very often	16 (11.68)	12 (8.96)	43 (31.39)
	Sometimes	26 (18.98)	46 (34.33)	30 (21.90)
	Rarely	54 (39.42)	61 (45.52)	24 (17.52)
	Never	33 (24.09)	14 (10.45)	15 (10.95)
Total		**137**	**134**	**137**
Lack of user education programs	Always	55 (40.15)	27 (20.15)	17 (12.41)
	Very often	35 (25.55)	45 (33.58)	61 (44.53)

	Sometimes	28 (20.44)	36 (26.87)	43 (31.39)
	Rarely	13 (9.49)	19 (14.18)	9 (6.57)
	Never	6 (4.38)	7 (5.22)	7 (5.11)
Total		**137**	**134**	**137**
Slow response of network	Always	23 (16.79)	13 (9.70)`	35 (25.55)
	Very often	23 (16.79)	36 (26.12)	31 (22.63)
	Sometimes	41 (29.93)	35 (26.12)	31 (22.66)
	Rarely	37 (27.01)	47 (35.07)	15 (10.95)
	Never	13 (9.49)	3 (2.24)	9 (6.57)
Total		**137**	**134**	**137**
Limited working time	Always	25 (18.25)	26 (19.40)	23 (16.79)
	Very often	44 (32.12)	60 (44.78)	61 (44.53)
	Sometimes	24 (17.52)	21 (15.67)	20 (14.60)
	Rarely	23 (16.79)	15 (11.19)	17 (12.41)
	Never	21 (15.33)	12 (8.96)	16 (11.68)
Total		**137**	**134**	**137**
Personal Problems				
I am not sufficiently familiar with the resources	Always	11 (8.03)	11| (8.21)	5 (3.65)
	Very often	26 (18.98)	26 (19.40)	17 (12.41)
	Sometimes	48 (35.04)	33 (24.63)	76 (55.47)
	Rarely	25 (18.25)	33 (24.63)	15 (10.95)
	Never	27 (19.71)	31 (23.13)	24 (17.52)
Total		**137**	**134**	**137**
I am not sufficiently familiar with the gadgets	Always	3 (2.19)	8 (5.97)	3 (2.19)
	Very often	28 (20.44)	17 (12.69)	22 (16.06)
	Sometimes	37 (27.01)	36 (26.87)	61 (44.53)
	Rarely	33 (24.09)	32 (23.88)	29 (21.17)
	Never	36 (26.28)	41 (30.60)	22 (16.06)
Total		**137**	**134**	**137**
I don't know how to search	Always	1 (0.73)	3 (2.24)	7 (5.11)
	Very often	14 (10.95)	13 (9.70)	15 (10.95)
	Sometimes	38 (27.74)	24 (17.91)	71 (51.82)
	Rarely	45 (32.85)	49 (36.57)	26 (18.98)
	Never	33 (24.09)	43 (32.09)	19 (13.87)
Total		**137**	**134**	**137**
Inconvenience in using different format	Always	3 (2.19)	2 (1.49)	4 (2.92)
	Very often	20 (14.60)	12 (8.96)	8 (5.84)
	Sometimes	30 (21.90)	43 (32.90)	21 (15.33)
	Rarely	30 (21.90)	43 (32.09)	21 (15.33)
	Never	54 (39.41)	59 (44.03)	31 (22.63)
Total		**137**	**134**	**137**
Difficult to read from the screen	Always	3 (2.19)	`2 (1.49)	4 (2.92)
	Very often	20 (14.60)	12 (8.96)	8 (5.84)
	Sometimes	30 (21.90)	18 (13.43)	73 (53.28)
	Rarely	30 (21.90)	43 (32.09)	21 (15.33)
	Never	54 (39.41)	59 (44.03)	31 (22.63)
Total		**137**	**134**	**137**
I get alternative sources	Always	17 (12.41)	7 (5.22)	13 (9.49)
	Very often	18 (13.14)	20 (14.93)	21 (15.33)
	Sometimes	33 (24.09)	42 (31.34)	67 (48.91)
	Rarely	37 (27.01)	34 (25.37)	17 (12.41)
	Never	32 (23.36)	31 (23.13)	19 (13.87)
Total		**137**	**134**	**137**

(Figures in brackets indicate respective percentage)

Table 96 shows the subject-wise analysis of the institutional and personal problems that scholars have to confront while using web-based information services. Coming to the issue of institutional problems, a good number of scholars 'sometimes' face 'inadequacy of ICT infrastructure' (41.61 per cent science scholars, 41.79 per cent arts scholars and 28.47 per cent social science scholars). 'No availability of material' is another institutional problem that a significant number of scholars have to encounter. 35.04 per cent science scholars, 45.52 per cent arts scholars and 32.85 per cent social science scholars encounter this problem.

45.52 per cent arts scholars say that they have to only 'rarely' confront the problem of 'do not get support from library staff', followed by 39.42 percent science scholars. But 31.39 per cent social science scholars 'very often' face the same problem. 40.15 per cent science scholars have to 'always' grapple with the problem of 'lack of user education program'. 33.58 per cent arts and 44.53 per cent social science scholars very often encounter the same problem. 'Slow response network' is another institutional problem that 29.93 per cent science, 26.12 per cent arts and 22.66 per cent social science scholars 'sometimes' face. A good number of scholars have to encounter the problem of 'limited working time of library', and this include 44.78 per cent arts scholars followed by 44.53 per cent social science and 32.12 percent science scholars.

Coming to the question of personal problems, 55.47 per cent social science, 35.04 per cent science and 24.63 per cent arts scholars are seen to 'sometimes' face the problem of 'not sufficiently familiar with the resources'. 44.53 per cent social science, 27.01 per cents science and 26.87 arts scholars sometimes face the problem of 'not sufficiently familiar with the gadget'.

The problem of 51.82 per cent social science scholars is 'don't know how to search'. 32.85 per cent science scholars and 36.57 per cent arts scholars 'rarely' encounter the same problem. 32.90 percent arts scholars 'sometimes' face 'inconvenience in using different format'. A few scholars of science (21.90 per cent) and social science (15.33 per cent) also have the same problem. 53.28 per cent social science scholars have to 'sometimes' confront the problem 'difficult to read from the screen' though

21.90 per cent science scholars and 32.09 per cent arts scholars 'rarely' face the same problem. A good number of social science scholars (48.91 per cent), arts scholars (31.34 per cent) and science scholars (24.09 per cent) sometimes 'get alternative source'.

Table 97

ANOVA test for Difficulties while using web-based information services (Subject-wise)

	N	Mean	Std. Deviation	F Value	P value
Science	137	2.8054	.65953		
Arts	134	2.8943	.48475		
Social Science	137	2.7056	.61029	3.467	.032
Total	408	2.8011	.59374		

Analysis of variance has been carried out to test subject-wise analysis of difficulties while using web-based information services in university libraries in Kerala. The p value of .032 shows that difficulties while using web information services on the basis of subject is statistically significant.

The data is further analyzed by using Scheffe test to know the significance of variation in level of difficulties of users with respect to subject. The result of the Scheffe test is presented in Table 98.

Table 98

Variation in Difficulties while using web based information services (Subject-wise)

	Science	Arts	Social Science
Science	1	.464	.377
Arts	.464	1	.032
Social Science	.377	.032	1

Table 98 indicates that in the case of science scholars, no significant variation is found with arts and social science scholars since the p value is greater than five per cent level. At the same time, variation has been found among arts scholars with

social science scholars as its p value is .032. It is seen that social science scholars have significant variation with arts scholars.

It is worth pointing out that Kannur University scholars 'very often' face institutional problems like lack of user education (54.08 per cent) and limited working time (50.02 per cent). A good number of scholars of Kannur university 'very often' have to encounter other institutional problems like inadequate ICT infrastructure, no availability of material, slow response network, lack of support from library staff etc. A considerable number of scholars of Kerala University, MG University, and Calicut University also 'sometimes' face such institutional problems. Many of Kannur university scholars 'sometimes' face personal problems like 'not sufficiently familiar with resources, not sufficiently familiar with gadget, inconvenience in using different format' etc. A good number of scholars from other universities 'sometimes' face the same personal problems. Subject-wise analysis indicates that more of arts scholars than the rest 'sometimes' face institutional as well as personal problems. The p values of zero and of .032 show that difficulty while using web information services on the basis of university and subject is statistically significant.

A significant variation is seen in the case of Kerala University users with Kannur University and MG University users since the p value is zero. Likewise, the variation is found significant among MG University with Kerala University, Calicut University and Kannur University as its p value is significant at five per cent level. In the case of Calicut University, variation is seen to be significant with MG University and Kannur University since the p value is zero. In case of Kannur University, the variation is significant with Kerala, MG and Calicut universities. There is no significant variation in the case of science scholars with arts and social science scholars, since the p value is greater than five per cent level. At the same time, there is variation in the case of arts scholars with social science scholars. It is seen that social science scholars get significant variation with arts scholars.

PART II

Part II of the analysis is based on the questions answered by the chief librarians of the selected universities. This part of the analysis deals with the library collection and infrastructure facilities of the library with respect to web-based information services.

5.10.Selected universities and their library web address

All the selected universities maintain its own library website or portal. Address of the particular library portal is given below.

Table 99

Selected universities and their library web address

University	URL
University of Kerala	www.kulib.in
Mahatma Gandhi University	www.library.mgu.ac.in
University of Calicut	www.library.uoc.ac.in
Kannur university	www.kannuruniversitylibrary.ac.in

5.11. Category-wise details of total membership

Table 100 shows the details of the library membership according to the category of users. Memberships are categorized into university students, university staff, research scholars, faculties and so on.

Table 100

Category-wise details of total membership

Category	UK	MGU	UC	KU
Students	5593	708	4050	107
University staff	970	832	1380	206
Research scholars	467	450	706	135
Faculty	197	1047	147	81
Others (Graduate, college students etc.)	2353	101	2227	1314
Total	9580	3138	8510	1723

From the table it is clear that the maximum number of users belong to Kerala University, followed by Calicut University. The least number of users are from Kannur University. Kannur University is a multi-campus university with campuses spread over across various locations under its jurisdiction. The headquarters and central library are situated in Thavakara campus and that's probably the reason for this university having lesser users compared to the other selected central libraries.

5.12. Library collections

The total number of library collections in number is given in Table 101. It includes the collections of printed and non-print materials.

Table 101

Library collections

Documents	UK	MGU	UC	KU
Books	349179	65893	109390	45390
Journal (Foreign)	24	43	21	7
Journal (Indian)	305	153	166	228
E-journals	17000	370	18368	4600
E-books	2500	7354	83470	-
CD-ROM	1300	294	325	1469

Table 101 provides insight into the collections of participating libraries. The data show that the biggest collection of books belongs to Kerala University and the smallest one belongs to Kannur University. MG University and Kerala University have the highest collections of foreign journals and Indian journals respectively. E-journal and e-book collections are higher in Calicut University in comparison to other universities. Kannur University has in its possession the largest number of CD-ROMs.

5.13. Budget of the university libraries

The allocation of funds to different university libraries in Kerala from the respective university budgets during the period from 2011-2012 to 2015-2016 is presented in Table 102.

Table 102

Budget of the university libraries

University	Budget	2011-12	2012-13	2013-14	2014-15	2015-16
Kerala University	Total	3,72,84,700	4,69,99,100	6,87,95,000	6,21,11,000	7,05,60,800
	E-resources	10,23,000	46,25,000	50,100,96	80,10,000	74,35,000
MG University	Total	2,62,90,000	3,46,50,000	5,98,10,000	5,23,35,000	6,77,60,000
	E-resources	18,00,000	18,00,000	20,00,000	25,00,000	30,00,000
Calicut University	Total	1,63,90,000	1,94,67,000	2,21,39,450	2,61,16,000	3,08,24,000
	E-resources	19,10,659	16,23,556	2,75,294	3,23,360	2,99,000
Kannur University	Total	5441000	3603600	7156000	9520000	1,14,50,000
	E-resources	-	-	-	-	-

Total funding is highest for Kerala University during the period of the study. MG University, which came into being later than Calicut University, is getting more funds than the latter. The smallest fund allocation is for Kannur University, which was also established later than the other three universities.

In the year 2011-12 highest amount of fund for e-resources is spend by Calicut University, from the period 2012-13 to 2015-16 highest amount for e-resources is spend by Kerala University. It is clear from the Table No.102 e-resources budget are continues to grow. But during these years no separate fund is allocated by Kannur University for e-resources budget.

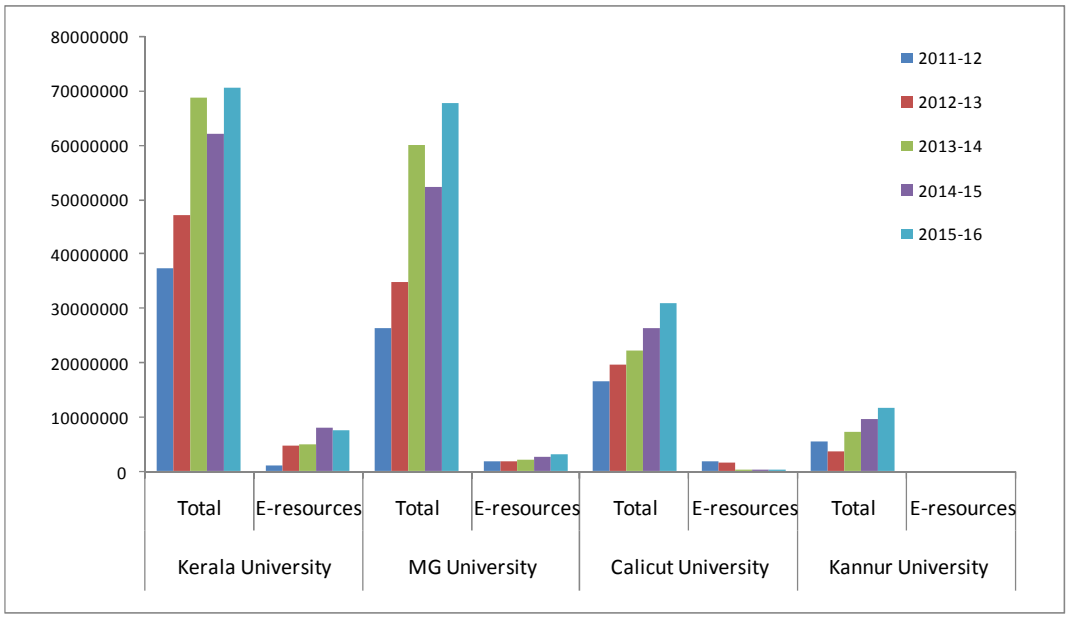

Figure 13 Budget of the university libraries

5.14. Library Network

A library network is an interconnected platform of a group of libraries incorporating certain agreements aimed at satisfying certain user needs by exchanging information.

Table 103

Library Network

Library network	UK	MGU	UC	KU
INFLIBNET	✓	✓	✓	✓
DELNET	✓	✓	-	✓
CALIBNET	-	-	-	-
Other	-	-	-	-

The universities in Kerala, except Calicut University, get the services of both Inflibnet and DELNET. Calicut University gets only the services of Inflibnet.

5.15. Operating system

An operating system is a program, which control the execution of all the other programs or applications.

Table 104

Operating system

Operating system	UK	MGU	UC	KU
Windows	-	✓	-	-
Linux	✓	✓	✓	✓
Other	-	-	-	-

An operating system provides an interface for the use of applications. Now-a-days libraries are using open source operating systems. All the selected libraries are using Linux operating system. In MG University windows is also used. By changing the platform to open source software, libraries are looking for ways to save money.

5.1.6. Network and network type

Networks help to share resources and information through different types of media. The selected four university libraries are providing network facilities for users. Both LAN and Wireless networks are provided by the libraries.

5.16.1. Network service provider

Network service providers own, operate and sell access to internet services. There are several network providers in India which include BSNL, ERNET, NICNET etc. It has been seen that the four selected universities subscribe to the network facility from BSNL. Both broadband and Wi- fi connectivity are provided in the campuses.

5.17. Mode of development of website

With this question, mode of development of websites is assessed by the investigator.

Table 105

Mode of development of website

Mode of development of website	UK	MGU	UC	KU
In house	-	✓	✓	-
Out sourced	✓	-	-	✓

Table 105 shows that both MG and Calicut universities have developed in-house websites. On the other hand, Kerala and Kannur Universities have outsourced the job of website creation to outside agencies.

MG University has got the provision for analyzing the hit rate of its website.

5.18. Automation software in libraries

The universities selected under this study are using KOHA as their automation software. Being an open-source software, the modules of this software can be customized according to the needs of the particular library.

An open-source software can be modified and shared because of its publically available source code. Because of this aspect, programmers can improve the

program by adding new features. The selected universities have created the records of the library in the particular software.

5.19. Hardware components of the library

The hardware components which help in the distribution of web services and resources are analyzed through the question. It shows that server, laptop, desktop, projector, scanner, UPS, modem etc. are used in all the universities.

Digital camera is not available in Calicut and Kannur universities. CD server and DVD players are not available in both Kerala and MG universities. However, it can be seen that most of the hardware components are available in all the universities.

5.20 Frequency of use of resources

Frequency of the visit of different types of users to libraries is analyzed in the study according to the librarian's perspective. It is seen that in MG, Calicut and Kannur universities, faculties are visiting the libraries to a reasonable extent. But in Kerala University, faculties are seen to visit the library only 'rarely'.

Research scholars are the frequent visitors in MG and Calicut universities. However, in Kerala and Kannur universities, research scholars visit the library only to a moderate extent. Students are frequent visitors to the library in both MG and Kannur universities. At the same time, in both Kerala and Calicut universities, students visit only 'rarely'.

Administrative staff members 'rarely' visit the library in Kerala, Calicut and Kannur universities. In MGU, their visit is slightly more, being to a 'moderate' extent. About the public making use of university libraries, it is 'moderate' in Kerala, Calicut and Kannur universities while quite 'rare' in MG university library.

5.21. OPAC services

In all the four universities, OPAC service is provided both online (www) and through local area network.

5.22. Institutional Repository

Kerala University and Calicut University are maintaining their institutional repository by using Dspace platform. Kerala University provides access in a restricted way and in the case of Calicut University, public access is provided in certain cases while only restricted access is provided to the rest. Most of the documents are in PDF form.

MG University and Kannur University are not providing institutional repository now though the idea for developing it is in the offing. However, most of the institutional repositories are now publically available through the World Wide Web so that users are not quite aware of the absence of it in both MG and Kannur universities as scholars are accessing repositories of different institutions from their campuses itself.

5.23. ETDs in libraries

All the four selected universities maintain ETD collections. In all the universities except Kerala University, the details of ETDs are provided through library OPAC and there is also online access to theses. However, in Kannur University, access is limited to the campus.

5.24. Training Programs in Libraries

Libraries and their activities are of a specialized nature. Regular training for both professionals and users is needed to take each resource and service to the masses. The four selected libraries are providing training for both professionals and users on yearly basis. The more commonly-faced problems for dissemination of web information resources and services are the following.

1. High cost of e-resources
2. Internet speed
3. Lack of infrastructural requirements

According to the opinion of chief librarians of the selected universities, centralized purchase of resources to all university libraries, and developing a consortium for university libraries in Kerala, will change this situation. It will also help in better utilization of the web resources and services provided by the libraries.

5.25. Conclusion

This chapter analysed the data collected from both the research scholars and chief librarians of the selected universities regarding the availability of web resources and services, mode of accessibility etc. by using various statistical techniques like chi-square, ANOVA, Mean, scheffe test and simple percentage method. Results are interpreted with the help of tables and diagrams which help the researcher to extract the findings through clear interpretations.

The present study details library services, highlights some of the dissemination defects of university libraries and gives suggestions and remedies to overcome these defects. After analyzing user needs exhaustively, the study recommends providing improved user training at regular intervals so that users will be competent in fully utilizing the materials and services provided in libraries.

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This study has been conducted to measure the different levels of use of various web resources and services by the research scholars in the university libraries in Kerala. This chapter contains the major findings of the study, tenability of the hypotheses, and also puts forward suggestions and recommendations for the improvement of web services in university libraries.

6.1 Major findings of the study

The following are the major findings of the study conducted among the research scholars in the university libraries in Kerala.

6.1.1 Infrastructure facility available in university libraries for providing web based information resources and services.

1. All the selected universities in Kerala are maintaining their own library website. The selected libraries are keeping a good collection of printed and electronic materials. All the libraries get access to 'Inflibnet library networks.

2. Both LAN and wireless networks are provided in all the universities. Most of the hardware components, which support the access to web resources and services, are available in the libraries.

3. Online catalogue is maintained in all the universities. Institutional repository is maintained both in Kerala and Calicut universities using DSpace platform. MG University is maintaining an online thesis repository named 'Online Nitya digital'.

4. Half of Kerala University scholars have access to necessary number of computers. Compared to scholars of other universities, Kerala University scholars have better access to sufficient number of devices like laptops, scanners and printers. Overall, significant difference can be seen in the university-wise analysis of the sufficiency of computers, scanners and printers.

5. More science scholars than scholars of other subjects are satisfied with the number of computers and laptops available for regular use. Coming to printers and scanners, only a slightly higher number of science scholars than the rest feel that they have an adequate supply of both devices. Subject-wise analysis shows that there is a significant difference of opinion on the availability of computers and laptops. In the case of availability of scanners and printers, no significant difference is seen.

6.1.2 Awareness about web-based services

6. The analysis indicates that all the scholars are aware of and use e-mail services. Majority of scholars are comfortable with using online chat, downloading text and multimedia files, and using social networking sites. Kannur University has the highest percentage of scholars using online chat (89.80 per cent), downloading text and multimedia files (97.96 per cent), and using wiki (82.67 per cent) than that of other universities. Online shopping sites (70.87 per cent) and social networking sites (84.47 per cent) are used by a good majority of Kerala University scholars. RSS feed and blogging is the least-used services among scholars.

7. More science scholars are aware of and using web services like online surveys, online chat, online shopping, social networking and wiki than scholars of other subjects. Creation of web pages, RSS feed and blogging do not appear to be very popular among most. Even though more than half of social science scholars (57.66%) are aware of blogs, the user percentage appears to be very low.

8. Library portal service is seen to be aware more by Kerala University scholars than those of other universities, and library catalogue service is seen aware more by MG University scholars than by those of other universities.

9. Among the respondents a high percentage (87.63 per cent) of MG University scholars are aware of institutional repository as well. MG University scholars are also in front with 52.58 per cent using library consortia services

10. Out of the respondents Kerala University has the highest percentage (57.28 per cent) of scholars relying on alerting services, scholars from other universities have lower percentages of awareness about this service.

11. Awareness about the E-journals are more by the MG University scholars (95.88 per cent). E-books also appear to be well aware by all with the lowest user percentage being only 80.58 per cent in the case of Kerala University scholars.

12. In the use of library portal and consortia, social science scholars appear to be more inclined to its use than the other-subject scholars, while in the case of library catalogue, arts scholars seem to have a higher preference for it. In general, reliance on institutional repositories and library consortia appears to be on the average while the use of alerting service is comparatively low. E-journal and e-book use is high among all categories, with the highest user percentage being among science scholars, followed by social science and arts scholars.

6.1.3 Purpose of use

13. A significant number of scholars use web services on a daily basis for their research work and it is comparatively high among MG University scholars. For study purposes, writing papers, and updating knowledge also, a significant percentage of them use web services.

14. A large majority of science, arts and social science scholars use web resources and services 'almost everyday' for their study purposes and research work. Majority of science scholars regularly use web resources and services for writing papers and updating their knowledge. A fairly good number rely on these resources for career advancement also though the percentages are not very high.

6.1.4 Mode of access and extent of use of different web resources and services

15. Users give first preference to use web information services from the university central library and it is followed by department library except in the case of MG University. MG University scholars appear to give second preference to their hostel.

16. Science and social science scholars also prefer to access information from university central library, their second preference being department library. In the case of arts scholars, their choice appears to be the researchers' room followed by hostel.

17. A good number of Kannur University scholars are seen to use web information resources and services for more than four hours in a day, compared to those of other universities. In the case of more than 3-4 hours category, a higher percentage of Calicut University scholars are seen to stick to this time schedule than those of the other universities.

18. Most of the research scholars of all faculties are seen using web information resources and services for more than four hours though more science scholars are seen doing so than the rest. Most of the research scholars in Kerala are using web information resources and services for more than 3 hours. Both university-wise and subject-wise analyses reveal that there exists a significant difference among scholars in the case of time spent for using web information resources and services.

19. Desktop is the most-favoured device among university scholars for making use of web information resources. Calicut University scholars top the list in using desktop computers and they are followed by Kerala University scholars.

20. In the case of laptop, Kerala University scholars have more users for it, followed by Calicut University scholars. Tablet is the least-preferred device for most.

21. Science scholars prefer Tablet to other devices. For arts and social science scholars, desktop is the preferred device, followed by laptop, mobile phone and Tablet.

6.1.4.1Differnt services and resources through different channels

22. Majority of scholars noticed the general information provided through the portal. The general information has been comparatively less noticed by Kannur University scholars.

23. It is also seen that majority of the scholars from all the discipline noticed the general information provided through the library portal.

24. Most of the scholars use web resources and services through the portal. In which E-journal is the most used resources through the portal. At the same time it is seen that IRs is the least used services through the library portal.

25. A good number of scholars from all the universities using library portal for accessing web resources and service very frequent basis (Daily or weekly). Compared to other universities these services and resources quite well used by the MG university scholars.

26. Compared to other subject scholars science scholars are ahead in the frequency of use of different web resources and services through the portal.

27. More of Kerala University scholars have the awareness of external links compared to the rest.

28. Majority of science and social science scholars know about the availability of these external links than arts scholars.

29. A large majority of scholars make use of links that support education while a lesser number of them make use of job-specific links. Compared to other universities, a higher percentage of Kerala University scholars gain access to educational links available through the portal.

30. Social science scholars have a larger percentage using external links which support education and lesser percentages of those who make use of job-specific and communication links.

31. A good number of MG University scholars use the library portal to a 'great extent' than those of other universities in Kerala. However, a good number of Kannur University scholars use it to 'somewhat extent'.

32. Social science scholars are ahead in using the library portal to a 'great extent' compared to scholars of other subjects. A good number of science scholars also use it to 'somewhat extent'.

33. A significant difference in the usage of the library portal in university-wise analysis is noticed. At the same time, subject-wise analysis produced p-value of 0.09 which indicate no significant association, since it is greater than 0.05.

34. A good number of scholars mentioned about the availability of different resources like ETDs, question paper, seminar paper etc. through the institutional repository.

35. While checking the frequency of use of different resources through the IRs it is found that a good number of scholars 'always' use articles and electronic thesis and dissertations and more number of MG university scholars frequently used these services. The resources like seminar papers, question papers etc. are comparatively less ('rarely') used by scholars of different universities of Kerala.

36. MG University researchers use institutional repository 'to great extent' compared to other universities.

37. A higher number of social science scholars use IR to a 'great extent' than science scholars and arts scholars.

38. The chi-square value and p-value of zero indicate that there is a significant difference among the universities in IR use. Since the p-value is .632, it can

be assessed that the association between the extent of use of IRs and discipline is statistically non-significant at the level of 0.05.

39. All the university scholars get access to most of the e-resources through the UGC-Infonet consortia. Majority of the scholars from all universities avail e-journals through the UGC- Infonet consortium.

40. A very high percentage of social science scholars (98.54 per cent) use e-journals through the consortia. This user percentage is very much higher than in the case of scholars of other subjects. Arts scholars use e-books more than those of other disciplines.

41. Majority of scholars from all universities use e-resources available through the different publishers like ACS publications, AIP, Emerald, JSTOR and so on.

42. Majority of scholars from all the universities prefer e-resources which is available in full text form. And a very good number of scholars also prefer abstract also. It is also seen that e-resources available in full text form is highly used among MG University scholars compared to scholars of other universities. Use of Abstract and bibliographic data is comparatively more among Calicut University scholars.

43. E-resources available in full text form are more used among science scholars. Abstract use is more among arts scholars and about half of the social science scholars use bibliography more than other subject scholars.

44. A substantial number of scholars prefer PDF format in which more MG University scholars prefer PDF than those of other universities. DOC format is seen to be the favourite of Calicut university scholars.

45. All the science scholars prefer PDF format. HTML and DOC formats are used more among social science scholars.

46. Most of the scholars of all universities find the level of availability of print facilities quite unsatisfactory.

47. A good number of Calicut University scholars use library consortia to a 'great extent' than those of other universities. The number of Kannur University scholars using library consortia to a 'great extent' is comparatively small.

48. A high percentage of arts scholars use library consortia to a 'great extent' compared to scholars of other subjects. A good number of scholars also use the consortia services to a 'large extent'.

49. The chi-square value and p-value indicate that there exists a significant difference on the extent of use of library consortia among scholars of different universities and researchers of different subjects.

50. Scholars from all the universities are seen to give first preference to e-journal use and least preference to audio/video clips.

51. The overall analysis of subject wise analysis also shows that Research scholars in different discipline also gave first preference to the e-journal use.

52. The arts and science scholars are seen to give the highest preference to e-journals and least preference to audio/video clips but science scholars give first preference to the use of ETDs.

53. Majority of scholars from all the universities used the OPAC services. Among the respondents a reasonable number of MG University scholars (32.99 per cent) frequently ('always') use this services. Comparatively low use of OPAC is seen among Kannur University scholars.

54. Majority of scholars from all disciplines used OPAC services. A good number of social science scholars (26.28 per cent) 'always' use this services. Chi-square test result also confirms that there exists a significant difference in both university-wise and subject-wise analysis of frequency of use of OPAC.

55. A higher number of Calicut University scholars know about Web OPAC facility compared to scholars of other universities. More social science scholars know about it than the rest.

56. More Kerala University scholars prefer 'author, subject and title' search options than scholars of other universities. Comparatively less-used options are 'class number', 'ISBN' and 'keyword' searches.

57. Most of the arts scholars prefer 'author' and 'title' search options and 'publisher' option as well than that of other subject scholars.

58. More Calicut University scholars 'always' retrieve bibliographic information compared to those of other universities. 31.07 per cent Kerala University scholars 'rarely' do so.

59. A reasonable percentage of scholars from all disciplines 'sometimes' retrieve bibliographic information through OPAC. The practice is comparatively high among science scholars. The chi-square test reveals that there exists a significant variation in both university-wise and subject-wise analyses.

60. More Kannur University scholars find 'spelling errors' while searching OPAC than those of other universities. A considerable number of scholars are inconvenienced by other difficulties like 'lack of multi-language support' and 'incomplete entries'.

61. More science scholars find 'spelling errors' as the hurdle than those of other subject scholars. A good number of social science and arts scholars feel that 'lack of multi-language support' and 'incomplete entries' are big issues.

62. In case of extent of use of OPAC services both the university wise and subject wise analysis found that a good number of scholars use it at 'somewhat extent'.

63. 'Renewal of book' and 'new arrival' to libraries are the popular alerting services among scholars. Majority of MG University scholars make use of alerts for renewal of books.

64. Majority of scholars from the selected universities use alerting services only to a 'very small extent'. Use of alerting services is comparatively high among MG University scholars. Subject-wise analysis also points at a very limited use of alerting service.

6.1.5 Search pattern of web resources and services

65. More Kannur University scholars conduct their search based on 'subject relevance' than those of other universities. And more of Calicut University scholars select according to 'authenticity of information' than those of other universities. 'Ease of accessibility' and 'year of publication' are the preferred criteria of Kerala University scholars.

66. More science scholars prefers 'subject relevance', 'authenticity of information' and 'year of publication' than scholars of other streams.

67. A good number of scholars from all the university prefer simple search method.

68. A substantial number of science scholars prefer both keyword search and advanced search. The preference of arts scholars is seen to be for simple search while the preference of more social science scholars is seen to be for advanced search.

69. About half of Kerala University scholars are aware of orientation programs. The chi-square value of 27.3 and p value zero indicate that there is a significant difference in university-wise analysis of orientation programs in libraries.

70. A good number of arts scholars (38.81 per cent) know about library orientation programs. Through the chi-square test it is clear that there is no significant association between different disciplines, since the p value is .318 which is greater than 0.05.

71. A significant majority of scholars, as seen from university-wise as well as subject-wise analyses have expressed their desire to have advanced level of orientation.

72. More of MG University scholars get the necessary assistance from library staff than those of other universities.

73. More of science scholars get the assistance from library staff for using web information services than those of other disciplines.

6.1.6 Advantages of web information services

74. More of Calicut University scholars than those of other universities are of the viewpoint that web information services have improved their quality of work. Most of the scholars have come to the conclusion that 'time saving' has been another main advantage for them. Majority of scholars also concur on the fact that 'print and downloading facility' and 'comprehensive information coverage' are other important advantages of web resources and services.

75. Large majority of science and social science scholars (95.62 per cent) feel that web resources and services have 'improved their quality of work'. Another advantage, namely 'time saving', has been highly (75.18 per cent) mentioned by social science scholars.

6.1.7 Impact of web resources and services among the research scholars

76. More of Kerala University scholars than those of other universities 'strongly agree' to the statement that web resources 'helps to find material'. More of Calicut University scholars than those of other universities agree to the statement 'easier to get hold of the material'. The findings show that 46.60 per cent Kerala University scholars 'agree' with the statement 'easier to find the development in their own field' and their percentage is more compared to other university scholars. More number of Kannur University scholars than the rest 'strongly agree' to the option 'inspires new thinking'. The findings

of university-wise distribution also reveal that majority of Kerala University scholars 'strongly agree' to the statement 'helps to find the material'. They are followed by a significant percentage of MG University scholars. About half of MG University scholars feel that it is 'easier to find the development in their own field'.

77. Science scholars have the highest percentage who think that it 'helps to find the material'. Most of the social science scholars 'agree' to the statement 'easier to find the development in their own field'. Subject-wise distribution also shows that more number of science scholars 'strongly agree' to the statement 'inspires new thinking'.

78. Analysis of variance indicates that there exists a significant difference in the mean scores of impact of web information services for academic efficiency in relation to subject-wise analysis whereas it is not significant in the case of university-wise analysis.

6.1.8 Level of satisfaction with respect to web based resources and services

79. It is found that e-journal is the most appreciated services among the various scholars. But, Alerting services is the least satisfactory services while compared to other web service in universities.

80. Statistical analysis shows that significant variation is found in both university-wise and subject-wise analyses in level of satisfaction of web-based information services. It can also be found that significant variation is seen among Kerala University with MG University and Kannur University, among MG University with Kerala University and Kannur University, among Calicut University with Kannur University, and among Kannur University with all other universities. Subject-wise analysis has found that the variation is significant among science scholars with arts scholars and arts scholars with science scholars, but no significant variation is found among social science scholars with scholars of other subjects.

6.1.9 Impediments faced by the research scholars while accessing web based information services

81. Kannur University scholars 'very often' face institutional problems like lack of user education (54.08 per cent) and limited working time (50.02 per cent). A good number of scholars of Kannur university 'very often' have to encounter other institutional problems like inadequate ICT infrastructure, non-availability of material, slow response of network, lack of support from library staff etc. A considerable number of scholars of Kerala University, MG University, and Calicut University also 'sometimes' face such institutional problems. Many of Kannur university scholars 'sometimes' face personal problems like 'not sufficiently familiar with resources, not sufficiently familiar with gadget, inconvenience in using different format' etc. A good number of scholars from other universities 'sometimes' face the same personal problems.

82. More of arts scholars than the rest 'sometimes' face institutional as well as personal problems. The p values of zero and of .032 show that difficulty while using web information services on the basis of university and subject is statistically significant.

83. A significant variation is seen in the case of Kerala University users with Kannur University and MG University users since the p value is zero. Likewise, the variation is found significant among MG University with Kerala University, Calicut University and Kannur University as its p value is significant at five per cent level. In the case of Calicut University, variation is seen to be significant with MG University and Kannur University since the p value is zero. In case of Kannur University, the variation is significant with Kerala, MG and Calicut universities.

84. There is no significant variation in the case of science scholars with arts and social science scholars, since the p value is greater than five per cent level. At the same time, there is variation in the case of arts scholars with social

science scholars. It is seen that social science scholars get significant variation with arts scholars.

Tenability of Hypotheses

Tenability of hypotheses, which were framed based on the objectives of the study, was examined in the light of the findings drawn out of the study.

Hypothesis 1

The first hypothesis states that **Infrastructure facilities available for providing web-based information resources and services in university libraries in Kerala are moderately adequate.**

It is evident from findings numbered from 1 to 3 that all the selected university libraries are maintaining most of the infrastructure facilities for accessing and delivering web resources and services to the end user.

According to findings number 4 and 5, there exists a significant difference in the adequacy of devices like computers, scanners and printers in the case of university-wise analysis. By applying the chi-square test result given in table number 11, it is clear that a good number of Kerala University scholars have better access to devices like laptop, scanners and printers compared to scholars of other universities. It is also evident from the result of chi-square test shown in table number 12 that above half of the science scholars feel that they get an adequate supply of computers and laptops, while as many scholars of other subjects do not feel so.

Hence, on the basis of the above stated findings, this hypothesis is fully accepted.

Hypothesis 2

Hypothesis 2 states that **research scholars are aware of most of the web-based resources and services available in their respective fields and most of the scholars frequently use web-based information services for their research work.**

The level of awareness of web services and resources was analysed as general services and specific services. As per findings number 6 and 7 it is clear that

scholars are aware of and using most of the web services like e-mail, social networking, wiki etc. According to findings number 8 to 12 it is clear that scholars are aware about the library-oriented web resources and services like library portal, online library catalogue and consortia services.

Findings number 13 and 14 clearly indicate that most of the scholars, regardless of their university or subject, use the various web resources and services 'almost every day' for their research work.

On the light of these findings, the hypothesis is fully validated.

Hypothesis 3

The third hypothesis states that **the mode of access to web resources and services are different for scholars of different universities and disciplines.**

As per findings number 15 and 16, it is clear that most of the scholars give first preference to the university central library for using web resources and services. Findings numbers 17 and 18 and result of chi-square value given in table number 15 show that most of Kannur University scholars use web resources and services for more than four hours every day. It is also evident from the chi-square test result in table number 16 that more science scholars than scholars of other specialties use web resources and services.

As per the details of findings number 19 and 20, desktop is the most-preferred device among scholars. Findings number 21 conveys that most of the science scholars prefer tablets.

According to finding number 24 most of the library services and resources are accessed through the library portal. As per the details of finding number 34, it seen that IRs is mainly used to access electronic thesis and dissertations. Finding number 39 and 40 shows that through the consortia services most of the scholars get access to e-journals. Finding number 42, 43, 44 and 45 shows that most of the scholars prefer full text resources and most of them prefer it in PDF formant. Finding number 54 sows that a good number of scholars exploits web OPAC services.

According to finding number 63 'renewal of book' is the most popular used alerting service.

Therefore, in the light of the above findings, this hypothesis is partially proved.

Hypothesis 4

The fourth hypothesis states that **the extent of use of various web resources and services among research scholars is at a moderate level and vary according to the universities.**

Findings number 31 and 32 summarize the extent of use of library portal. By applying the chi-square result in table number 27, it is clear that there is a significant difference in university-wise analysis since its p value is zero.

Findings number 37 and 38 and table number 33 clearly show that there is a significant university-wise difference in the extent of use of IRs. Findings number 47, 48 and 49 and the chi-square value of zero in table number 47 show that there is a significant difference in university-wise analysis in the extent of use of library consortia. According to findings number 62 and 64, the difference is also seen in the extent of use of OPAC and alerting services.

Hence the hypothesis has been proved by the findings.

Hypothesis 5

The fifth hypothesis states that **most of the research scholars prefer subject criteria and simple search methods while utilizing web-based resources and services for their academic purposes.**

It is clear from findings number 65 and 66 that most of the scholars prefer subject relevance while selecting web resources and services. Further, findings number 67 and 68 show that most of the scholars are using simple search methods while searching web resources and services. This is revealed through the results of table number 69 and 71 as well.

Therefore the fifth hypothesis is also fully substantiated.

Hypothesis 6

The sixth hypothesis states that **there is no significant difference in the impact of use of web resources and services for academic efficiency among research scholars.**

It is evident from findings 76 and 77 that more number of scholars feel that web resources have influence as it 'helps to find the material'. According to findings number 78 and the value of analysis of variance given in table number 84, there exists no significant difference in the mean scores of influence of web information services for academic efficiency in relation to universities. As per the details of the result in table number 86, the ANOVA value of 3.136 and p value of .045 indicate that there is a significant difference in the mean scores of influence of web information services for academic efficiency in relation to subject-wise analysis at five per cent level of significance.

In the light of these findings, the hypothesis can be partially accepted.

Hypothesis 7

The seventh hypothesis states **that the satisfaction level of research scholars in using web-based information services varies according to university and discipline.**

Findings number 79 and 80 show that the e-journal is the most-preferred service among scholars. But alerting services is the least-preferred web service in universities. Statistical analysis shows that there is a significant variation in both university-wise and subject-wise analyses in the level of satisfaction of web-based information services. Significant variation can also be seen in the case of University of Kerala with MG University and Kannur University, MG University with Kerala University and Kannur University, Calicut University with Kannur University and among Kannur University with all other universities. Subject-wise analysis shows that the variation is significant among science scholars with arts scholars and arts scholars with science scholars but no significant variation is seen in the case of social science scholars with scholars of other subjects.

As per the above findings, the hypothesis can be partially accepted.

Hypothesis 8

The eighth hypothesis states that **there is no significant variation found in difficulties faced by research scholars while using web resources and services in university libraries in Kerala.**

As per finding number 81 Kannur University scholars 'very often' faced with many institutional problems. The p values of zero and .032 seen in finding number 82 show that difficulty while using web information services is statistically significant in the case of different universities and different disciplines. Findings number 83 and 84 reveal significant variations in universities and subjects.

Hence, the hypothesis is fully rejected.

Suggestions and Recommendations

Based on the findings and responses to the various aspects of use of web resources and services among research scholars, the following suggestions are made with a view to improve the web-based information services and its dissemination in university libraries in Kerala, and help to improve the usage of these resources and services.

1. University authorities should provide adequate funds for the proper maintenance of web resources and services.
2. University authorities should provide adequate infrastructure facilities with respect to web-based information services and resources dissemination like fast internet connectivity with good network including both wired and wireless network facilities.
3. Librarians should ensure the maintenance of user-friendly settings and must do frequent updating of the portal, so that users can access web services and resources easily.
4. Library portal should also contain a comprehensive list of free e-resources in different subjects.

5. Effective user education should be provided to familiarize users with all the resources and services in the libraries.

6. Library orientation should be provided as resource specific training, discipline specific training, retrieval training, reference work and so on.

7. University libraries should maintain their institutional repository well by adding resources like articles of teachers, students, researchers etc. It will help the users to keep in touch with the developments in their respective fields.

8. Online publications like e-journals, e-books and e-magazines are easily available now. Libraries should take full interest to provide quality publications of these to the users.

9. In addition to photocopying services, printing facility must also be provided within the library premises.

10. Libraries should give proper attention to providing alerting services like e-mails and SMSs. Alerting services can be provided to alert renewal of membership, renewal of books, addition of new resources etc.

11. More hyperlinks to useful resources and services should be offered to users. Through this, users can familiarize themselves with many useful resources and services which will widen their access to the broad array of digital information.

12. University authorities should provide digital literacy programs to the academic community. It will lessen the digital divide among students and scholars. That way many individual problems that scholars encounter while using web resources and services can be reduced.

13. While selecting web resources and services, users requirement or feedback may be collected and considered.

Conclusion

Web resources and services help to disseminate information to a wider audience. In this 21st century, users mainly depend on the information available through the web. The active transformation of various services to the web environment helps the user to access the services and resources easily. This study throws light on the various aspects of web resources and services in university libraries and their usage pattern among scholars.

The study has revealed that most of the web services and resources are set up in the libraries. In the overall analysis, results indicate that research scholars are aware of most of the general and library-related web services. General web services like e-mail, social networking, wiki etc. are known to most of the Kerala and Kannur University scholars. Most of the science scholars are also aware of the general as well as library-related web services. It is clear from the result that majority of the scholars are aware of most of the web services. However, services like creation of web pages, RSS feed, IRs, alerting services etc. are not equally popular. Only about half of the research scholars are familiar with these.

The findings also indicate that a large part of the scholars use web information services almost every day for their research purposes. Meanwhile, the usage is high among MG University scholars. A good majority of scholars use it for their study purposes. Most of the scholars also use it for writing papers and for updating their knowledge. Likewise, a large majority of science, arts and social science scholars use web resources and services 'almost every day' for study purposes as well as research works. Majority of science scholars always use web resources and services for writing papers and updating their knowledge. Proper guidance on accessing and using web resources and services will help the scholars to utilize these to the fullest extent for various purposes.

Coming to the question of the most preferred place for utilizing these services, most of the scholars seem to prefer the central library. More Calicut University scholars than the rest prefer to avail these services from the libraries. As regards scholars of different disciplines, more social science scholars prefer the central library. After

central library, the next favoured places are department libraries and hostels. For MG University scholars their second preference is hostel. Overall it shows that scholars mainly avail web-based information services and resources through the network provided by the university library. If universities expand network connectivity to the whole campus it will be helpful for the entire academic community. On the question of adequacy of devices, the result shows that only computers are available in sufficient numbers in universities. Other devices like laptops, printer and scanners are not available to the required amount. Desktop is the most-preferred device for gaining access to web information resources and services within the campus, followed by laptop. Most of the scholars use web resources and services for more than four hours on a daily basis and the result shows that more Kannur University scholars than the rest use it for more than four hours. As regards scholars of different disciplines, more science scholars use web resources and services for more than four hours than scholars of the other two fields.

Development of library portal or websites and setting up of external and internal links to resources and services will increase the effective and efficient use of resources and services available through the library. The study also finds that e-journal is the most frequently-used web service in university libraries. Institutional repository and alerting services are the least-used services among scholars. As regards the extent of use of various resources, most of the services are only moderately used by scholars. In addition to photocopying facility, university libraries should also provide printing facility. The study has highlighted that most of the scholars use full text resources and that they also prefer the PDF format. The main advantages of web resources and services, according to the scholars that they are improved the quality of work, time and helped to gain comprehensive information coverage.

The most important influence of web resources and services on academic achievement is the fact that they help the user to find the required material easily. In the four universities, MG University has the maximum number of scholars who are satisfied with the web resources and services. E-journal is the most sought-after

service in university libraries. Kannur University scholars are the ones who are least-satisfied with the available resources and services. The academic research community has to grapple with both institutional and personal problems while handling web resources and services. These problems are mainly lack of user education programs, network problems and limited working time. Other problems faced by scholars are non-familiarity with resources, gadgets or search methods. Research scholars from Kannur University are the ones who appear to have maximum difficulties related to institutional problems.

The findings from the study indicate that usage of most web resources and services can be improved through proper orientation programs, as most of the scholars have asserted the need for different types of orientation programs. In addition to these, there should be focus on steady upgrading of the available services in libraries. Hence, library professionals in charge must take care of these things and make sure that users are utilizing all the resources and services in the proper way. It is also suggested that those universities with multi or off campus system should ensure that main campus as well as off campus have adequate infrastructure facilities for providing web based resources and services to their academic community.

Recommendations for further research

The study has enabled to understand the availability of web resources and services in university libraries and the awareness and level of usage of these among research scholars. The investigator wishes to suggest the following areas for further research to add more knowledge in this area.

1. Similar studies can be conducted among the faculty members and PG students of universities in Kerala

2. This type of study can be conducted among the affiliated colleges of different universities

3. A study on Digital literacy can be conducted among research scholars of universities in Kerala.

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APPENDIX I

SCHOLARLY USE OF WEB BASED INFORMATION RESOURCES AND SERVICES IN UNIVERSITY LIBRARIES IN KERALA

Dear sir/Madam

This questionnaire is intended to collect data regarding **"SCHOLARLY USE OF WEB BASED INFORMATION RESOURCES AND SERVICES IN UNIVERSITY LIBRARIES IN KERALA"**, in connection with Ph.D programme undertaken by me under the supervision of **Dr. Abdul Azeez T A**, University Librarian, University of Calicut. I seek your valuable cooperation and help in obtaining the necessary information. I request you to kindly fill up the questionnaire with care and accuracy.

DEEPA P K
Research Scholar in library and information science
University of calicut

Personal Details:

Name of the University:
Department:
Gender (Please tick mark the appropriate) : Male ☐ Female ☐

Age (Please tick mark the appropriate) : Below 25 ☐ 26-30 ☐ 31-35 ☐ 36-40 ☐ Above 40 ☐

Subject of your study: Science and technology ☐ Arts ☐
Commerce and Management Study ☐ Social Science ☐

I. Awareness about web based services:

1. Please mention the awareness about the following internet based tools/services/resources you are familiar with.

Tools/services	Aware and using	Aware but not using	Not aware
E-mail			
WWW			
Online surveys			
Chat			
Online shopping			
Downloading text and multimedia files			
Uploading documents and multimedia files			
Social networking (Eg: Facebook)			
Blogging			
RSS feed			
Wiki			
Creating web page			

2. Specify the web based information services related to the library you are aware

Services	Aware and using	Aware but not using	Not aware
Library portal			
Online library catalogue			
Institutional repository			
Library consortia			
Alerting service			
E-book			
E-journal			

II Purpose of use

3. How often do you use the web based information services for the following purposes?

Sl no	Purpose	Almost every day	Twice in a week	Once in a week	Once in a month	Never
1	Study					
2	Teaching					
3	Research work					
4	Writing papers					
5	Updating knowledge					
7	Career advancement					
8	Recreation					
9	Others (please specify)….					

III Mode of access and extend of use

4. From where do you prefer to use web based information services in the campus (rank 1,2,3..)

University Central Library ☐ Department library ☐

Hostel ☐ Departmental lab ☐

Researcher's room ☐ Other (please specify)…… ☐

5. Please mention your opinion on the adequacy of devices to access web based information services in your campus/library

Devices	Fully adequate	Adequate	Moderately adequate	Not adequate	No comment
Computers					
Laptop					
Scanners					
Printers					

6. Which is your preferable device to use the web information (rank 1,2,3...) ?

Desktop ☐ Laptop ☐

Mobile phone (smart phone) ☐ Tablet ☐

7. How much time do you spent per week in using the web information sources/services?

Below one hour ☐ 1-2 hour ☐

More than 2-3 hour ☐ More than 3-4 hour ☐

More than 4 hour ☐

(a) Library Portal

8. What are the web based information sources/services you are using through the library portal? (Please tick all that you get)

E-journal ☐ E-book ☐
Online databases ☐ Institutional repository ☐
ETD (Electronic thesis and dissertation) ☐
Others (Please specify)..... ☐

9. Please mention frequency of use of web based information sources/ services from the portal

Information sources/services	**Daily**	**Weekly**	**Fortnightly**	**Monthly**	**Quarterly**
E-journal					
E-book					
Online databases					
Institutional Repository					
ETD					

10. What are the general information do you get from the library portal

Sl no	**General information services**	**Please tick mark**
1.	About the library	
2	Postal Address	
3	Contact Number	
4	Email IDs	
5	Circulation Timing	
5	Library Timing	
7	Holidays	
8	Membership	
9	Borrowing Privileges	

10	General rules of library	

11. Does the University library portal provide any other useful links

Yes ☐ No ☐ Don't Know ☐

If Yes, specify the type of website link

Educational ☐ Recreational ☐

Job specific ☐ Communication ☐

Others (please specify)..... ☐

12. To what extend do you use library portal services

To great extent ☐ To Large extent ☐ To somewhat extent ☐

To Small extent ☐ To very small extent ☐

(b) Institutional Repository

13. what are the resources do you use from the institutional repository

Question papers ☐ Syllabi ☐

Electronic theses and dissertations ☐ Seminar papers ☐

Publications of teachers ☐ Others.....

14. Please indicate the frequency of use of resources from the Institutional repository

Sources	**Always**	**Very Often**	**Sometimes**	**Rarely**	**Never**
Electronic theses and dissertation					
Articles					
Seminar paper					
Publications of teachers					
Question Paper					
Syllabus					
Others					

15. To what extend do you use Institutional repository

To great extent ☐ To Large extent ☐ To somewhat extent ☐

To Small extent ☐ To very small extent ☐

(c) Library consortia (Eg: UGC-INFONET Consortium)

16. Which are the e-resources do you get from the consortia?

a E-journal ☐ b. E-book ☐

c .Fulltext Databases ☐ d. Bibliographic databases ☐

e. Any other (please specify)..... ☐

17. Please mention the awareness and usage about the following e-resources you are using.

E-resources	**Aware and using**	**Aware but not using**	**Not aware**
ACS Publication			
AIP(American Institute of Physics)			
Annual reviews			
APS Physics			
Cambridge Journal			
Economic and Political Weekly			
Emerald			
ISID			
JSTOR			
OXFORD Journal			
Project Euclid			
Science Direct			
Springer link			
Taylor and Francis			
ISI Web of Knowledge			
Jgate			
Others.....			

18. Which type of e-resources do you prefer to use? (Please tick mark all that you use)

Full text ☐ Abstract ☐

Bibliography ☐ Others..... ☐

19. Which format of the e-resources do you prefer to use?

a. PDF ☐ b. HTML ☐

c. SGML ☐ d. Doc ☐

e. Any other (please specify.....)

20. Do you get print facility from library Yes ☐ / No ☐

If yes, Please mention the charges for print out per page.....

21. Which are the most preferred e-resources? Write your priority by giving ranks to the options (Please rank 1,2,3…etc)

E-Journals	E-books	E-databases	ETDs	Audio/Video recordings

22. To what extend do you use Library consortia

To great extent ☐ To large extent ☐ To somewhat extent ☐
To small extent ☐ To very small extent ☐

(d) OPAC

23. Do you use your library OPAC?

Yes ☐ No ☐

If Yes please specify the mode of access OPAC do you get
LAN ☐ Web OPAC ☐

24. What are the options do you get for searching document in your OPAC? (Please tick mark)

Author		Publisher	
Subject		Class Number	
Title		Key words	
Boolean search		ISBN	
Any other ……			

25. How often do you use your library OPAC?

Always ☐ Very Often ☐ Sometimes ☐
Rarely ☐ Never ☐

26. How often do you use the bibliographic information through the OPAC?

Always ☐ Very Often ☐ Sometimes ☐
Rarely ☐ Never ☐

27. What are the difficulties faced by you while using OPAC?

a. Lack of Multi language support ☐ b. Incomplete entries ☐
c. Wrong entries ☐ d. Lack of standards ☐
e. Spelling errors ☐

28. To what extend do you use OPAC?

To great extent ☐ To Large extent ☐ To somewhat extent ☐
To Small extent ☐ To very small extent ☐

(e) Library alert services

29. Is there any alerting services provided by the library Yes ☐/No ☐/Don't Know ☐

If Yes, specify the types of services you get under alerting services?

a. To know about new arrivals ☐ b. Renewal of book ☐
b. Giving fine details ☐ d. Instant messages ☐
e. Email ☐ f. RSS Feed ☐
f. Other.....

30. To what extend do you use Library alert services.

To great extent ☐ To large extent ☐ To somewhat extent ☐
To small extent ☐ To very small extent ☐

IV Search Pattern

31. What are the criteria for selecting and using e-resources ?

Subject relevance ☐ Authenticity of information ☐
Ease of accessibility ☐ Year of publication ☐

32. Which method do you prefer to search Web based information services?

a. Simple search ☐ b. Advanced search ☐
c. Restricted search ☐ d. Keyword search ☐

33. Do you get any orientation program for using web based information services/resources from library?

Yes ☐ No ☐ Don't Know ☐

34. Do you need advanced level orientation program for using web based information resources from library?

Yes ☐ No ☐

35. Do you get any assistance for using web based information services/ resources from the library

Yes ☐ No ☐ Don't Know ☐

If yes who will assist you? (please tick mark)

Faculty ☐ Library staff ☐

Friends/colleage ☐ Other..... ☐

V Advantages and Hurdles

36. Please specify the advantages of using web information (Please tick mark the appropriate)

Advantages	Please tick mark
Improved quality of my work	
I get the library facility round the clock	
I got compound access	
I got the maximum retrieval speed	
Print and downloading facility	
Comprehensive information coverage	
Time saving	
Reduced the amount of browsing of resources	
Environment friendly	
Access to recent thoughts	
Physical movement reduced	
Other(Please specify)	

37. Please mention your agreement with the use of web based information services influenced your academic efficiency? (Please tick mark the appropriate)

Efficiency	Strongly agree	Agree	Neutral	Disagree	Somewhat disagree
It helps to find the material I need					
It is easier to get hold of the material I need					
Made it easier to keep up with the development in my own field					
Inspired new thinking/ ideas					
Reduced the amount of browsing of resources in libraries					
Reduced my working time					

38. What is your level of satisfaction/ comfort regarding the availability of web based information services offered by your library? (please tick mark the appropriate)

Information services	Very satisfied	Fairly satisfied	Don't know	Fairly dissatisfied	Very dissatisfied
Library portal					
Institutional repository					
E-resources					
OPAC					
Alerting services					
E-book					
E-journals					

39. Mention the frequency of difficulties you faced while using web based information services

Difficuties/ Problem	Always	Very often	Sometimes	Rarely	Never
Institutional Problem					
I do not get adequate ICT infrastructure					
The material I want is not available					
I do not get support from library staff					
Lack of user education programs					
Slow response of network					
Limited working time					
Personal problems					
I am not sufficiently familiar with the resources					
I am not sufficiently familiar with the gadgets					
I don't know how to search					
I find inconvenience in using different formats					
It is difficult to read from the screen					
I get alternative sources					

40. Please give your suggestions to improve the web based information services in the university libraries.

.....

.....

Thank you

APPENDIX II
Questionnaire for the Librarian

Dear sir/Madam

This questionnaire is intended to collect data regarding **"SCHOLARLY USE OF WEB BASED INFORMATION RESOURCES AND SERVICES IN UNIVERSITY LIBRARIES IN KERALA"**, in connection with Ph.D programme undertaken by me under the supervision of **Dr. Abdul Azeez T A**. The data given by you will be of immense value for this study and will be used for research purpose only. I would be grateful if you would kindly spare sometime to fill up the questionnaire with true and accurate information.

DEEPA P K
Research Scholar in Library and Information Science
University of Calicut

I. Personal Information

Name :
Designation :
Educational Qualification :
Age :
Sex :
Number of years of experience :

II. Institution Details

Name of the University : _____
Telephone : _____
Email : _____

1. Working hours of the library : _____
2. Working hours on holidays : _____

3. Total number of library Staff

a. Library professionals: _____
b. Non professionals: _____

4. Have you created portal for your library Yes ☐ No ☐
If yes please provide its address _____

5. Category wise details of total membership

Sl. No	Category wise membership	Total

III Library Collection

1. Total collection in numbers

Print materials

Sl no	Materials	Collection
1	Books	
4	Ph D Theses	
3	Manuscripts	
4	Other……	

Journals subscribed

Journal	Collection
Foreign	
Indian	
Unsubscribed- foreign	
Unsubscribed- Indian	

Non print materials

Materials	Collection	Materials	Collection
E-journals		CD-ROMs	
E-books		Audio cassettes	
DVDs		Microfilims	
Any other (please specify)			

2. Please give the details of last 5 years library budget

Budget	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Total library budget					
Budget for e-resources					
Others					

IV Network

1. Do you have network facility in your library — Yes/No
2. Which type of network you are provided with — LAN/MAN/Intranet/Extranet/WAN/ Wireless
3. Specify your internet service providers — BSNL/ERNET/VSNL/NICNET/ASIANET/ SATYAM/others(please specify……)
4. Whether your library is connected to library network (Please tick mark) — INFLIBNET/DELNET/OCLC/ CALIBNET/Others(……)
5. The operating system used in your library is — Windows/Linux/other ……
6. Do you maintain a website for your library? — Yes/No

If yes, whether developed in house/ out sourced

7.Do you assess the hit rate of your website — Yes/No

If yes, please give the last six months hit rate. (specify current month and previous 5 months.)

1	2	3	4	5	6

V Library automation

1. Which automation software is used in your library_____
2. Please provide the details of library automation package used
   a. Name of software_____ company_____
   b. Cost of the package_____
   c. Whether developed in-house/ out sourced
   d. No. of records created

Books		Journal	
CD		Reports	
Bound Volume		Standards	
Theses/ Dissertation		Multimedia files	
Patend		Others……	

   e. Conformity with national/ international standards

   ISO 2709/Z 39.50/ UNIMARK/ Any other……

3. Please specify the computer hardware available in your library

Hardware		**Hardware**	**No.**
Server		CD Server	
Laptop computers		DVD Player	
Desktop		Modems	
Projector		Hubs	
Scanner		Active switches	
Digital camera		Gateways	
UPS		Others (please specify)……..	

VI Web Resources and services

1. Do you have a separate section for accessing web resources Yes/ No
   If yes how many computers are available for users for accessing web resources----------

2. How do you provide access to e-resources

   IP authenticated ☐

   User ID+ Password ☐

3. Are you a member of UGC- INFONET programme Yes/No

4. Which year onwards your library started providing UGC-Infonet services to users?_____

5. How many e-resources are accessible in your library (in numbers)……

   E-journal…….. E-books……
   Full text database…… Bibliographic database…….
   Other (please specify)….

6. Do you collect users opinion to evaluate the subscribed e-resources to take the decision to continue or to cancel the subscription of resources Yes ☐ / No ☐

7. Please mention the frequency of using the e-resources by user categories based on the statistical data available with you

Sl no	**Users**	**Frequently**	**Moderately**	**Rarely**
1.	Faculties			
2	Research Scholars			
4	Students			
5	Administrative staff			
6	Public			

8. Whether OPAC is available in your library Yes/No/Planned

   If yes, whether on LAN_____ World wide web_____

9. Please specify the Digital resources of your library

   Born digital ☐ digitally preserving collection ☐ Both ☐

10. If your library contain digitally preserving collection how will you maintain the collection In house ☐ /outsource ☐ / any other ☐

11. Do you provide institutional repository Yes ☐ / No ☐ / Planned ☐

12. If yes, specify the platform used_____

13. How is its access mode Public/ Restricted

14. Specify the file format included in IR _____

15. Have you systematically organized ETD Yes ☐ No ☐

16. Whether the ETD details are available through catalogue entries (OPAC) Yes ☐ No ☐

17. Do you provide online access to ETD Yes ☐ No ☐

    If yes, whether access with in campus ☐ or out side campus ☐

VII Training Program

1. Do you conduct any training program for the library professionals? Yes/No
2. If yes please give details regarding no. of programs and no. of participants

   _____

   _____

3. Do you conduct training program for the users of the library? Yes/No

4. If yes please give details regarding no. of programs and no. of participants

   _____

   _____

5. Please mention the hurdles faced in providing web based resources

   _____

   _____

6. Give your suggestions to improve the web based information services in university libraries

   _____

   _____

Thank you very much