LEVERAGING WEB-BASED LIBRARY SERVICES IN THE DIGITAL ENVIRONMENT: A USER STUDY OF THE BIOLOGICAL SCIENCE INSTITUTES OF CSIR OF NORTHERN INDIA

ABSTRACT OF THESIS

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IN

LIBRARY AND INFORMATION SCIENCE

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DECLARATION

I hereby declare that theses entitled, **LEVERAGING WEB-BASED LIBRARY SERVICES IN THE DIGITAL ENVIRONMENT: A USER STUDY OF BIOLOGICAL SCIENCE INSTITUTES OF CSIR OF NORTHERN INDIA** submitted by me for the award of the Degree of Doctor of Philosophy in Library and Information Science to the Department of Library and Information Science, Babasaheb Bhimrao Ambedkar University, Lucknow is an outcome of my own efforts and is an original work. The contents of this thesis did not form a basis for the award of any previous degree to anyone else. It is also undertaken that thesis is essentially free from all kinds of plagiarism.

I hereby also undertake that the thesis submitted by me to Babasaheb Bhimrao Ambedkar University, Lucknow satisfies all the requirements as stipulated in the Doctor of Philosophy (Ph.D) regulations -1999 as amended in 2013 and it is fit for submission and evaluation for the award of the degree of Doctor of Philosophy in Library and Information Science of the University.

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CERTIFICATE

This is to certify that the thesis titled **LEVERAGING WEB-BASED LIBRARY SERVICES IN THE DIGITAL ENVIRONMENT: A USER STUDY OF BIOLOGICAL SCIENCE INSTITUTES OF CSIR OF NORTHERN INDIA** submitted by Ms. Shreya Gupta is an original research work and has not been previously submitted in part or full for the award of any other degree or diploma to this or any other university.

The thesis submitted to Babasaheb Bhimrao Ambedkar University Lucknow satisfies all the requirements as stipulated in the *Doctor of Philosophy (Ph.D) regulations-1999 as amended in 2013* and it is fit for submission and evaluation for the award of the degree of Doctor of Philosophy of the University.

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CHAPTER 1

INTRODUCTION

1.1 Background

The development of an Internet and web innovation has assumed to be a crucial part of changing libraries from conventional to online providers. The Web has empowered library services to be offered 24x7, past the normal working hours of the users from any place and from a variety of gadgets like tabs, laptops, desktops, and smart mobile phones. This has not only saved the user's time but has also enabled the library users to effectively and efficiently utilize the library services without going to the library. The World Wide Web (WWW) or web created by Tim Berners-Lee in 1989, has emerged as an effective medium because of its exceptional features like easy to use, universal access, search capabilities, and hypertext information system. The web has brought new communication revolution and empowered us to access, retrieve and deliver information anytime anywhere effortlessly, instantaneously and inexpensively.

The technological developments, like PCs, word processing programs, desktop, electronic publishing have transformed the information-seeking behaviour and pattern from print to the web. It has given an online stage to specialties, researchers and business publishers to publish their work universally. The pattern of web publishing is on the ascent because of widespread uses of the internet and the emergence of most effective technological innovations. It has turned out to be the most broadly utilized channel for publishing the wide range of digital information resources over the globe. Moreover the electronic resources allow multi-user and full-text access to library users.

The collection building strategies and policies of libraries have also been changed due to the users' inclination for electronic access to data. This has not just changed the mode of delivering the library services but also changed the policies of ownership to give access on demand. Therefore the acquisitioning of information has also changed from "just in case to just in time" (Arora, 2001, p. 6). Libraries are confronting the new age of online users who are technologically skillful and integrate information access in all spheres of their lives to a remarkable degree. Patterns have demonstrated that users are more influenced towards web-based resources and services as a

comparison to traditional print resources and services. Users' experience of innovation-based services like online and banking transactions, online reservations, and so forth have influenced them for accessing library services at their P.C. and cell phones at any place and anytime.

This new web environment has amazing effects on how user services are planned and executed. "Innovation has created new opportunities and difficulties to libraries in promotion, dissemination, and storage of information" (Madhusudan & Nagabhushan, 2012, p.569). It has improved the existing services and their expectations. The users' satisfaction with library services would rely upon the ability of the library to adapt and accommodate the changing information needs and perceptions of the users'. To adapt to this changed web environment libraries all over the world are putting forth new electronic library resources and services, for example, online journals, ebooks, e-databases, OPAC, web-forms, etc. to satisfy the users' demands. "Web-based library services are modified versions of existing services and technology-driven services" (Arora, 2001, p.2). Halub (1999) expressed that "web-based library resources and services promote the image of the library as an innovative, progressive and integral to the commitment to excellence in education and research" (p.257). Library users are fond of these services as they can get access to these resources from their desktop whenever it might suit them, and thereby, saving their precious time.

This increasing expectation from the users' required the advancement of the library websites. Library websites have totally altered the concept of traditional and scholarly visits to physical libraries with that of desktop access to website-accessible library resources and services. Special libraries are using such innovative technology "to create home pages, as starting points or gateways for information" (Arora, 2001, p. 23) by giving valuable and interactive resources and services to meet the scientists research and developmental needs and to promote "the image of the librarians as the Internet expert" (Madhusudan & Nagabhushan, 2012, p.570). A home page provides an opportunity for the library to express its objectives and achievements.

The websites of the special libraries give information about the library's resources and services by providing access to all digital collections like online databases, electronic databases, subject resources, library instructions, and new arrivals. This has transformed the role of information scientists from the insignificant curator of information into a guide for information. This has greatly helped the information

scientists to integrate the four aspects of a library from acquisitioning of information, to organizing of information, to retrieving information to users and to preserving information resources of the library on their website. The web 2.0 applications have opened up new opportunities in the improvement of the library services, systems and operations, and empowered users' by with the creation and management of the services.

Therefore, it is crucial for special libraries to adopt these latest web innovations for providing access to web-based library resources and services to satisfy the information needs of the users. It is vital for libraries to design, create and deliver high-quality web-based library resources and services at the fingertips of users.

1.2 The need for the Study

The expansion in web-based technologies in libraries has expanded the demand for web-based library services from the users. Therefore, in order to give better facilities to the users, there is a need for libraries to redesign the existing library framework in order to change traditional library services to web-based library services.

The investigation plainly drew out the assessment of the web-based library services from the libraries. The reason for the examination was to discover what kind of web-based library resources and services, their awareness, utilization, satisfaction level and the problems faced in accessing the web-based library services.

This study will provide the following advantages, as:

- The study is based on the actual situation and the result can be used for redesigning of web-based library services for users.
- Needs for new web-based services after getting users' feedback which could fulfill the requirement of CSIR users.

This study will provide suggestions on how the current web-based services can be improved to better serve CSIR users to navigate in the new data-rich environment.

1.3 Statement of the Problem

The present study is conceived under the title,- Leveraging Web-Based Library Services in the Digital Environment: A User Study of Biological Science Institutes of CSIR of Northern India.

Leverage- The ability to influence a system, or an environment, in a way that multiplies the outcome of one's efforts without a corresponding increase in the consumption of resources. In terms of library services, it highlights the advantages or benefits derived from the library services to its users. This basically involves the delivery of quality information services to the users. With quality information service it means, the co-operation between the creator or provider of the information and the user of the information and the service is provided with the use of technology and technological advancements use for data transmission.

Web-based Library Services- According to White (2001), it can be defined broadly as 'an information access service in which users ask questions via electronic means e.g., email or web forms'. The web-based library services are offered with the integration of library management software using the internet as a medium and library website as a gateway. From the user viewpoint, web-based library services such as online textbooks, databases, tutorials, and virtual reference services help to links to other useful resources also.

Digital Environment- This digital environment includes the use of computers, computer networks (e.g. the Internet and Intranet) and digital communication (e.g. email, telephone, voice mail and faxes) to access a wide range of information resources.

CSIR Institutes- Council of Scientific & Industrial Research (CSIR) was founded in 1942 and is the nation's largest Industrial Research Organization. It is an autonomous body, registered under the Registration of Societies Act of 1860 and is funded by the Science and Technology, Ministry of India. At present 38 laboratories, 39 outreach centers, 3 innovation centers, and 5 units are running under CSIR.

Biological Sciences- It is a natural science concerned with the study of life and living organisms, including their structure, function, growth, evolution,

distribution, and taxonomy. Its sub-disciplines include- cellular biology, microbiology, biochemistry, botany, physiology, evolutionary biology, and ecology.

1.4 Scope of the Study

Council of Scientific & Industrial Research (CSIR), founded in 1942 is the largest Research and Development Organization. It is funded by the Science and Technology Ministry, Government of India and is working as an autonomous organization. CSIR laboratories aims to provide scientific and industrial researches to maximize the economic, environmental and wellbeing of the people and development of India.

For this study, the CSIR institutes of Northern India dealing with Biological Sciences have been selected. The north zone of India comprises of following states - Jammu & Kashmir, Uttarakhand, Punjab, Haryana, Uttar Pradesh, Delhi, Himachal Pradesh, and Chandigarh.

Biological Sciences Institutes of CSIR Laboratories of Northern India

S.No.	CSIR LABS	URL
1	Central Drug Research Institute (CDRI), Lucknow	http://www.cdri.res.in/
2	Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow	https://www.ihbt.res.in/en/
3	Institute of Genomics and Integrative Biology (IGIB), Delhi	https://www.igib.res.in/
4	Institute of Himalayan Bioresource Technology (IHBT), Palampur	https://www.ihbt.res.in/en/
5	Indian Institute of Integrative Medicine (IIIM), Jammu	https://www.iiim.res.in/
6	Indian Institute of Toxicological Research (IITR), Lucknow	http://iitrindia.org/
7	Institute of Microbial Technology (IMTECH), Chandigarh	https://www.imtech.res.in/
8	National Botanical Research Institute (NBRI), Lucknow	http://www.nbri.res.in/

1.5 Limitations of the Study

For this study only the Biological Science Institutes of CSIR of only Northern India have been selected, because in North India most of the CSIR institutes are dealing with Biological Sciences. Therefore, a total of 8 institutes of CSIR have been selected for the study.

1.6 Objectives of the Study

1. To describe the range of library services offered via the web in selected CSIR institutes.
2. To identify the awareness of web-based library services of the users of the selected CSIR institutes.
3. To identify the purpose of the use of library web-based library services by the users of the selected CSIR institutes.
4. To rank the institutes on the basis of the level of sophistication of web-based services offered via selected CSIR institute.
5. To estimate the level of satisfaction of users by web-based library services of the selected CSIR institutes.
6. To measure the performance of web-based library services of the selected CSIR institutes.
7. To identify the problems faced by users in using web-based library services of the selected CSIR institutes.
8. To suggest improvement measures based on the inferences drawn from the study for the selected CSIR institutes.

1.7 Hypotheses of the Study

Ho1. Users are aware and use regularly the web-based library services.

Ho2. Users are satisfied with the delivery quality of the web-based library services

Ho3. Web-based library services are very interactive as compared to traditional services.

Ho4. Web-based cataloguing is a highly used web-based library service.

1.8 Research Methodology

The study was conducted among the users of biological science institutes of CSIR of Northern India. In doing so, the survey technique and a structured questionnaire were used for the data collection and distribution was done through random sampling technique.

1.8.1 Designing of the questionnaire

The questionnaire was designed keeping in view the stated objectives. The questionnaire contains both close-ended and open-ended questions. To collect primary data, two sets of semi-structured questionnaires were designed. One set of questionnaire was designed for the librarian for the survey of web-based library services of the selected biological sciences institutes of CSIR. Another set of questionnaires was prepared for the library users' to assess their library using behavior, satisfaction towards various web-based services provided by the library and to collect their opinion towards web-based information services.

1.8.2 Sampling Technique

The present study was conducted on eight librarians and a sample of eight hundred users of libraries of the Council of Scientific & Industrial Research (CSIRs). Simple random sampling was used to draw samples from selected CSIRs institutes.

The purpose of drawing a random sample was to take a representative population of users per CSIR. Eight questionnaires were distributed to all the information scientists of eight institutes. A hundred questionnaires were distributed among the users of each library under study. In CSIR- NBRI there was no library portal and the library was not offering the web-based library services to its users till the time of data collection. However, the CSIR-NBRI was working on the same to improve its quality, the web-based resources and services were under up-gradation. So the CSIR-NBRI was not in the position of giving the data at the time of data collection. Therefore, a total of seven hundred questionnaires were distributed among users evenly. The seven librarian questionnaire and five hundred and sixty user’s questionnaires were received back and analysed.

1.8.3.Pilot Study

A good research strategy requires careful planning and a pilot study is often be a part of the strategy. A pilot study can disclose the gaps in the design of a proposed experiment or procedure, and based on the findings of the pilot study, corrective action could be taken to address the research gaps so that the research provides a fruitful outcome. A pilot study was conducted in the library of the Indian Institute of Toxicological Research, Lucknow to test the usefulness of designed instruments. The finding of the study revealed that many questions had incomplete options and a few necessary questions can be included. Based on the findings of the pilot study, the final questionnaire was modified to incorporate not only all the missing questions but also the new options of the web-based library services offered via library websites.

1.8.4 The Reference Period

The data was collected from September 2017 to April 2018. Thus, the data pertains to the reporting libraries for the period (reference period) September 2017 to April 2018.

1.8.5 Development of study instrument

To measure the level of usage of web-based library services by the user's five-point Likert-type scale (i.e. 0= Don't, 1= Rare, 2= Occasionally, 4= Frequently & 5= Highly) was used. Further, these responses were grouped as either preferred or not preferred. Preferred ratings were frequently and highly whereas not preferred ratings were don't, rare and occasionally.

And to measure the satisfaction with web-based library service again five-point Likert- type scale was used (i.e. 1= Strongly agree, 2= agree, 0= uncertain, -2= disagree, -1= strongly disagree). Further, these responses were grouped as either positive or negative. Positive ratings were strongly agreed and agree whereas negatives ratings were uncertain, disagree and strongly disagree.

1.8.6 Data Analysis

The collected data was analysed using MS Office (Excel). Apart from these, graphs were created to summarize the data. The tools applied for the analysis of user’s data were chi-square test. The citation and references were presented in accordance with the APA style, edition 6. Other tools like observation and interviews were used to support the study.

References

Arora, J. (2001). Web-based Digital Resources and Services: Trends and Innovations. *CALIBER*. Retrieved June, 17, 2016 from http://ir.inflibnet.ac.in/handle/1944/105

Asogva, Bredan E., Cyprian I. and Ugwuanyi, Ugwu Fredunand C. (2015). Evaluation of electronic services infrastructures and quality of e-resources in Nigerian. *The Electronic Library*. 33(6).1133-1149.

https://www.csir.res.in/sites/default/files/LIST%20OF%20CSIR%20LABS.pdf. Retrieved January, 11, 2016

Halub, L.P.(1999). The Value of Web-based library services at Cedars- Sinai Health System. *Bulletin of Medical Library Association*, 87(3), 256-60.

Madhusudhan, M. and Nagabhushanam. (2012). Web-Based library services in university libraries in India: an analysis 'perspective'. *The Electronic.* 30(5). 569-588

Okon, E.E., Inyang, I.J. & Etim, I.A. (2015). Marketing of Web-Based Library Resources in Nigerian Universities. *Library Philosophy & Practice (e-journal)*, paper 1263. Retrieved June, 20, from http://digitalcommons.unl.edu/libphilprac/1263

Thomas, C. & McDonald, R.H. (2005). Millennial Net Value(s): Disconnect Between Libraries and the Information Age Mindset. Retrieved May, 2, from https://www.researchgate.net/profile/Robert_Mcdonald4/publication/228452528_Millennial_net_value_s_Disconnects_between_libraries_and_the_information_age_mindset/links/00b7d5230d35bc0d7f000000.pdf

CHAPTER 2

REVIEW OF LITERATURE

Review of literature is undertaken to know the overview of the present state of affairs and also the scope for the development of the same. A literature review helps the researcher to prepare a research design and appropriate tools for the successful completion of the study. A review of literature enables the researcher to thoroughly look into the problems and to understand different aspects of the problem. There are a number of studies that have been carried out on the usages of the Internet and web technology for various purposes in general and particular. It is difficult to cite all literature being published either in print or electronic form. The review on web-based resources and services is made on online resources, Emerald, Elsevier Science, JSTOR, Open Access e-journal like Directory of Open Access Journal (DOAJ), Open Access Journal Search Engine (OAJSE), Google Scholar, etc. These studies under review offered in-depth insights on the issue pertaining to web-based library services in the biological sciences institutes of CSIR of Northern India.

The review of the literature of the present study is grouped into four heads, which are as:

1. Library websites

2. Web 2.0 applications

3. Web-based library services

4. Web resources

2.1 Library Websites

Mierzecka and Suminas (2018) have discussed the functions of Academic library websites as viewed in the context of information needs of the selected users. The study was done on 680 users of University of Warsaw (Poland) and Vilnius University (Lithuania). The researcher distinguished five functions of the academic library website: (1) supporting the usage of the collection (online and traditional); (2) promotion of culture; (3) gateway for locating information on the Web; (4) education;

(5) creation of library's online image. It was found that the websites were qualified in serving as a digital gate for library resources and services.

Devi and Verma (2017) have done a content evaluation on the design trends and web contents of the library websites of 27 National Institutes of Technology of India. It was found that all the NIT libraries did not have their separate library websites. Out of 17 NITs only 5 Nits library websites were offering web 2.0 tools to their users. It was found that the NIT Allahabad took 422.68 seconds connection rate for downloading their website which was maximum time whereas NIT Agartala took the least time of 5.48 seconds. The researchers recommended that all the libraries should create separate library websites in order to attract their users.

Wilson (2015) have done a content analysis on the website content and design trends of 24 Alabama academic libraries websites to examine their services, content, and compliance with design and accessibility standards. It was found that although libraries were offering high number of online services, but they failed in implementing basic web design and accessibility standards.

Mohammad, Garba and Umar (2014) analysed the content of functional website of ten University libraries in Nigeria. The finding of the study concluded that the information about library services and physical holding were present on the websites. In order to improve library websites of Nigerian universities the researchers suggested the need for improving library professionals' expertise and library curriculum by including website development course. The study recommended improvement of librarian skills as well as the inclusion of website development course in the library curriculum for the improvement of library websites in Nigerian universities.

Islam and Hossain (2013) studied the marketing of information resources and services on the Web status of 57 University library websites in Bangladesh in their study. The researchers examined the extent to which websites of university libraries were used to promote the collection and services to their users for the marketing initiative and discovered that libraries did not fully use the website to market library resources and services. Indeed, most libraries did not provide an online information literacy program, OPAC facility, e-books, and moreover no link to other libraries and associations.

Siddike, Munshi and Mahamud (2013) analysed the status of 16 academic library websites, including both public and private universities of Bangladesh. It was revealed that the academic library was not fully utilized for marketing information resources and services. It was also found that libraries were not much interested in providing online literacy courses, live supports, copyright documents, and online user surveys.

Aharony (2012) analyzed 31 academic library websites, which were selected from the ACRL accredited LIS schools, was conducted from the year 2000 to 2010. It was found that Between the period of 2000 to 2010 the academic library website contents have been changed substantially basically in terms of number of journals, focus on library users, application of web 2.0 tools and great use of graphics in websites.

Kehinde and Tella (2012) has analyzed the rating of 30 Nigerian University websites on the basis of hits and in the view of the increased rate of university established in the country. The researcher drawn the checklist on the basis of assessment of library website for web 2.0 tools, access to electronic resources and like to the National University Commission (NUC) virtual library. It was found many universities in Nigeria have a website, while some of them were in process of developing websites for their library to meet the new information superhighway's challenges. The study also revealed that there is a low level of the integration of web 2.0 in most of the studied library's websites.

McGillis and Toms (2001) examined the usability Academic Library Website and its implications for Design. The study found users' were able to well interact, but they found difficulties in knowing where to start and with the site's information architecture with library website. The study recommended that libraries should take systematic user-centric approach for their development.

2.2 Web 2.0 applications

Punchihewa (2018) has explored the types of Web 2.0 applications employed and to identify the purposes of embracing Web 2.0 applications in fifteen Sri Lankan university libraries. The researcher collected the data by assessing the web pages of these university library websites. it was found that out of 15 universities fourteen university library websites have introduced at least one feature of web 2.0 technology in their library website. In which RSS, SNS were the most popular applications used

for informing the new addition in the library and to establish personalized relations with the users, respectively, followed by blogs. the researcher recommended that that the libraries should organize practical training sessions for library staff and special user orientation programs related to web 2.0 technologies for users.

Al-Kharousi, Jabur, Bouazza, and Al-Harrasi (2016) investigated the different factors that affect the using of web 2.0application in five Omani academic libraries (OALs). It was found that there were nine internal factors, which includes- low motivation of directors and library staff regarding the usage of web 2.0 applications, lack of training constant changes in the management structure, and four external factors, which includes- lack of policies, low speed of internet, technical issues related to data conversion and shortage of electronic Arabic content, affect the usage of web 2.0 in Omani academic libraries. The researcher recommended that the development of knowledge and implementation of Web 2.0 should begin in the Information Studies Departments of OALs.

Pirshahid, Naghshineh and Fahimnia (2016) investigated the levels of awareness and use of web 2.0 tools by librarians and to determine how librarians use these tools in everyday life in the university libraries of East Azerbaijan (EA), Iran. It was found that librarians were well aware of the web 2.0 tools like wikis and blogs. The librarians use web 2.0 tools in order to communicate with friends and family, keeping themselves up-to-date and to collaborate with colleagues. The study also indicated that the librarian uses web 2.0 tools for information sharing about library resources and internet filtering. The biggest obstacles were the slow speed or internet and lack of orientation programs.

Boateng & Liu (2014) in their study have explored the usage and trends of web 2.0 technologies in top 100 US academic libraries websites. Top 100 universities were selected from US News & World's Report (USNWR) 2013. It was found that all the library websites have implemented almost all the SNS application tool. Facebook and Twitter were the highest applied Web 2.0 technology followed by blogs. The wiki was the least applied technology. It was found that the US academic libraries are highly using web 2.0 technology in promoting, enhancing library services and highlighting resources to library users.

Lwoga (2014) demonstrated the work undertaken by Muhimbili University of Health and Allied Sciences (MUHAS) Library to integrate the web 2.0 technologies in its library in order to investigate the user requirements, already developed 2.0 technologies and their awareness level. It was found that web 2.0 technologies may improve the quality of library services and can be utilized to enhance the delivery and promotion of library services and it also helps in the capacity building of the librarians and users. Users positively supported web 2.0 technologies although they face many challenges related to infrastructure, literacy, awareness, inadequate staff and privacy issues.

Zhixian (2014) surveyed perception of 200 Australian academic librarians in 37 University libraries for using Web 2.0 tools effectively in marketing of their services and resources. Factors such as demographics, human capital and library variables were discovered to play a significant part in affecting the perception towards the usage of specific tools for marketing services and resources.

Khalid and Richardson (2013) investigated the impact of web 2.0 technologies on 67 US academic libraries listed in the Association of Research Libraries membership. It was found that each library was using some form of web 2.0 technology such as RSS, social networking sites, Instant Messaging, blogs, and wikis. They found that the significant positive correlation exists between the extent of adoption of web 2.0 technologies by the libraries and librarians' opinion based on its advantages.

Khan (2013) discussed the application and utilization of web 2.0 tools in library and information centers and their effect on librarian's role in the libraries and the services offered. The researcher has also discussed the interactive environment to explore some of the most popular and innovative tools and techniques associated with libraries, Web 2.0 and new ways of information storage and retrieval. The researcher suggested the librarian needs to expose and educate themselves on how to relocate them in the age of Library 2.0 environment. It was also suggested that the Library and Information Science education must respond to the changing needs of technological advancement in libraries today.

Sarkar (2013) highlighted the characteristic features, usage purpose and kinds of widgets apps and evaluate the degree of widget applications among academic libraries of higher education institutions across four continents (North America, Europe,

Australia, and Asia) to make library resources easy and convenient for users. The researcher focused on the relative acceptance of widgets among the continents and emphasized the areas where widget is being applied most.

Shafique and Rieldling (2013) explored the concepts and adoption of Library 2.0 and Library 3-D in Pakistani libraries. The researchers considered application of Library 2.0 and Library 3-D as Second Life for Library Services. The study suggested that librarians should switch their mindset from a collection centered approach to a user-centered approach by using Library 2.0 and library 3D applications (Second life).

Anunobi and Ogbonna (2012) studied the use of web 2.0 applications by the librarian in a State in Nigeria. The finding of the study revealed that the lack of awareness, computer skills, motivation, facilities, and limited access were the major hindrances faced by the librarians in using web 2.0 tools.

Arif and Mahmood (2012) explored the patterns and extent of the adoption of Web 2.0 technologies by Pakistani librarians. It was found that most popular web 2.0 tools were Instant messaging, blogs, social networking, and wikis. The study also revealed that the gender, length of professional experience and place of work have no effect on the frequency of use, while perceived skill level of internet use. It was found that the major hindrances in adoption of web 2.0 technology were lack of information and computer literacy and lack of facilities like computers and internet. In order to cope with web 2.0 technologies the researcher suggested the librarian to introduce the user orientation and awareness programs in their libraries.

Chen, Chu and Xu (2012) focused on the four types of interactions, which were-knowledge sharing, information dissemination, communication, and knowledge, between libraries and users on the libraries social networking sites like Facebook, Twitter, and Weibo, The study found that among the four types of interactions, knowledge-sharing attracted the largest volume of user responses on libraries social networking sites. The study suggested that in order to improve the efficiency of interaction with the users on SNSs, it is imperative for libraries to coordinate with different types of SNSs and take the properties of their communities under consideration.

Rahman and Shafique (2011) found the use of web 2.0 implications and applications by the Information Professionals and their perceptions in Pakistan libraries. It was found that the Instant Messaging (IM), RSS and Micro-blogging (Twitter) that could be used to provide online reference services and for selective dissemination of information (SDI) were not very clear in libraries. The study suggested that library professionals in Pakistan could avail the benefits of web 2.0 technologies for offering attractive and dynamic services for users.

Balaji and Kumar (2011) surveyed the library websites and the usage of web technology in providing information services by South Indian Technological Universities. The findings of the study revealed that the most technological University libraries were still working in the conventional library set up and was relatively low rate of dispersal of web information services.

Chua and Goh (2010) studied the web 2.0 applications of 120 library websites from North America, Europe, and Asia. It was found that the RSS, instant messaging, social networking services, wikis, and social tagging applications were the most popular web 2.0 applications. It was also found that the presence of web 2.0 applications in websites was associated with the overall quality of the library websites.

Kim and Abbas (2010) investigated the adoption of library 2.0 functionalities by 230 academic library websites and 184 users from the perspectives of knowledge management. It was found that the RSS and blogs were the most popular library 2.0 applications adopted by academic libraries whereas the bookmark function was widely popular among the users.

Katariya and Anbu K (2009) investigated the applications of web 2.0 in the enhancement of services and resources in academic libraries and proposing the model for Learning Resource Center (LRC) for JIIT University, Noida. It was found that the users were very much agreed with the features of web 2.0 like Blogs, RSS, etc., which brings them more closer to LRC.

Xu, Ouyang and Chu (2009) examined 81 academic library websites to study the Web 2.0 applications and implication in academic libraries and found that libraries had included IM, blogs, RSS, tagging, wikis, social networks, and podcasts in their websites to improve their library operations and services. Instant Messaging was the

most frequently used web-based tool followed by blogs and RSS, respectively. A conceptual model for academic library 2.0 which consists of three elements- librarian 2.0, user 2.0 and information 2.0 was proposed by the researchers.

2.3 Web-Based Library Services

Shivakumaraswamy (2019) has studies the use of web-based library services offered by the engineering colleges of Mysore city of Karnataka. The study covered the various section of web-based library services like- reference, circulation, acquisition, cataloguing, periodical and the problems faced by the users in accessing these services. It was found that most of the users found web-based library services as highly useful, but the major hindrance was the number of web technologies to learn for proper accessing of web-based services.

Arif, Ameen and Rafiq (2017) have done a study to assess the distant education students' satisfaction with the use of web-based library services of the Allama Iqbal Open University (AIOU), Pakistan. The findings of the study revealed that the users of the AIOU library were satisfied with the web-based library services. However, tracking system of online books, Web- OPAC and Web radio service were not able to satisfy the users' information needs.

Haruna, Kiran and Tahira (2017) validated empirically the LibWEBSQ measurement scale. The researcher investigated the relationship between web-based service quality with user satisfaction, service quality, and user loyalty. The researcher studied the two federal universities of the Northwestern zone of Nigeria. It was found that that perceived web-based service quality and service value exhibit no statistically significant direct influence on user loyalty. However, user satisfaction has a direct positive influence on user loyalty, and it also mediates the relationship between web-based service quality and user loyalty to the library.

Si, Wanigasooriya and Ranaweera (2017) have done a study to asses and evaluate the current status and issues related to e-service quality of 15 Sri Lankan University library websites. The researchers adopted the 62 items checklists which were organized into 6 categories; core e-service, e-reference service, facilitating e-service, supportive e-service, currency, accuracy and speed quality, and website features examined by the survey. It was found that although university libraries were offering number of web-based library services, the development of e-services is still in its

early phase, which means they have not focused on marketing and promotion of e-services through library websites. It was also found that no attention was given to user orientation programs and information literacy via library websites. The researchers recommended that library administrators and website designers should give more emphasis to maintain more informative and attractive library website to cater to the information needs of scholarly users.

Kalita and Hazarika (2016) have done a case study on ten universities on web-based interactive services in the University libraries in Assam and perception of library managers and users. It was found that Blog was the highly preferable application by librarians followed by RSS feed and Instant messaging. Current Awareness Service was the highly preferred web-based service by the users.

Bawalaya (2014) have done a comparative study of the University Zambia and Copperbelt University Libraries on the provisions of internet and web-based library services. It was found that the University libraries have not completely welcomed the internet and web technologies for providing web-based services like reference services, circulation, and inter-library loan services. However, the Copperbelt library offers web-OPAC, online reservation and web-based current services.

Malik and Mahmood (2013) explored the current status of ICT infrastructure needed for digital reference services in the 40 universities of Punjab as recognized by the Higher Education Commission (HEC). It was found that the current status of ICT infrastructure is better but still not up to the mark, it needs improvements. It was also found that not all the libraries are working on digital reference service rather most of the libraries are still using the traditional method of reference transaction, that is, face to face communication.

Kiran and Diljit (2012) have studied the e-service quality and the adoption of e-service quality measurement tools to assess the quality of web-based library services. The researchers also identified the key determinants of web-based library service quality and emphasized on the perception of the library users towards the service quality. The findings of the study support the idea that in addition to concentrating on the technical development of new services, libraries should not neglect basic library services such as reference and bibliographic instruction, in the Web environment.

Madhusudhan and Nagabhushanam (2012) analysed the current status of web-based library services offered with the help of web-based library automation software in different sections via websites in the select university libraries of India. The findings showed that most of the surveyed libraries are still not been able to leverage the full potential of the web-forms and are not effectively using library websites. This study identified specific ways in which the web helps university libraries to improve and develop innovative and creative web-based library services for their effective usage.

McMenemy (2012) explored the digital services of public library websites of 32 Scottish Public Libraries. The study revealed that there was a consistent set of electronic reference resources subscribed by multiple libraries, offering high-quality information both within the library and for library members from their home or workplace. Guidance on the usage of resources and confusion and inconsistency in terminology usage across different library services were the major obstacles found.

Singh, N. K. (2012) has done a survey on the status of digital reference service in the four university libraries, in which the researcher discussed the various models for providing digital reference services to the user through emails, ask a librarian, chat reference, video conferencing and etc. The study revealed that all four libraries provide online/digital services. It was found that although all the four libraries were providing the digital reference services, but the library system of Delhi University was the best in terms of providing digital reference services.

Zarei and Abazari (2011) conducted a survey of web-based services of 23 accessible and English language websites of Asian national libraries. It was found that national library of Singapore scored first rank in providing web-based library services and was the only library that offers more than half of its services via website. It was also revealed from the study that the websites of Asian Nation Library were far from optimal service provider.

Cervone (2008) discussed the Information Technology Infrastructure Library (ITIL) frameworks and its relevance to digital library projects and operations. It was found that the use of ITIL framework has been persistent in corporate environment in UK. It was also found that ITIL offers a systematic approach to providing and managing

information technology services. ITIL also helps in providing effective ways of defining metrics and measuring their outcomes.

Choi (2008) examined the 60 digital library projects selected from the Digital Initiatives Database (DID) and analysed the extent to which they integrate reference services offered and how they are varied in order to increase the value of the collections, support the use of information. It was found that digital collections scored high marks in offering services in two areas – search and digital reference, but it was also revealed that they were not able to give much valuable information services in the other areas.

Pathak, Mishra and Sahoo (2008) highlighted the potential of web-based library services. The study found that web services are highly beneficial for library community. However, these advantages need standardization of web services and active involvement of library staff. It was suggested that librarians should organise training programs for users and should promote the usage of standard web services which will help to prevent the loss of proprietary web services.

Hariharan, Hariharan and Mymoon (2007) discussed their experiences of using AutoLib library software and explained the various innovative and useful web-based library and information services and the alert service being provided at the SERC library. the researcher revealed the importance of libraries to provide IT-based services by using new technologies to the scientists, who are engaged in time-bound research and development projects. They need to be alerted about the nascent literature in their respective fields.

Kanamadi and Kumbar (2006) discussed the library portals and web-based library services expected at the management institutes of Maharashtra. It was revealed from the study that due to the inadequate and static information available on the website, the users were not interested in accessing it. Therefore the management libraries in Mumbai were not fully exploiting the library portal.

Li (2006) explored the 10 key issues to leverage quality web-based library services to the users which included the opportunities, challenges and developing trends of delivering dynamic web-based academic library information resources, services, and instructions for library users and for librarians as well in the digital age. It was found that knowledge, competence, and skills could not match up with the rapid

advancements in science and technology. Most of the students still need assistant in effectively accessing, locating, converting, synthesizing and evaluating information.

Krishnamurthy (2005) discussed the design of digital library services with a view to give an efficient library practice and development of online resources at the Indian Statistical Institute. It was found that considerable progress was seen library consortium of ISI within a year. The study also revealed that the system enables the library staff to create and provide more effective information services.

Shiri, A. (2003) had done an overview of current developments and trends of digital library researches which includes digital library structure, system, tools and technologies, metadata, interoperability and etc. The researcher found that the collaborative digital work environments, social digital navigation and new forms of the digital environment for academic, educational, publishing and recreational can be viewed as a source of future development in digital library researches.

Chowdhury (2002) identifies the current status of research in reference service in digital libraries. It was found that in most of the cases web was the only medium for communication. The study also revealed that the users find it difficult to categorize their reference queries. The researcher observed the poor state of end-user searches, that means the users used two search term per search query.

Halub (1999) studied the value of web-based library services at Cedars-Sinai Health System. The researcher stated that library services on the web improve the visibility of library within the system. The web allows library staff to offer their services beyond library hours. Further, these web-based services help in building a positive image of the library as a progressive, innovative and committed to excellence in research and education.

Rowlands (1999) discussed the development of web-based library services and resources in the BMA Library. It was found that the web access to the library's MEDLINE Plus service has been extended to include Web access to the library's Dynix/Ameritech catalogues and the introduction of a central, public Website. The study also revealed that the library's public Website, and a private staff Website, are developed and maintained by the library's own Web development team.

2.4 Web resources

Sarasvathy, Prasada and Jagdeesha (2016) discussed the concept of digital library and emphasized the user evaluation in digital library environment at the University of Mysore. It was found that Mysore University library has greatly improved in a large number of e-resources, scientific databases, institutional repositories, social networks ad web OPAC services. It was found that digital library services in Mysore University are well managed and equipped.

Thangam, M. & Padma, P. (2016) have studied the usage of web resources by the research scholars of madras university**.** It was found that maximum users use web resources for academic purpose, Google was the most used search engine and Gmail account for file transferring. Keyword and subject search was the most preferred search technique. Besides this, the biggest obstacle in accessing web resources were facing virus attack and slow internet speed.

Okon, Etim and Inyang (2015) investigated the status of marketing of web-based library resources in Nigerian Universities. The researchers examined the current status of university library websites in terms of visibility, online services/resources and networking with subject gateways, professional associations, etc.. The researchers suggested that the digital libraries should make it mandatory to link with professional organizations like NLA, LRCN, etc. so that users can access unlimited sources and services**.**

Anaraki and Babalhavaeji (2013) have done a comparative study and investigated the awareness and ability of medical students in using electronic resources of the Integrating Digital Library Portal of Iran. It was revealed that the awareness and utilization level of students in the three Universities were lower than the average and those who were not aware of the existence of the IDL portal used general search engines to meet their information needs. The respondents admitted that a lack of awareness about the IDL was their most significant problem. The study assisted administrators of the University libraries in developing a more complete understanding of student's electronic information needs and barriers that may inhibit their optimal use.

Bhardwaj and Walia (2012) discussed Web-Based Information Sources and Services of St. Stephen's College, University of Delhi. The study revealed that the majority of the faculty members were aware of the e-resources but need training in

accessing the available e-resources through workshops and lecture methods. Most of the users preferred N-LIST resources. It was observed that most of the faculty members were satisfied with the video library contents and half of the users rated them excellent.

Sinh and Nhung (2012) identifies the searching behaviour of users, the difficulties they are acing and the expectations they have in using online databases from the library at the Central Library of Vietnam National University – Ho Chi Minh city. It was found that although the amount of e-resources has been increased gradually this is very much less in comparison to the number of users registered for accessing the online databases. The study also revealed that most of the users were unaware of how to use online databases but they prefer self-learning. English language and database searching skills were found to be the biggest obstacle in accessing online databases.

2.5 Conclusion

The above review of the literature shows that ample studies have been carried out on the use of web technology in libraries. This review covered almost all the related studies between 1999 and 2019. The review reveals that there are no exhaustive, comprehensive, and nationwide studies carried out so far in the libraries of biological sciences institutes of CSIR in India. Moreover, there are many changes and developments that have taken place on the utilization of Internet and web technologies. Therefore, there is a gap in the knowledge, about the usage of web technology and its application in the KRCs' of biological sciences institutes of CSIR. The present study endeavors to fill this knowledge gap. The findings of the study would be beneficial for the concerned stakeholders and authorities in improving the web-based facilities in the libraries in general and CSIRs in particular.

References

Aharony, N. (2012). An analysis of American academic libraries' websites: 2000-2010. *The Electronic Library*, 30(6), 764-776. doi: https://doi.org/10.1108/02640471211282091

Al-Kharous i, R., Jabur, N.H., Bouazza, A. and Al-Harrasi, N. (2016). Factors affecting the implementation of Web 2.0 applications in Omani academic libraries. The Electronic Library, 34(2), 332-351. doi: https://doi.org/10.1108/EL-06-20140101

Anunobi, C. V. and Ogbonna, A.U. (2014).Web 2.0 use by Librarians in a State in Nigeria. *Developing Country Studies.* 2(4). 57-66.

Arif, M., Ameen, K., & Rafiq, M. (2017). Assessing distance education students satisfaction with web-based services: A Pakistani's perspective. *Online Information Review*, *41*(2), 202–218. doi: https://doi.org/10.1108/OIR-07-2016-0172

Arif, M. & Mahmood, K. (2012). The changing role of librarians in the digital world: Adoption of Web 2.0 technologies by Pakistani librarians. *The Electronic Library.* 30 (4). 469-479. doi: https://doi.org/10.1108/ 02640 471 211 252184

Asogva, Bredan E., Cyprian I. and Ugwuanyi, Ugwu Fredunand C. (2015). Evaluation of electronic services infrastructures and quality of e-resources in Nigerian. *The Electronic Library*. 33(6).1133-1149.

Balaji, B. P. & Kumar, V. (2014).Use of Web technology in Providing Information Services by South Indian Technological Universities as Displayed on Library Websites. *Library Hi Tech.* 29(3). 470-495.

Boateng, F. & Liu, Y. Q. (2014). Web 2.0 applications' usage and trends in top US academic libraries. *Library Hi Tech*. 32. doi: https://doi.org/10.1108/LHT-07-2013-0093.

Bharadwaj, R.K. & Walia, P.K. (2012). Web Based Information Sources and Services: A Case Study of Stephen's College, University of Delhi. *Library*

Philosophy and Practice (e-journal). Retrieved October 18, 2016, from http://digitalcommons.unl.edu/libphilprac/768/

Bwalya, T. (2014). Internet and Web based library Services Provision among Academic Libraries in Zambia: A Comparative study of the University Zambia and Copperbelt University Libraries. *International Research: Journal of Library and Information Science, 4(4,)* 475-493.

Cervone, F. (2008). ITIL: a framework for managing digital library services. *OCLC Systems & Services: International digital library perspectives*, 24(2), 87 - 90. doi: https://doi.org/10.1108/10650750810875430

Choi, Y. (2006). Reference services in digital collections and projects. *Reference Services Review,* 34(1), 129-147. doi: https://doi.org/10.1108/00907320610648815

Chen, D.Y.T., Chu, S.K.W & Xu, S.Q. (2013). How do libraries use social networking sites to interact with users. *Wiley Online Library*. 49(1).1-10. doi:https://doi.org/10.1002/meet.14504901085

Chowdhury, G.G. (2002). Digital Library and Reference Srvices: present and future. Journal of Documentation, 58(3), 258-283. doi: https://doi.org/10.1108/00220410210425809

Chua, A.Y.K. & Goh, D.H. (2010). A study of Web 2.0 applications in library websites. *Library & Information Science Research,* 32(3), 203-211. doi: https://doi.org/10.1016/j.lisr.2010.01.002

Devi, K. K. & Verma, M. (2017). Content Evaluation And The Design Trends Of National Institutes Of Technology (Nits) Library Websites Of India: An Evaluative Study. *Journal Of Indian Library Association*. 53. 135-174.

Halub, L.P.(1999). The Value of Web-based library services at Cedars- Sinai Health System. *Bulletin of Medical Library Association,* 87(3), 256-60.

Hariharan, A., Hariharan, C.M. & Mymoon, M. (2007). Customised Web-based Services at SERC Library with Special Reference to Alert Services. *DESIDOC Bulletin of Information Technology,* 27(3), 31-38. doi: https://doi.org/10.14429/djlit.27.3.134

Haruna, B., Kiran, K. Tahira, M. (2017). Modelling web-based library service quality and user loyalty in the context of a developing country. *The Electronic Library*, 5(3), 507-519. doi: https://doi.org/10.1108/EL-10-2015-0211

Islam, M. A., & Hossain, M. J. (2014).Marketing Information Resources and Services on the Web. The *Electronic Library*, 32(5),742- 759.

Kahinde, A.A., & Tella, A. (2012). Assessment of Nigerian University Library Websites/Webpages. *New Review of Information Networking*, 17(2) 69-92. doi: https://doi.org/10.1080/13614576.2012.724282

Kalita, D. & Hazarika, T. (2016). Web based Interactive Services in the University Libraries in Assam and perception of library managers and users: a case study. *ACLA Bulletin*, 8.

Kanamadi, S. & Kumbar, B.D. (2006). Web-Based Services Expected from Libraries: A Case Study of Management Institutes in Mumbai City. *Webology*. Retrieved December 2, 2016 from http://www.webology.org/2006 /v3n2 /a26.html

Katariya, S. & Anbu k, J.P. (2009). Applications of Web 2.0 in the Enhancement of Services and Resource in Academic Libraries: An Experiment @ JIIT University Noida, India. Retrieved February 8, 2016 from http://crl.du.ac.in/ical09/papers/index_files/ical-98_130_287_1_RV.pdf

Khalid, M. & Richardson, J. V. (2013).Impact of Web 2.0 Technologies on Academic Libraries: a Survey of ARL Libraries. *Electronic Library*, 31(4), 508-520.

Khan, I. (2013). Library, Librarian and Library Services in Web 2.0 Environment. Retrieved February, 16, 2017 from http://www.ijodls.in/uploads/3/6/0/3/ 3603729/imran_khan_14-36.pdf

Kim, Y. & Abbas, J. (2010). Adoption of Library 2.0 Functionalities by Academic Libraries and Users: A Knowledge Management Perspective. *The Journal of Academic Librarianship*, 36(3), 211-218. doi: https://doi.org/10.1016/j.acalib.2010.03.003

Kiran, K., & Diljit, S. (2012). Modeling Web-Based library service quality. *Library and Information Science Research,* 34(3), 184-196. doi: https://doi.org/10.1016/j.lisr.2012.02.005

Krishnamurthy, M. (2005). Digital Library Services at the Indian Statistical Institute. The Electronic Library, 33(2),200-203. doi: https://doi.org/ 10.1108/026 404 70510592898

Li, L. (2006). Leveraging quality web-based library user service in the digital age. *Library Management*, 26 (6/7), 390-400. doi: https://doi.org/1.1108/01435120610702387.

Lwoga, E. T. (2014). Integrating Web 2.0 into an Academic Library in Tanzania. *The Electronic Library*, 32(2), 183-202. doi: 10.1108/EL-06-2012-0058

Madhusudhan, M. and Nagabhushanam. (2012). Web-Based library services in university libraries in India: an analysis 'perspective'. *The Electronic.* 30(5). 569-588

Malik, A.& Mahmood, K. (2013). Infrastructure needed for digital reference service (DRS) in university liraries: An exploratory surve in the Punjab, Pakistan. *Library Review*. 62 (6/7), 420-428.

McGillis, L. & Toms, E.G. (2001). Usability of Academic Library Website: Implications for Design. *College & Research Libraries*, 62(4), 355. doi: https://doi.org/10.5860/crl.62.4.355

McMenemy, D. (2012). Emergent digital library services in public libraries: a domain study. *New Library World,*113(11/12), 507-527. doi: https://doi.org/10.1108/03074801211282902

Mierzecka, A. & Suminas, A. (2018). Academic library website functions in the context of users' information needs. *Journal of Librarianship and Information Science*. 50. 157-167. doi: https://doi.org/10.1177/ 0961000616664401.

Okon, E.E., Inyang, I.J. & Etim, I.A. (2015). Marketing of Web-Based Library Resources in Nigerian Universities. *Lbrary Philosophy & Practice (e-*

journal), paper 1263. Retrieved June 27, 2018 from http://digitalcommons.unl.edu/libphilprac/1263

Pathak, S.K., Mishra, A. & Sahoo, G. (2008). Future of Web Based Library And Information Servicess: An Indian Scenario. *Planner 2008*. Retrieved August 30, 2016 from http://ir.inflibnet.ac.in:8080/ir/bitstream/ 1944/1156/1/36.pdf

Pirshahid, S.E., Naghshineh, N. & Fahimnia, F. (2 016). Knowledge and use of Web 2.0 by librarians in university libraries of East Azerbaijan, Iran. *The Electronic Library*, 34(6),1013-1030. doi: https://doi.org/10.1108/ EL -10-2014- 0192

Punchihewa, C.N.D.. (2018). How do Sri Lankan University Libraries Employ Web 2.0 Tools in Providing Web-Based Library Services? : A Comparative Study. *Journal of the University Librarians Association of Sri Lanka.* 21. 18-39. doi: https://doi.org/10.4038/jula.v21i1.7909.

Rahman, A. & Shafique, F. (2011). Use of Web 2.0 and Its Implications for Libraries: Perceptions of Information Professionals in Pakistan. *Library Philosophy and Practice (e-journal)*. 623. Retrieved July 25, 2017 from http://digitalcommons.unl.edu/libphilprac/623/

Rowlands, J. (1999). BMA Library Online: Library Development of Web-based Services and Resources. *VINE,* 29(1), 25-34. doi: https://doi.org/10.1108/eb040708

Sarasvathy, P., Prasada, G. & Jagdeesha. (2016). Digital Library Environment in Changing Scenario: User's Survey of Mysore University, Mysore. *International Journal of Library and Information Studies.* Retrieved July 26, 2018 from http://ijlis.org/img/2016_Vol_6_Issue_2/90-96.pdf

Sarkar, T. D. (2013). Prevalance of widget applications on library websites: an analytical study. *New Library World*. 114 (3/4). 110-131. doi: https://doi.org/10.1108/03074801311304032

Si, L., Wanigasooriya, P. & Ranaweera, A. (2017). Evaluation and Assessment of E-Service Quality of University Libraries in Sri Lanka. *European Academic Research*. 4. 10646-10671.

Sinh, N.H. & Nhung, H. T. H. (2012). Users' Searching Behaviour in Using Online Databases at Vietnam National University - Ho Chi Minh City. *Proceedings of the IATUL Conferences*. Paper 27. Retrieved September 12, 2017 from: http://docs.lib.purdue.edu/iatul/2012/papers/27

Singh, N. K. (2012). Digital Reference Service in University Libraries: A Case Study of the Northern India. *International Journal of the Library and Information Studies,* 2(4), 1-17.

Shafique, F. & Riedling, A. (2013). Survival avenues for Pakistani libraries in the era of emerging technologies: Adoption of Library 2.0 and Library 3-D. *The Electronic Library,* 31 (4), 412-432. doi: https://doi.org/10.1108/EL-02-2011-0025

Shiri, A. (2003). Digital library research: current developments and trend. *Library Review,* 52(5), 198-202. doi: https://doi.org/10.1108/ 002425 303104 76689

Shivakumaraswamy, K.N. (2019). Use of Web-Based Library Services in Mysore City Engineering Colleges in Karnataka, India: A Study. *Library Philosophy and Practice (e-journal).* 2370. doi: https://digitalcommons.unl.edu/libphilprac/2370

Siddike, M.A.K., Munshi, M.N. & Mahamud, R. (2013). Marketing of web-based academic library services in Bangladesh. *International Journal of Library and Information Science,* 5(10), 378-385. Retrieved October 18, 2018 from http://www.academicjournals.org/IJLIS

Thangam, M & Padma, P. (2016). Usage of Web Resources by the Research Scholars of Madras University in Chennai: A Study. *International Journal of Library and Information Studies. Retrieved February 12, 2017 from* http://ijlis.org/img/2016_Vol_6_Issue_2/104-112.pdf

Wilson, D. E. (2015). Web content and design trends of Alabama academic libraries. *The Electronic Library*, 33, 88-102. doi: https://doi.org/10.1108/EL-05-2013-0100.

Xu, C., Ouyang, F. & Chu, H. (2009). The Academic Library Meets Web 2.0: Applications and Implications. *The Journal of Academic Librarianship*, 35(4),324-331. doi: https://doi.org/10.1016/j.acalib.2009.04.003

Zarei, H. & Abazari, Z. (2011). A study of web based services offered by Asian national libraries. *The Electronic Library*, 29(6), 841-850. doi: https://doi.org/10.1108/02640471111188051.

Zhixian, Y. (2014). Australian Academic Librarians' Perceptions of Effective Web 2.0 Tools Used to Market Services and Resources. *The Journal of Academic Librarianship*, 40(3/4), 220-227. doi: https://doi.org/10.1016/j.acalib.2014.02.009

CHAPTER- 3

WEB-BASED LIBRARY SERVICES IN CONTEXT TO SPECIAL LIBRARIES

3.1 Introduction

Over the most recent couple of decades, libraries are confronting major issues, like- information explosion increasing expenses of electronic resources, rise of advanced/virtual libraries and reducing costs of budgets and regularly rising users' demands. Innovation has given boundless potential in improving the capacities of modern libraries not only to meet these challenges but to fulfill the increasing demands of users proficiently and viably. WWW has opened up new vistas for giving information services to the users who consider themselves as technology savvy and are using data resources virtually. Over the years, libraries have accepted the fact that the use the internet as the primary platform to build and deliver information resources, services, and instructions is very helpful in gaining user loyalty and trust.

Traditional library user information services have the following two major features:

- Face-to-face: traditional library user information services usually are being processed by face-to-face personal communication, including eye contact, facial expression, oral communication, and written communication.
- On-site: traditional library user information services include, but are not limited to, on-site bibliographic instruction, campus outreach coordination and collaboration, classroom instruction, consultation, library tour, ready reference, user technical support, and etc.

Types of Library Services

The library services can be grouped into the following groups:

a) Traditional Services: It includes user-based services and technical services. The user services basically include reference and referral services, accession list or monthly list of additions, display of current arrivals in the library, display of the publishers catalogue and newsletters, price list in the library, CAS, SDI services, ILL, translations, review of literature, journal article indexing, book display and exhibitions, and user education training. In technical services manual or online catalogue, special indexes, thesaurus building, literature search, subject and computer training were the main components,

b) IT-based services: IT-based library services are provided by using technology like web-based, Internet-based, CD –Rom based, Network-based, and Consortium based Information services, and these are purely based on the digital documents or information resources like databases, e-books, e-journals, etc. The access to these services is offered by using the technology which in turn assists in providing pinpointed services to the users. The Web-based libraries and virtual libraries are examples of the usage of modern technology.

Need for Web-based Services-

The requirement for online services is condensed underneath.

- Globalization of education demands that teachers and students be brought together at the same time, irrespective of the geographical location. This is possible through e-learning.
- To enhance the competitiveness among the students by training them.
- To provide access to a greater level of resources and information services to students and teachers to enhance their learning opportunities.
- Library and information services are expected to be like internet banking. A 24X7 information service, the convenience of access at their desktop.
- Faster and simple access to library services at a single login.
- Availability of library staff online constantly.
- Easy-to-utilize web services that permit self-benefit.

Need for the Web-based library services in the Special Library

India is a developing country and the development of a developing country basically depends on the quality of the research and development activities taking place in the research institutes of the country. Since CSIR is one of the topmost research and development institutes of India and its main aim is to provide a scientific and industrial researcher that maximizes the economic, environmental and human welfare for the people and development of India. The use of the web to deliver efficient library services has become a trend in the CSIR libraries. To support the growing demand of the users there is a need to upgrade the current library infrastructure facilities in order to transform conventional library resources and services to online information resources and services for providing better services to the library users.

3.2 CSIR Library/KRC-related Projects

3.2.1 National Knowledge Resource Centre-

The National Knowledge Resource Centre (NKRC) is a network of libraries and information centre's of 39 CSIR and 24 DST institutes. It facilitates access to more than 5,000 e-journals of leading publishers along with patents, standards, and bibliographic databases. Apart from licensed resources, it is also a single point entity that provides a large variety of open access resources. NISCAIR's NKRC project is shared with all the libraries as nodal points.

3.2.2 Digital Information Resource Facility

With a view to overcoming the unorganized way of hosting data and services on the servers and to ensure uninterrupted backup service, NISCAIR has proposed to set up a project on Digital Information Resource Facility (DIRF) as an integrated facility. The resources include NISCAIR online journals, subscribed CSIR E-Journal consortium under NKRC and many other digital resources databases. The project aims to provide an integrated state-of-art facility for managing and sharing digital information resources of CSIR.

3.2.3 CSIR KNOWGATE Project

It is an open-source private cloud infrastructure (KNOWGATE) network project under the information sciences cluster. The main objectives are to: Enhance the capacity and capability of CSIR computing power and provide CSIR KRCs an integrated library management solution using OSS. Other services include catalogue sharing, ILL, and referral service for document supply services. Currently, the data of 39 KRCs of CSIR laboratories have been harvested to CSIR Virtual Union Catalogue successfully, OPAC of 39 KRCs of CSIR laboratories have been published on Internet, data of 39 KRCs of CSIR laboratories have been migrated to koha successfully and CSIR Virtual Union Catalogue contains around 15 lakh records. There is also a provision of training on Linux, MySQL, CSIRCat (KOHA, CSIR Virtual Union Catalogue) including a demonstration on CSIR Cloud & CSIR Trend modules. Further details are available at NISCAIR website.

3.2.4 LOADB (Listing of Open Access Databases)

It is a service of CSIR Unit for Research and Development of Information Products (URDIP) located at Pune in India. The objective is to create web-enabled, linked, classified and categorized collection of open-access databases that can be accessed from a single portal.

3.2.5 Special Services

Some special services also exist with few libraries. These are DTP, Impact factor and Citation analysis (by IHBT), Marketing of information products and services (by IIIM and IMTECH) and other labs which are in the process of the same.

3.3 Foundation Facility

Compelling online library services can't be accomplished without giving thoughtfulness regarding the arrangement of the framework office. Libraries contrast in their foundation office and this is an impression of how much they are resolved to give a stage to electronic library services. When it wants a library to begin making online services accessible to the clients they need sensibly satisfactory framework office. The imperative parts required for setting up online services are equipment, programming, narrative sources, administration of advanced assets, look and persuing interfaces, HR and spending plan.

(a) Servers

A server is a computer program that receives requests from the patrons and the computer that fulfill and respond to those demands. This is called client-server architecture. Typically computing servers are database server, mail server, record server, web server, print server, gaming server, and application server. Servers give high-end processing.

(b) Web Servers

The capacity of a web server in the customer server condition is to store, process and convey pages to the customer. The communication among client and server is ensured through the hypertext transfer protocol (HTTP). A client avail the services of the server software utilizes webserver software and begins communicating by sending a demand for a particular resource using HTTP and the server responds with the requested web pages. Pages conveyed are typically HTML files, having multimedia files that like- pictures, contents, and templates.

(c) Back up and Mirror Servers

A backup server takes backups and restores folders, files, databases and, ard hard drivestwork to prevent the loss of data which may occur due to hard drive failure, user error, disaster or accident. The backup server can immediately take the place of primary server without any downtime.

Mirror server duplicates all the processes and transactions of the primary server in case of failure of primary server. The mirror website is an exact replica of the original

site and is updated frequently by the administrator to ensure that it reflects the content of the original site. The typical use of the mirror web server is to balance the load or traffic.

(d) Input Devices

Input devices like scanners, video cameras and camcorders are utilized by the library for the implementation of image-based digital library. The scanners used in a library are of two types- destructive scanners and non-destructive scanners.

(e) Storage Devices

Storage devices help to record and process data. Computers or information processing devices (data storage equipment) may either access a portable (removable) recording medium or a permanent component (Hard disks) to store or retrieve data. The electronic data is stored in either analog or digital form.Digital libraries in order to allow its users to store huge amount of data use number of hard disks used in an array which is known as RAID (redundant array of independent disks).

(f) Computer Network

A computer network is communication network that interconnects computers within a constrained region or a larger geographical area which includes communication circuits. The communication network constitutes hardware like repeaters, switches, hubs, routers, modems, and other things. The network media (transporter media) is of highest significance as it ought to be of high data transmission bandwidth.

(g) Internet Backbone

Internet backbone refers to Internet facility provided by an internet service provider to the users. Web-based library services are completely dependent on the type bandwidth of the internet backbone. Various types of optical fiber Cables (OFC), very small aperture terminals (VSATs) and broadband are used for establishing Internet backbone. The Internet backbone is determined by any institution on the basis of extent and scale of anticipated data transfer and its ability to carry high-speed multi-media traffic. Broadband connections have limitations to the bandwidth and connection reliability, so they are rather used as a backup connection in case of any failure of the other two options being discussed. The choice is therefore between an Optical fiber network and a VSAT network. VSAT is a small, software-driven station with an antenna for communicating to the satellite. The equipment supports all the

basic Ethernet and TCP/IP protocols. OFCs thus considered a long-term solution for their ability to handle high Internet traffic with reliability.

3.4. Application of Web Technology on Traditional Library Services

3.4.1 Web-based Reference and Information Services

The availability of various reference sources such as encyclopedias, directories, and dictionaries, etc. on the web has increased exponentially during the past decade. The libraries can develop subject portals that would provide links to important reference sources through the library website. Web-based reference services include- Selective Dissemination of Information, Current Awareness Service, Document Delivery Service, Web-based Reference Tools, Virtual Reference Desk/ Ask-a-Librarian, Online Current Awareness Bulletin, Virtual Reference Services, Inter-Library Loan based Service, and etc.

"The six-step process to aid institutions in creation and operation of digital reference service are as:

1. Informing- it involves conducting preliminary research both into the field of digital reference and existing services in the area of expertise.

2. Planning- developing policies, procedures and methods and then evaluating them to achieve organizational goals.

3. Training- development of a comprehensive training plan necessary for developing effective staff.

4. Prototyping: Many digital reference services fail because they are launched prematurely. Services that are first pilot-tested in a controlled environment can identify and correct problems with minimal inconvenience.

5. Contributing- development of ongoing publicity and resource development to support the service.

6. Evaluating: As with any service, digital reference services benefit from regular evaluations to ensure a quality product and to gather data for the continued support from the organization." (Wasik 1999)

(a)Virtual Reference desk/ Ask- A Librarian

Ask-a-librarian/virtual reference desk is an asynchronous method of information delivery which connects users with individual who has specialised knowledge and skill in conducting searches. In this service user submit questions either by mail or web interface. Once the question is read, it is forwarded to the person who has knowledge on it and the reply is sent to the user either by mail or posted on web.

(b) Web-based Current Awareness Service

Web-based CAS includes individual notification of published information directly to users through e-mail, which is the easiest way. The library may refer or link directly to some locations to their web pages. The various online publishers provide Table of content service to their users such as Elsevier (Science Direct) and Springer (via Springer Link) or other knowledge resource consortium journals

(c) Web-based Document Delivery Service

Web-based document delivery offers the opportunity of accessing information residing at remote sites. The success of a well-established electronic document delivery system lies in the availability of research journals in electronic format, inexpensive technology to scan articles and improved electronic delivery mechanisms.

(d) Web-based Inter-Library Loan Service

Web-based ILL is a modified traditional ILL service. All web-enabled libraries are providing ILL services to their users through electronic documents and ILL management tools such as software Ariel and Avis. These tools helped libraries to share their resources effectively and efficiently.

(e) Web-based Selective Dissemination Service

In R & D organisations faculty, researchers and scientists have a specific time-bound need. To meet their specific demand electronic SDI is designed to deliver

current information of interest to them at their desks. E-SDI enable users to receive information through email on a regular basis through profiles that reflect their information needs. RSS feed is being used for selective dissemination of information.

3.4.2 Web-based Acquisition Services

Web-Based Acquisition Services have made simple and speedy purchase of documents, printed as well electronic. Most of the publishers, vendors, and suppliers have made their websites online which enables the acquisition staff to access their catalogue online and thereby followed by selection, ordering, and management of documents for verifying information on various aspects, including costs, edition, reprint, etc. The electronic resources, including electronic journals, electronic books, encyclopedia, dictionaries, directories, online databases, online courseware, etc. are also available on subscription/ purchase model. This trend has resulted in purchase of access right to information rather than the source. Web-based technology in acquisition services can be applied on -list of new arrivals, alert services for new addition, status of items, request for documents, status of suggested document, forthcoming items, etc.

3.4.3 Web-based Technical Services

WWW has helped a lot in better and fast processing of documents by preparing standard catalogue and doing classification of documents without much effort The various links to tools like Library of Congress classification schedule, Library of Congress subject heading, MARC documentation, OCLC user documentation, Cyber DDC and other thesauri and subject dictionaries are available on the web, is a great help to the library professional involved in technical processing of books.

A web-based library can provide a link to the new arrival of monthly/weekly lists of books, journals, etc. acquired by the library through the websites. Link to union catalogue of journals subscribed by a group of libraries could help in resource sharing. The technology has made the cataloguing of in-house documents much easier than before. After the technical processing of newly acquired documents, they can be placed in the Web-OPAC on the day of acquisition itself.

(a) Web-OPAC

It is similar to OPAC in searching and browsing. The main difference between the two is that in access or usages, in Web-OPAC it is global and can be searched from any corner of the globe. Web-OPAC uses HTML files that provide hyperlinks to subject areas or disciplines. The library websites become access points to the catalogue and other web-based library resources. The users with internet connection at home, hostel or at University can browse and reserve the document sitting right in their class or at home. Further, libraries subscribing electronic journals need not necessarily provide access to it in the library, these can be made available within the campus as well outside through IP and user/ID password.

(b) Federated Search

Libraries are subscribing number of e-resources for their users. It becomes a tedious job to search for each catalogue of resources and retrieve desired information. Federated search allows the user to do cross-searching of multiple resources with only a single query. There is no need to consult information resources individually. The search result eliminates duplicates which are then displayed in one result set. It saves time of users for searching multiple databases one-at-a-time. Popular federated search portal products are WebFeat, MetaLib, etc.

3.4.4 Web-forms

Web forms are alternatives to the mails and postal mails that traditional libraries were using for two way communication. Library websites are using web-forms for inviting feedback/suggestions from the users and have provision of separate web-forms for different queries. Web-forms may be used for purposes such as for reference queries, request for document on ILL/DDS, status of circulation account (reserve/ cancel/ renewal status), feedback/ suggestions for services and for recommending new book /journal, etc.

3.4.5 Web Application Tools and Web-Based Library Services

Special libraries have to strive hard to offer high quality of web-based services as they face stiff competition with other resource discovery tools like Google, etc. So, it's very necessary to discover new and advanced techniques through which user can interact with library resources and services more easily because mere presence of services on web does not appeal users. Web application tools bring

fundamental change in the way library operate. The special libraries may use these application tools to create new environment to promote their web-based resources and services and involve users in two way communication.

Web application tools are the name given to new capabilities and services offered by the second generation World Wide Web (WWW). “Web 2.0 refers to the second generation of the Web, wherein interoperable, user-centered web applications and services promote social connectedness, media and information sharing, user-created content, and collaboration among individuals and organizations” (Wilson and et al. 2011).

Web 2.0 concept was coined in a “conference brainstorming session between O’Reilly and Media Live International” (OReilly 17). Coombs stated that web 2.0 is “a space that allows anyone to create and share information online- a space for collaboration, conversation, and interaction; a space that is highly dynamic, flexible and adaptable." Web 2.0 encompasses wide range of applications and tools such as blog, wiki, social networking sites (Facebook, LinkedIn), photo sharing sites (flicker, Instagram, etc.) and social bookmarking sites (delicious, Furl, etc.). Web 2.0 phenomena have made impact on all professions and libraries are no exception to this.

On the other hand, Library 2.0 term coined by Michael Casey on his blog library crunch is the integration of web 2.0 features on web-based library services. Library 2.0 harnesses technological abilities and community capability by delivering valuable, valued and advance services to those who stand to benefit from them, whether they (ever) physically enter a library building or not. It is a model for library service that allows user participation in physical as well as for virtual services. It is mainly focused on user-centered change and their participation in the creation of content and community. The main aim is to serve current users and to reach potential users through improved customer-driven services.

These web application tools provide a platform to the users for publishing and sharing of information which allows them to add, share, rate or adjust information. The concept of collaborative work, social networking, and ease in the usage of these applications have brought a significant change in the behavior of internet users around the world.

3.4..5.1. Advantage of Web application tools

• Web application tools facilitate library services with new functionalities by offering new service models, methods, and technologies.

• These tools provide tremendous opportunities for libraries to offer specialized services to better serve current users as well as to reach out to potential users at a point of need, at a time of need by integrating these tools on websites and involve users in their activities and solicit their feedback for improving the library services.

• These tools increase the visibility of library among users which may improve communication with users, provide interactive ways to improve information literacy among users and increased the demand for services in online environment.

• The integration of these tools may improve the quality of library services and gives new dimension for promotion and marketing their activities.

Special libraries may enhance their web services by using web application features which give new dimension to library to engage their users in "acquisition, dissemination, organization, and sharing of information" (Clausen 7) and make their work easier, more productive, and bridge the gap between the user and the information.

3.5. Web-based Library Service Quality

The Web-based library service quality survey tool is a user-centered approach to service assessment in special libraries and is built upon the performance-only measure. The changing needs and expectations of users from the service providers on the web may convert a loyal library user from the library to the public internet. So, in order to maintain this loyalty of the library users in the digital environment is the main concern of libraries these days. Thus, it is important to understand and conceptualize library-service quality in the Web-based service environment, and how it can be assessed.

The conceptualization of Web-based service quality hinges on an understanding of the concept of service quality. The inclusion of the terms "electronic" or "Web-based" is an indication of the service being delivered and consumed in a networked environment(Kiran & Diljit, 2012, pp.185).

The LibQUAL was developed by the Association of Research Libraries to measure library service quality on three dimensions: effect of service, information control, and library as a place. This instrument has since been trademarked as LibQUAL TM and is available in many languages but requires a subscription fee, and its lengthy questionnaire may be a deterrent to respondents. Considering these limitations, Kiran and Diljit (2012) developed the LibWebSQ scale specifically to measure web-based library service quality based on a re-conceptualization of service quality in this context (Harun et al., 2017, pp. 508)

The multidimensional service quality model proposed by Fassnacht and Koese (2006) (as cited in Kiran & Diljit, 2012) was referred to. According to their framework, service quality is a hierarchical multidimensional construct, with three second-order dimensions: 1) environment quality, relating to appearance of user interface; 2) delivery quality, pertaining to customer –Web site interaction during service usage; and 3) outcome quality, viewed as what the customer is left with after the service delivery.

3.5.1 Performance Indicators

Special values and characteristics used for evaluating or measuring the performance of library and information center are called performance indicators. They provide the formula for measuring the progress of a program towards achieving the organisation's goals and objectives. Performance indicators must combine the elements of inputs, outputs, and outcomes, as suggested by (Bryson, 1996)

These piece of information are used to measure the service quality, performance efficiency and user satisfaction. Quantitative performance indicators may include a volume of backlogs, processing time, reference response time, ILL delivery time, availability of information needed, etc. Qualitative performance indicators include user perception of service quality, user satisfaction with reference response, types or levels of service available, etc.

3.5.1.1 Web-based environment quality

The inputs of a system deal with the environment quality of a system. The environment quality of a system pertains to the attributes of the library website user interface. It includes the criteria like :

(a) Access and collection arrangement on the library website, which includes, whether it provides trusted information as compared to the Internet, online information resources are clearly arranged by subject, service provides access to a wide range of electronic resources in their subject, the web site is convenient to use and the web site has all working links

(b) Equipment facilities offered by the library to its users to access web-based library services, which includes, availability of enough ports for laptops and the library has enough working computers to access Web-based services.

3.5.1.2 Web-based delivery quality

The output of a system deals with the delivery quality of a system. The delivery quality of a system pertains to the attributes related to patron and website interaction during the usage of web-based library services. It includes criteria like:

(a)Patron support which means the support given by online librarians to its users, which includes, online librarians understand their specific information needs, online librarians are always willing to help them and online librarians interact with them in a courteous manner

(b)Level of personalization which means the personalization of user's activity in web-based library services, which includes, whether library system stores all their preferences to offer them extra information, whether the users can save their searches and display search history and whether the users are able to set up an alert for new materials in their discipline.

(c)Patron relationship which is based on the user-friendly features offered by the website to its users', which includes, whether the site allows them the convenience of sending query online, whether the site carries the clear, precise instructions at the time of use and whether the instructions on remote access are easy to follow. The outcomes of the system deal with satisfaction level of the users after delivery.

3.5.1.3 Web-based output quality

The outcomes of the system deal with the satisfaction level of the users after delivery. The outcome quality pertains to the functional and emotional benefits a user gets after having access to the web-based library services.

(a) The functional benefits are like by accessing to web-based library services they get information in minimal time, effort and most of the time.

(b) The emotional benefits evaluate the level they feel very happy when they get the exact information, whether web-based library services make them feel that the library is truly dedicated to fulfilling my needs.

(c) Reliability towards web-based library services depends upon, whether the online interlibrary loan requests and online document delivery requests were dealt in a promised time.

REFERENCES

Arif, M., Ameen, K., & Rafiq, M. (2017). Assessing distance education students satisfaction with web-based services: A Pakistani's perspective. *Online Information Review, 41*(2), 202–218. doi: https://doi.org/10.1108/OIR-07-2016-0172

Haruna, B., Kiran, K. Tahira, M. (2017). Modelling web-based library service quality and user loyalty in the context of a developing country. *The Electronic Library*, 5(3), 507-519. doi: https://doi.org/10.1108/EL-10-2015-0211

Kiran, K., & Diljit, S. (2012). Modeling Web-Based library service quality. *Library and Information Science Research*, 34(3), 184-196. doi: https://doi.org/10.1016/j.lisr.2012.02.005

Si, L., Wanigasooriya, P. & Ranaweera, A. (2017). Evaluation and Assessment of E-Service Quality of University Libraries in Sri Lanka. *European Academic Research*. 4. 10646-10671.

Siddike, M.A.K., Munshi, M.N. & Mahamud, R. (2013). Marketing of web-based academic library services in Bangladesh. *International Journal of Library and Information Science,* 5(10), 378-385. Retrieved July 4, 2018 from http://www.academicjournals.org/IJLIS

Wasik, J.M. (1999). Building and Maintaining Digital Reference Service. *Eric Digest.* Retrieved August 7, 2017 from *https://www.ericdigests.org/1999-4/digital.htm*

Wilson, D.W., Lin, X., Longstreet, P. & Sarkar, S. (2011). Web 2.0. A Definition, Literature Review and Directions for Future Research. *AMCIS 2011 Proceedings - All Submissions. 368.* Retrieved December 20, 2017 from http://aisel.aisnet.org/amcis2011_submissions/368

CHAPTER 4

PROFILE OF COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH (CSIR) INSTITUTES DEALING WITH BIOLOGICAL SCIENCES

Council of Scientific & Industrial Research (CSIR), is an autonomous organization established in 1942 and is one of the largest Industrial Research Organization. It is funded by the Science and Technology Ministry, Government of India. CSIR laboratories focus on the development of India by producing a scientific and industrial researches that maximizes the economic, environmental and human welfare. CSIR has a dynamic network of 38 national laboratories, 39 outreach centers, 3 Innovation Complexes and 5 units.

List of CSIR institutes dealing with biological sciences in Northern India.

	CSIR Institutes	**Library website address**	**Library establishment year**
1	Central Drug Research Institute (CDRI), Lucknow	krc.cdri.res.in	1951
2	Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow	library@cimap.res.in	1959
3	Institute of Genomics and Integrative Biology (IGIB), Delhi		1988
4	Institute of Himalayan Bioresource Technology (IHBT), Palampur	Library.ihbt.res.in	1984
5	Indian Institute of Integrative Medicine (IIIM), Jammu	onlinelibrary@iiim.res.in	1957
6	Indian Institute of Toxicological Research (IITR), Lucknow	Opac.iitr.res.in	1965
7	Institute of Microbial Technology (IMTECH), Chandigarh	Opac.imtech.res.in	1984
8	National Botanical Research Institute (NBRI), Lucknow	-	-

CSIR covers a large range of science and technology which includes- radio and space physics, oceanography, geophysics, chemicals, drugs, genomics, biotechnology, mining, aeronautics, instrumentation, environmental engineering, and information technology.

For this study the CSIR institutes dealing with Biological Sciences of Northern India have been selected. The north zone of India comprises of following states as- Jammu & Kashmir, Uttarakhand, Punjab, Haryana, Uttar Pradesh, Delhi, Himachal Pradesh, and Chandigarh.

1. CENTRAL DRUG RESEARCH INSTITUTE (CDRI), LUCKNOW

Central Drug Research Institute (CDRI) was established in India right after independence and it was formally inaugurated on 17th Feb. 1951 by the Prime Minister of India, Pandit Jawahar Lal Nehru. The scientific achievements of the institute and its scientists and infrastructure capabilities built up by CDRI over the years have been appreciated far and wide.

The institute's basic objective is the discovery and development of new drugs and contraceptive agents, and development of innovative, economical and environment-friendly process technologies for known drugs and drug intermediates. The thrust of research is on tropical diseases, cardiovascular disorders, metabolic diseases, and some other problems such as ulcers. Synthetic routes, as well as natural products, are explored to obtain drugs. Natural products explored include terrestrial plants including Indian traditional remedies and marine flora and fauna for search of novel molecules for drug development. The institute is equipped with latest facilities, infrastructure, and expertise to utilize both conventional as well as target-based molecular approaches utilizing inputs of molecular and structural biology, genomics, proteomics, bioinformatics, etc. and by utilizing high throughput technologies.

KNOWLEDGE RESOURCE CENTER (CDRI-KRC)

A very contemporary, extremely wealthy collection and well-managed library support the CDRI researches.The books and journals collection of the library is best in their respective fields, updated regularly and meets the current requirements of biomedical research. Materials are added very regularly in newly emerging areas.

Img. 1. Front view of CDRI-KRC

CDRI has gradually and systematically built up a specialized collection of reading materials in order to meet the increasingly scientific and technological information needs which include- specialized books, periodicals, reference works, serials and various macro & micro-documents in the areas of Biomedical Research and Drugs & Pharmaceuticals.

Img. 2 Reading view of CDRI-KRC

The Knowledge Resource Center of CDRI is situated as a separate building which is a big hall. It includes 6 sections that were a reception, textbook section, reading section, periodical section, a reference section, and the IT section. The total number of staff in the CDRI library is 6 in which 4 are professional staff and 2 are non-professional staff. At present total number of registered user is approximately 918. The hardware infrastructure of CDRI library is good.

The library has a collection of 2.4k books, 3k reference books, 7.7k back volumes and subscribed to almost 20 national and international journals. Besides, it also acquires various types of resources in the forms of patents, standards, theses, video cassettes, CD-ROMs, DVDs, micro documents, reports, etc. The library is fully automated with integrated management software Libsys7

2. CENTRAL INSTITUTE OF MEDICINAL AND AROMATIC PLANTS (CIMAP), LUCKNOW

Central Institute of Medicinal and Aromatic Plants (CIMAP) is a multi-disciplinary R & D Institute dedicated to the cause of medicinal and aromatic plant research, cultivation and business. With its Resource Centers (CRC) and Resource points (CRP), CIMAP has its footprints in various agro- climate areas in India. The institute aims for improving health and life in green technologies.

Various research activities include- conservation and utilization of genetic resources of medicinal aromatic plants, bio-village approaches, development of agro-technologies for priority plants, plant tissue culture technology, pest management strategies, and etc.

KNOWLEDGE RESOURCE CENTER (CIMAP-KRC)

The library is supporting the research & development activity of the institute by offering various web-based library services such as acquisition service, reference service, cataloguing services, and periodical service.

Mr. Shiv Prakash is present information scientist of CIMAP. The library has a total 3 no. of staff, 1 in each category professional, semi-professional and non-professional. The number of register users is 182. The library is divided into two halves. One half includes the circulation section, reading section and periodical section the other includes the textbook section and cyber section.

The center's ongoing operations include retrieval and evaluation of soft and hard data access, online and off-line searches, journals publication, farm bulletins, books, monographs, catalogues, directories, bibliographies, education and training on an average nearly 200 users from CIMAP and nearby institutions access the KRC regularly.

3. INSTITUTE OF GENOMICS AND INTEGRATIVE BIOLOGY (IGIB), DELHI

One of the premier institutes of CSIR is IGIB, which carries out researches basically in the field of Genomics and Genome Informatics. The goal of IGIB is "*To translate concepts developed in basic biological research to commercially viable technologies*."

IGIB was earlier known as Center for Biochemicals in 1977 and its main aim was to provide rare biochemicals and reagents for biomedical researchers. Later in 1993 it was developed into a full-fledged laboratory and renamed as Center for Biochemical Technology. Core area of research in IGIB are Genomics and Molecular Medicine, Respiratory Disease Biology, Genome Informatics and Structural Biology, Energy and Environmental Biotechnology, Chemical & Systems Biology, Ayurgenomics, Allergy and Infectious Diseases, Gene Expression Profiling & Comparative Genomics, Informatics and big data, Proteomics and Structural Biology, Environmental Biotechnology, Bioactive molecules and Technology Development Unit, Design and Synthesis of Nucleic Acid and Peptides.

KNOWLEDGE RESOURCE CENTER (IGIB-KRC)

The Knowledge Resource Center of IGIB is situated in Delhi University. IGIB-KRC was established in the year 1988. Since the KRC is situated in Delhi University, IGIB students have easy access to the Science Library of Delhi University (within Campus). The library has a core collection of around 400 books and subscribes to core 60 scientific journals (Online+Print). In addition to their library, it has access to various journals through CSIR e-journal consortium.

Mrs. S. Ganju is presently working as information scientist at IGIB. The library has only 3 staff, 2 are professionals and 1 is non-professional. The library has 2 photocopiers, 1 scanner, and 1 printer in the library to cater to the needs of almost 170 researchers and scientists. Exclusive four nodes and wi-fi connection are also fixed in the library so that researchers are able to make use of their own Laptops in the library. The Library uses Libsys Automation Software Package for computerization of its activities.

4. INSTITUTE OF HIMALAYAN BIORESOURCE TECHNOLOGY (IHBT), PALAMPUR

CSIR-IHBT is situated in the Kangra valley of Himachal Pradesh (H.P.) and is the only laboratory of the CSIR in the State. The institute has a research mandate focused on bioresources to sustainably catalyze the bio-economy.

Floriculture tea sciences, biotechnologies, and natural plant product Conservation Biology Cell and Tissue Culture, Genomics, Proteomics, Natural Products Chemistry, Agro-Chemicals, Chemical Engineering, Plant Virology, Pesticide Residues, Diagnostics are few major subjects being focussed in IHBT.

KNOWLEDGE RESOURCE CENTER (IHBT-KRC)

Img. 3 Front view of IHBT KRC

The Library and Information Centre (IHBT-LIC) of the IHBT was established in the year 1982-83 with the inception Institute. IHBT-LIC is a special resource center by its nature as it is serving the scientific and technical community. Its parent institution i.e. Institute of Himalayan Bioresource Technology (IHBT) is providing R&D services in the western Himalayan region leading to value-added Plants, agricultural, social & environmental benefits.

Mr. Mukhtiar Singh is the Principal Technical Officer who is currently heading the charge of IHBT-LIC, with 4 permanent staff. The Library subscribes to 45+ print journals and 2500+ online journals. The Library has a rich collection of books on Chemistry, Biotech, Genes, Nanotechnology, Book of Tea, Flora of Himachal Pradesh, Biodiversity and Other.

Opening hours of the library from Monday to Friday (On All Working Days) are 9:00 am to 5:30 pm. Government Holidays and Saturdays from 9:00 am to 2:00 pm

Img. 4 IHBT KRC

5. INDIAN INSTITUTE OF INTEGRATIVE MEDICINE (IIIM), JAMMU

The Laboratory was established in 1941 as a research and production center, known as Drug Research Laboratory of J&K State and was later taken over by Council of Scientific & Industrial Research of Govt. of India in December 1957 as Regional Research Laboratory, Jammu. In view of its core strength in natural products based drug discovery, the mandate of Institute was redefined in 2005 and its name changed to Indian Institute of Integrative Medicine (IIIM). The current mandate of IIIM is to discover new drugs and therapeutic approaches from Natural Products, both of plant and microbial origin, enabled by biotechnology, to develop technologies, drugs, and products of high value for the national and international markets.

Few major fields which are being focused in IIIM Jammu are as- Agrotechnology of medicinal & aromatic plants, identification/authentication of medicinal plants, synthetic (chiral) and natural product chemistry, herbal drugs, selected biological screening, bioprospecting microbial biodiversity for industrially useful enzymes, molecular biology & gene cloning, fermentation technology, quality control and standardization of herbal drugs, establishment of gene bank, bioinformatics,

pharmacology phytochemicals/herbal drugs/nutraceuticals research. Chemical Engineering & Design backup for packaging of technologies.

KNOWLEDGE RESOURCE CENTER (IIIM-KRC)

IIIM-KRC is a 3-floor building and has very rich library collection in terms of books, periodicals, databases, and other intellectual materials. Records show that the library was operational even during the pre-independence years on this campus. During those times, it was known as 'Drug Research Laboratory (DRL) – Library' which was renamed as 'Regional Research Laboratory (RRL) – Library' in 1957 when CSIR took-over DRL and renamed the Institution as 'Regional Research Laboratory (RRL)'. Library shifted to its new building (present building) on 13th September 1974.

The IIIM library is known as 'IIIM Knowledge Resource Centre (KRC)". The IIIM KRC's main aim is to meet users ' information needs by providing them with the finest and most up-to-date resources and facilities that allow them to keep up with current trends and developments in biotechnology, botany, natural products chemistry (NPC) and quality control.

Mr. Sanjay Sharma is the present library in charge of the IIIM-KRC. The library has a rich collection of approximately 27,500 Books, 17000 bound Volumes, 1000 standards, 60 doctoral theses, 04 Online Databases, 03 Online Archival Databases, and many other print and e-resources. The library also offers high range of web-based services to approx. 190 users.

The library works on Windows & Linux operating system, KOHA library automation software.

6. INDIAN INSTITUTE OF TOXICOLOGICAL RESEARCH (IITR), LUCKNOW

Indian Institute of Toxicology Research (IITR) is a constituent laboratory of CSIR, which was formerly known as Industrial Toxicology Research Centre, ITRC. But in 1965 it was renamed as Indian Institute of Toxicolody Research, IITR.

IITR undertakes research in niche areas of toxicology which includes Neurotoxicology, environmental health, ecotoxicology, phototoxicology, epidemiology, immunotoxicology, developmental toxicology, cardiovascular toxicology, pulmonary toxicology, environmental carcinogenesis, environmental monitoring and environmental biotechnology heavy metals, industrial dusts and fibres, plastics and polymers, hydrocarbons, pesticides, detergents, dyes and food additives.

KNOWLEDGE RESOURCE CENTRE (IITR-KRC)

IITR's KRC serves as an outstanding nation's toxicology top data resources. This center offers people, private and public sector organizations, regulatory authorities and government organizations with data on toxic chemicals and their impact on the environment and human, their management, regulation, etc. The library has a collection of approx. 8400 books, 14440 back volumes, 07 magazines, 15 newspapers, etc.

Mr. Rakesh Singh Bisen is the present librarian of the IITR. Total number of staff in IITR KRC is 7 out of which 1 is professional, 1 is semi-professional, 3 are non-professionals and 2 are MTS. The center is serving to approx 130 users of the institute. It offers 9 computer systems, 1 scanner, 1 power backup system and 2 multifunctional printers to its users.

7. INSTITUTE OF MICROBIAL TECHNOLOGY (IMTECH), CHANDIGARH

CSIR-Institute of Microbial Technology (IMTECH), a national laboratory of CSIR, which focuses on microbial research & technology development, established in 1984.

IMTECH's team of scientists having cutting edge R&D expertise in the areas of: Cloning & expression of recombinant / engineered proteins & their scale-up, Understanding / manipulating proteins and their engineering, Protein structure

determination through X-ray crystallography, Molecular microbiology of pathogens especially with respect to drug resistance & vaccine development, Immunology of infectious diseases, Yeast Genetics, Screening of microorganisms for novel enzymatic activities and strain improvement, Bioinformatics & high end computational biology, Microbial taxonomy and metagenomics, and allied areas like technology and business management and intellectual property protection.

KNOWLEDGE RESOURCE CENTER (IMTECH- KRC)

IMTECH- KRC is one of the finest center in the area of microbiology and biotechnology. The KRC is well equipped and has a rich and up-to-date collection in terms of books, journals both print and online, microfilms/microfiche, general magazines, annual Reports, audiovisual materials, theses, etc.

KRC is open all the year except on weekends and holidays. The working hours of the library are 9:00 am to 5:50 pm. The currrrent information scientist of IITR KRC is K.P. Singh.

IMTECH KRC has established a well automated library system with the help of Koha software (OSS). The IMTECH KRC web-OPAC is a web-based user interface to access the library catalogue for searching. The web OPAC also provides the secured way of accessing member-specific information from the KRC.

REFERENCES

https://www.csir.res.in/. Retrieved July 4, 2018

https://www.csir.res.in/csir-labs. Retrieved July 13, 2018

http://www.cdri.res.in/. Retrieved July 19, 2018

https://www.cimap.res.in/english/. Retrieved July 24, 2018

https://www.igib.res.in/. Retrieved July 29, 2018

https://www.ihbt.res.in/en/. Retrieved August 4, 2018

https://www.iiim.res.in/. Retrieved August 9, 2018

http://iitrindia.org/. Retrieved August 14, 2018

https://www.imtech.res.in/. Retrieved August 16, 2018

CHAPTER -5

DATA ANALYSIS AND INTERPRETATION

To realize the objective of the study, data was collected from librarians and the users of the libraries of Council for Science and Industrial Research (CSIRs) on various aspects of web-based library services. Librarian's questionnaire was prepared to find the information regarding present status of CSIR libraries in terms of infrastructure facility, various web-based resources and services offered by their library, use of web application tools for effective use of web-based resources and services, and their opinion to rate the level of sophistication of the web based library services. User's questionnaire was designed to know the awareness, use, opinion towards the web-based services environment quality, web-based services delivery quality and web-based services outcome quality and the problems faced by the users in using these web-based services.

Institution wise distribution of information scientist's questionnaire

CSIRs	**Questionnaire distributed**	**Questionnaire received**	**Response rate (%)**
CDRI	1	1	100.00
CIMAP	1	1	100.00
IGIB	1	1	100.00
IHBT	1	1	100.00
IIIM	1	1	100.00
IITR	1	1	100.00
IMTECH	1	1	100.00
TOTAL	**7**	**7**	**100.00**

CSIRs	Sample size	Questionnaire distributed	Questionnaire received	Response rate (%)
CDRI	100	100	84	84.00
CIMAP	100	100	90	90.00
IGIB	100	100	63	63.00
IHBT	100	100	65	65.00
IIIM	100	100	84	84.00
IITR	100	100	84	84.00
IMTECH	100	100	90	90.00
TOTAL	**700**	**700**	**560**	**80.00**

Institution wise distribution of users' questionnaire

After collecting the questionnaire the data was analyzed on MS- Excel.

The data is presented in the following two sections:

5.1. Analysis of data collected from the Information Scientists of the selected biological sciences institutes of CSIR and

5.2. Analysis of data collected from the users of the KRCs of the selected biological sciences institutes of CSIR

5.1. Analysis of data collected from the Information Scientists of CSIR

Section A: IT Infrastructure

5.1.1. Availability of Hardware: In order to provide web-based library resources and services, the library staff should have the required number of hardware to initialize the web-based resources and services. Without basic hardware it will not be possible for the CSIR libraries to extend web-based library resources and services. Data was collected from the libraries with regard to the availability of required hardware which is presented in the Table 5.1.1

	HARDWARE	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**Computer Systems**	√	√	√	√	√	√	√
2	**Scanners for Digitization**	√	√	√	√	√	√	√
3	**Web Camera**	√	-	-	√	-	-	-
4	**Power Backup**	√	√	√	√	√	√	√
5	**Multifunction Printers**	√	√	√	√	√	√	√
6	**Web Servers**	√	√	-	√	√		√
7	**Database server**	√	√	-	√	√	-	√
8	**Mirror Servers**	√	-	-	√	-	-	-
9	**Backup Servers**	√	√	-	√	-	-	-
10	**LCD Projector**	-	-	-	-	-	-	√
11	**Fax**	-	-	-	-	-	-	-

Table 5.1.1. Availability of Hardware

Table 5.1.1 shows that the hardware tools like computer systems, scanner for digitization, power backup and multifunction printers were available in all the selected CSIR KRCs. Web Servers and database servers were available in 5 libraries which were CDRI, CIMAP, IHBT, IIIM and IMTECH, followed by Backup servers which was present in only 3 libraries which were CDRI, CIMAP and IHBT whereas fax service was not available in any library.

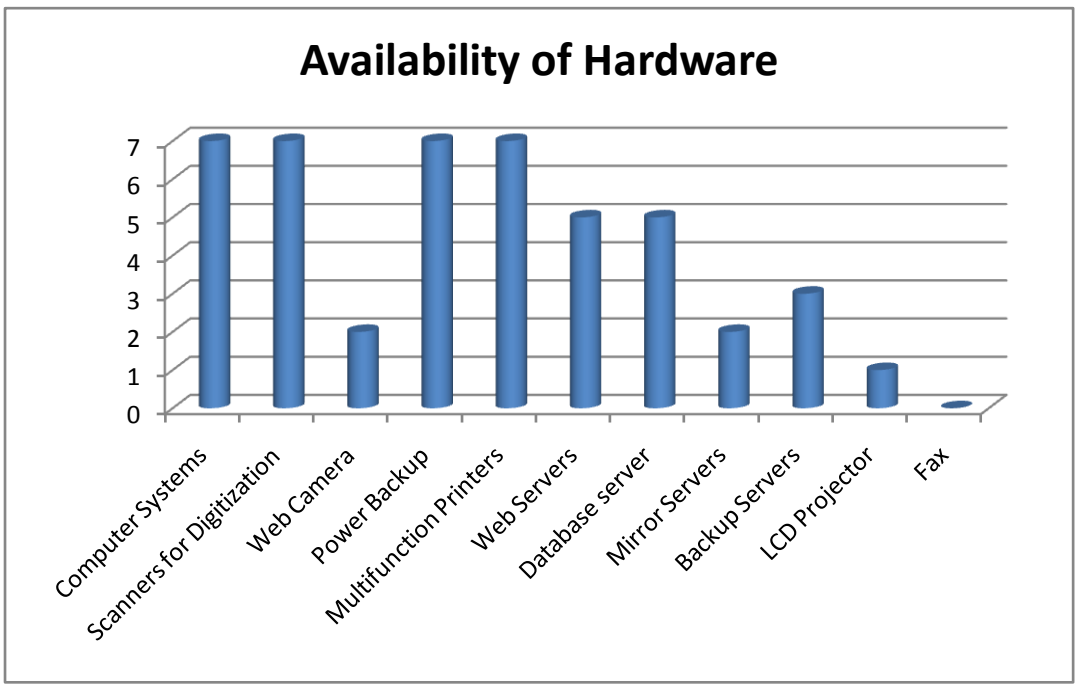

Fig. 5.1.1 Availability of Hardware

The fig. 5.1.1 clearly indicates that the hardware tools like computer systems, scanners for digitization, power backup and multifunction printers were available in all the selected CSIR KRCs.

5.1.2 Availability of Software: Availability of software is equally important as hardware in web-based environment. The data was collected to find out whether the libraries have acquired suitable software tools for delivering web-based services or not. The data is presented in the table 5.1.2.

	SOFTWARE	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	Operating System Software	√	√	√	√	√	√	√
2	Library Management Software	√	√	√	√	√	√	√
3	CD-Net Management	-	√	-	√	-	-	-
4	Multilingual Support	-	-	-	-	√	√	-
5	Web Designing Software	√	-	-	-	-	-	√

Table 5.1.2. Availability of Softwares

The table 5.1.2. clearly indicates that the operating system software and library management software were present in all the CSIR KRCs. Multilingual support was present in CDRI, IIIM and IITR KRCs.

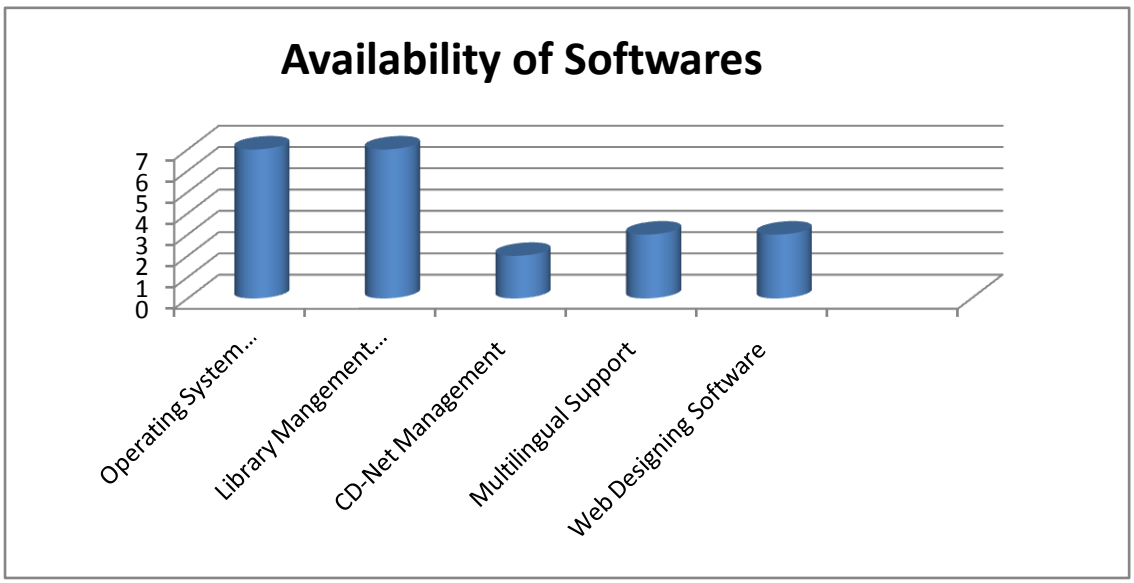

Fig. 5.1.2. Availability of Softwares

The fig. 5.1.2. clearly shows that the operating system software and library management software were present in all the 7 KRCs.

5.1.3. LAN facility: LAN is required to provide web-based library resources and services online to end users at their endpoints inside the library or campus. In order to provide the robust and efficient services to the users it is pertinent for all the sections of the library to be connected with each other with the help of integrated library management software. Subsequently the library can plan to make operational versions on the web-based platforms. The data are presented in table

Table 5.1.3.1: Connection of all the sections through ILMS within the Library

	CSIRs	**YES**	**NO**
1	**CDRI**	√	_
2	**CIMAP**	√	_
3	**IGIB**	√	_
4	**IHBT**	√	_
5	**IIIM**	√	_
6	**IITR**	√	_
7	**IMTECH**	√	_

Table 5.1.3.1 Connection of all the sections through ILMS within the Library

It is evident from the Table 5.1.3.1 that all sections of the CSIR KRCs were connected through integrated library management software.

Table 5.1.3.2: Availability of Library Services on Network

	CSIRs	YES	NO
1	CDRI	√	-
2	CIMAP	√	-
3	IGIB	√	-
4	IHBT	√	-
5	IIIM	√	-
6	IITR	√	-
7	IMTECH	√	-

Table 5.1.3.2 Availability of Library Services on Network

It was observed from the table 5.1.3.2 that all the selected KRCs have made library services available on network, which can be accessed on campus/hostel/classes.

5.1.4. Internet Facility: Internet, network of networks is a tool to support library activities as well as to provide library resources and services online within and outside the campus.

	CSIRs	TYPES OF CONNECTION	SERVICE PROVIDER	BANDWIDTH
1.	CDRI	Dedicate lines	NKN, STPI, BSNL	NA
2.	CIMAP	NA	NA	NA
3.	IGIB	NA	NA	NA
4.	IHBT	Leased lines	NIC/NKN	1GB
5.	IIIM	Dedicated Lines	NKN	NA
6.	IITR	Broadband	NA	NA
7.	IMTECH	Leased Line	NA	NA

Table 5.1.4 Internet facility

The table 5.1.4 indicates that in CDRI, IHBT, and IIIM, NKN (National Knowledge Network) was the main Internet services provider. Type of connection in CDRI and

IIIM was dedicated lines whereas in IMTECH and IHBT was leased lines. It was also noted that IGIB and CIMAP didn't responded in this regard.

5.1.5. Rating of Overall Infrastructure Facility: In order to assess the availability of infrastructure facility for extending web-based resources and services in the libraries, the question was asked to libraries to rate the available overall infrastructure facility with them. The response of libraries is presented below in Table 5.1.5

	CSIRs	EXCELLENT	GOOD	AVERAGE	FAIR	POOR
1	CDRI	√	-	-	-	-
2	CIMAP	-	√	-	-	-
3	IGIB	-	√	-	-	-
4	IHBT	√	-	-	-	-
5	IIIM	-	√	-	-	-
6	IITR	-	-	√	-	-
7	IMTECH	√	-	-	-	-

Table 5.1.5 Rating of Overall Infrastructure Facility

The table 5.1.5. reveals that the information scientists of CDRI, IHBT, and IMTECH rated their overall infrastructure facility of web-based services as excellent, the information scientists of CIMAP, IGIB and IIIM rated as good and whereas information scientist of IITR rated its infrastructure facilities as average.

5.1.6. Availability of Web-based library Services round the clock

The access to information resources and services at 365x24 helps on/off-campus users after the library is closed. The data related to this aspect is presented in the Table 5.1.6.

	CSIRs	365*24 hrs	REGULAR WORKING HOURS
1	CDRI	√	-
2	CIMAP	√	-
3	IGIB	√	-
4	IHBT	√	-
5	IIIM	√	-
6	IITR	√	-
7	IMTECH	√	-

Table 5.1.6. Availability of Web-based library Services round the clock

It is clear from the table 5.1.6. that all the selected KRCs were offering web-based library services 365*24 hrs.

5.1.7. Mode of Accessibility: It is necessary to provide online library services through authentication not only for security reasons but also to have usages statistics. The remote access is provided either to registered users through authentic Internet Protocol (IP) address or to the registered users through identity (ID) and password (PW) or proxy server. The data was collected to find out the mode of accessibility of web-based resources and services of the libraries which are presented in the table 5.1.7.

	CSIRs	CAMPUS WIDE THROUGH IP AUTHENTICATION	USER ID/PASSWORD	PROXY SERVER
1.	CDRI	√	√	√
2.	CIMAP	√	-	-
3.	IGIB	-	-	√
4.	IHBT	√	--	-
5.	IIIM	√	-	-
6.	IITR	√	-	-
7.	IMTECH	√	-	-

Table 5.1.7. Mode of Accessibility

The table 5.1.7. shows that the CDRI, CIMAP, IHBT, IIIM, IITR and IMTECH provide campus wide IP authentication although CDRI was providing access to users through ID/Password and Proxy server also. Only IGIB was providing proxy server as authentication tool.

5.1.8. Frequency of updating of information on website: the library website should be updated on regular basis in order to provide its users the real time information. If this is not done regularly the users may shift to another sources of information. The data pertaining to this aspect is presented below.

CSIRs	REAL TIME	NEXT DAY	MONTHLY	WEEKLY
CDRI	√	-	-	-
CIMAP	√	-	-	-
IGIB	√	-	-	-
IHBT	√	-	-	-
IIIM	-	-	√	-
IITR	√	-	-	-
IMTECH	-	-	-	√

Table 5.1.8. Frequency of updating of information on website

The table 5.1.8 reveals that the library websites of CDRI, CIMAP, IGIB, IHBT, and IITR were updated in real time, whereas library website of IMTech was updated on weekly basis and IIIM was updated on monthly basis.

5.1.9. Factors that encouraged the library to offer web-based library services through websites

	FACTORS	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**Easy access and Faster services**	√	√	√	√	√	√	√
2	**To increase the visibility of library**	√	-	√	√	√	√	√
3	**To make services available 24*7**	√	√	-	√	√	√	-
4	**Enhance and effective use of library services**	√	-	√	√	√	√	√
5	**Due to technological changes**	√	-	-	√	√	√	-
6	**Easy to use web resources permitting self service**	√	-	√	√	√	-	√
7	**Staff efficiency improved technologically**	√	-	√	√	√		√
8	**Marketing of library service**	-	-	-	√	√	√	-
9	**Save users time by providing personalized services**	√	√	√	√	√	-	-
10	**Due to change in the users' perception regarding access to services/information**	√	-	-	√	√	-	√

Table 5.1.9. Factors affecting

The table 5.1.9. shows that all the selected KRCs accepted that easy and faster services was the major factor which encouraged them to offer web-based services, 6 out of 7 KRCs i.e. CDRI, IGIB, IHBT, IIIM, IITR, and IMTECH accepted that web-based environment increases the visibility of the library and enhance the effective use of library services. 5 CSIR KRCs accepted that it makes the services available 24x7 and staff efficiency was also improved technologically. 4 CSIR KRCS offers web-based services due to technological change and changes in the users perception regarding access to services and information.

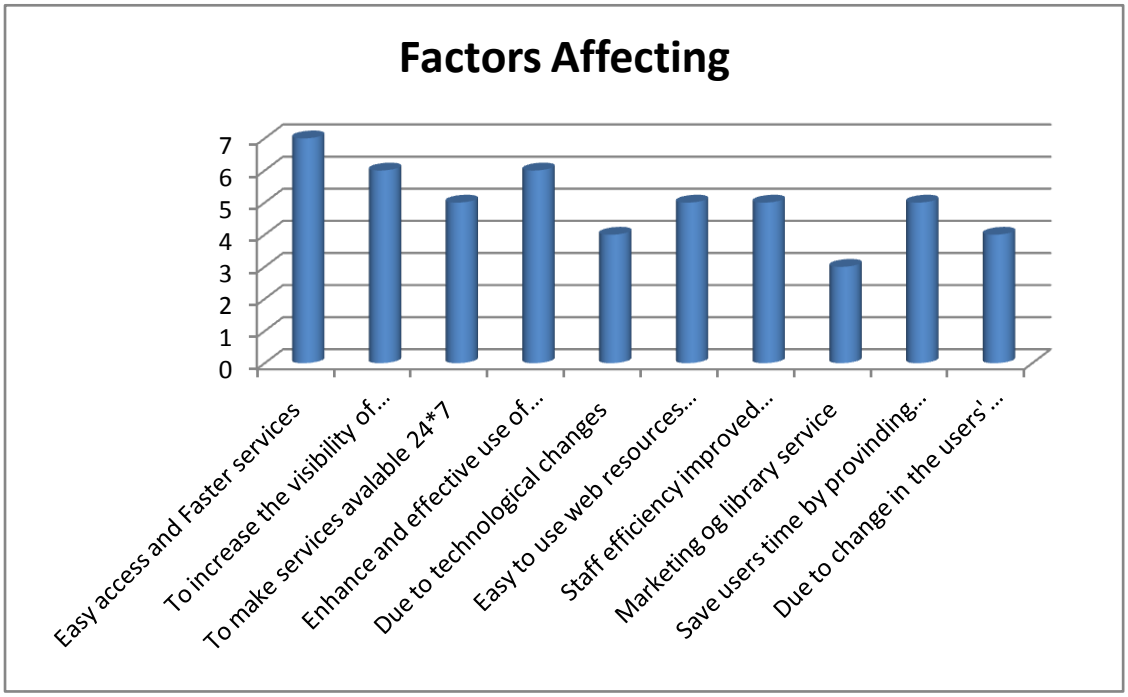

Fig. 5.1.9. Factors affecting

It is evident from the fig. 5.1.9. that almost all the selected KRCs have responded that the factors that encouraged them to offer web-based services were- easy access and faster service, to increases the visibility of the library, to make services available 24x7, to enhance the effective use of library services, due to technological change, staff efficiency improved technologically, saves users time by providing personalized services.

5.1.10. Web-resources: in this modern world of information and communication technology era, the academic communities are heavily dependent on electronic resources that meet their information need in a better way. Therefore it was attempted

to find out the availability of web-resources in the libraries which are offered via web-based library services. The data is presented as follows:

	WEB RESOURCES	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	E-books	√	-	-	-	-	√	-
2	Open Access Journals Databases	√	√	√	√	√	√	√
3	Institutional Repository Gateway	√	-	√	√	√	-	√
4	E- Journals	√	√	√	√	√	√	√
5	Video Library	√	-	-	√	-	-	-
6	Patents/Standards	√	-	-	√	-	-	-
7	E-theses/dissertations	√	-	-	√	-	-	√
8	CD-ROM	-	√	-	√	-	-	-
9	E-Databases	√	-	√	√	√	√	-
10	E-newspaper Clipping	√	√	-	√	√	√	-
11	Any other	-	-	-	-	-	-	-

Table 5.1.10. Availability of Web-resources

The table 5.1.10 clearly shows that all the selected KRCs focuses basically in providing access to open access journals databases and e-journals through web-based library services. E-newspaper clippings and e-databases were provided by 5 libraries. the resources like video library, patents/standards, e-theses/dissertations, e-books and CD-ROM were not focused much.

5.1.11. Web-based library services: The data pertaining to availability of different web-based library services offered by the KRCs, the target group who got the

privilege to access, and the information scientists' opinion to rate the level of sophistication of their respective KRCs for the six sections named as- reference, acquisition, circulation, cataloguing, periodical and general/administrative services from surveyed libraries were discussed below.

5.1.11.1 We-based Reference Services- It is crucial for libraries to extend the reference/information desk beyond the library's walls and make available services 24 x7 as the demands from users for easy access to electronic reference sources and services from their desktop is increasing day by day.

(a) Web-Based Reference Services Offered by CSIR KRCs

	WEB-BASED REFERENCE SERVICES	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**SDI**	√	√	√	√	-	-	-
2	**CAS**	√	√	√	√	√	√	√
3	**DDS**	√	√	√	√	√	√	√
4	**Web-base Reference Tools**	√	√	-	√	-	-	-
5	**Virtual Reference Desk**	√	√	-	√	-	√	-
6	**Online Current Awareness Bulletin**	√	-	-	√	-	-	-
7	**Virtual Reference Service**	√	√	√	√	-	√	-
8	**Inter-Library Loan based Services**	√	√	√	√	-	-	-

Table 5.1.11.1(a) Web-Based Reference Services

The table 5.1.11.1(a) reveals that the web-based CAS and DDS services were offered by all libraries. SDI and Interlibrary loan service were offered by CDRI, CIMAP, IHBT, and IGIB. Virtual reference service was offered by CDRI, CIMAP, IHBT,

IGIB and IITR. Virtual reference desk was offered by CDRI, CIMAP, IHBT, and IITR. Web-based Reference tools were offered by CDRI, CIMAP, and IHBT. Online current awareness bulletin was offered only by CDRI and IHBT.

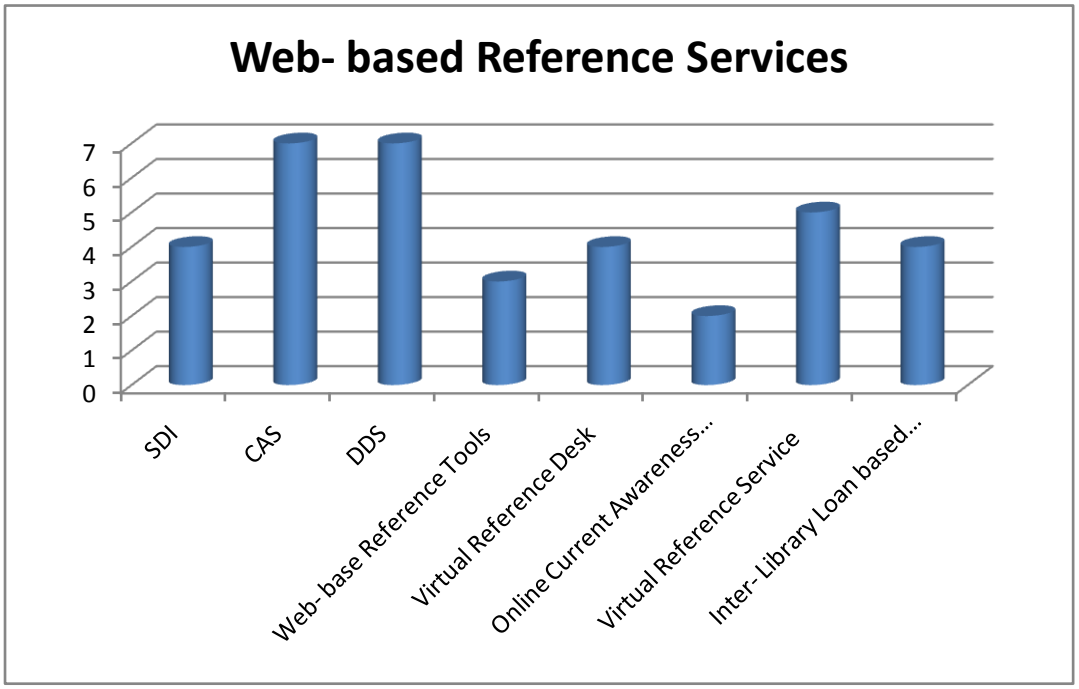

Fig. 5.1.11.1(a) Web-Based Reference Services

It is evident from the fig. 5.1.11.1(a) CAS and DDS services were offered by all the selected 7 KRCs, followed by virtual reference service which was offered by 5 KRCs, followed by SDI, virtual reference desk service, and inter-library loan service by 4 KRCs. However, web-based reference service was offered by 3 KRCs and online current awareness service by only 2 KRCs.

(b) Users' authorised to acces web-based library services

	USERS' AUTHORISED	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**All internet users, regardless of institutional affiliation**	-	-	-	-	-	-	√
2	**On campus internet users**	√	√	√	-	√	√	-
3	**Off campus internet users**	-	-	-	-	-	-	-
4	**In house library patron**	-	-	-	-	-	-	-
5	**Restricted to affiliated users**	-	-	-	√	-	-	-

Table 5.1.11.1 (b) Users' authorised

The table 5.1.11.1(b) revealed that the CDRI, CIMAP, IGIB, IIIM, and IITR offers web-based reference service to only on-campus internet users, whereas IHBT had restricted the access of WBLS to only affiliated users and IMTECH provide access to all internet users, regardless of institutional affiliation.

(c) Rating the Level of Sophistication

	LEVEL OF SOPHISTICATION	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**None**	-	-	-	-	-	-	-
2	**Basic**	-	-	-	-	-	-	-
3	**Average**	-	√	-	-	-	√	√
4	**Advanced**	√	-	√	√	√	-	-

Table 5.1.11.1(c) Level of Sophistication

The table 5.1.11.1(c) indicates that the Information Scientists of CDRI, IGIB, IHBT, and IIIM have rated the level of sophistication of their web-based reference services as advance whereas the Information Scientists of CIMAP, IITR and IMTECH have rated as average.

5.1.11.2. Web-based Acquisition Services- As the collection of the library resources and services is meant for the users, their participation in collection development of the library is always important and crucial. To ascertain whether libraries have provided a facility in the system where users can participate in library collection building or not, the data was collected and presented below.

(a) Web-Based Acquisition Services Offered by CSIR KRCs

	WEB-BASED ACQUISITION SERVICES	**CDRI**	**CIMAP**	**IGIB**	**IHBT**	**IIIM**	**IITR**	**IMTECH**
1	List of new arrivals	-	√	-	√	√	√	√
2	Alert services for new additions	√	√	√	√	√	-	√
3	Status of Items (on order, processing, etc)	√	-	√	√	-	-	√
4	Request for Document	√	-	√	√	-	-	√
5	Acquisition Policies	√	-	-	√	-	-	-
6	Status of Suggested Document	√	-	-	√	-	-	-

Table 5.1.11.2. (a) Web-Based Acquisition Services

The table 5.1.11.2.(a) indicates that all the 7 KRCs offers one or the another web-based acquisition services, in which alert service for new addition was the most popular acquisition service as it was offered by 6 KRCs *except IITR*. List of new arrivals service was offered by CIMAP, IHBT, IIIM, IITR, and IMTECH. Status of documents and Request for documents were offered by CDRI, IGIB, IHBT, and IMTECH.

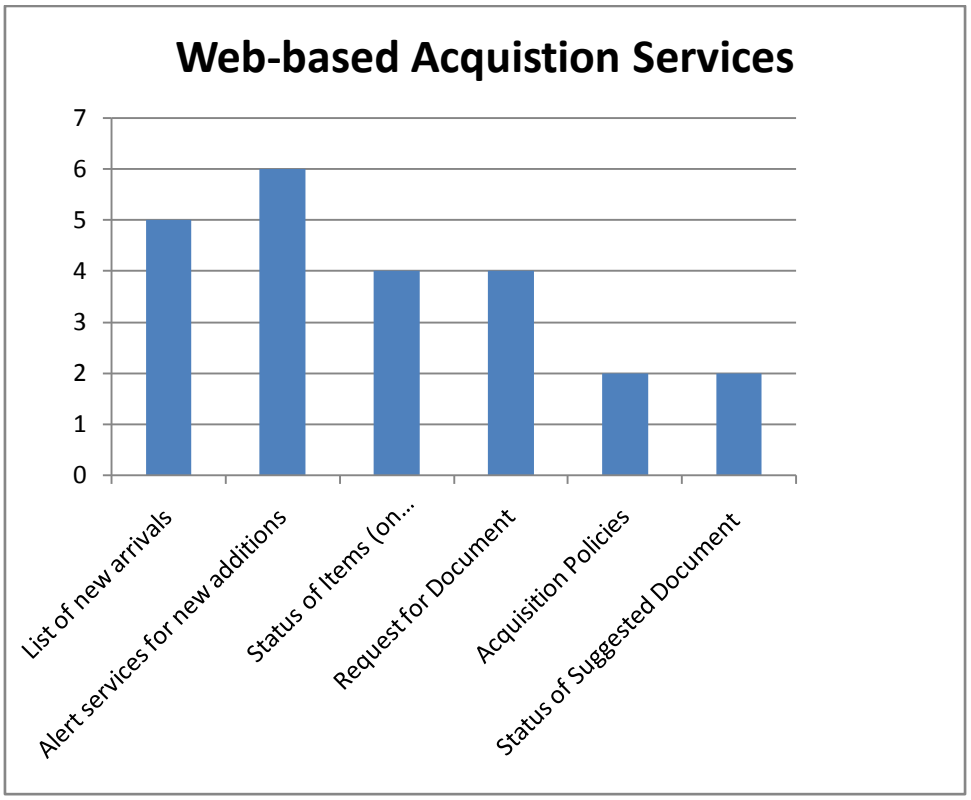

Fig. 5.1.11.2 (a) Web-Based Acquisition Services

It is evident from the fig. 5.1.11.2 (a) that 6 CSIR KRCs offered alert service for new additions to its users, 5 KRCs offered list of new arrivals service to its users, 4 KRCs allow users to know the status of items and request for documents service. 2 KRCs offered the users to know the acquisition policies and status of suggested documents.

(b) Users' authorised to access web based acquisition services

	USERS' AUTHORISED	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**All internet users, regardless of institutional affiliation**	-	-	-	-	-	-	√
2	**On-campus internet users**	√	√	√	-	√	√	-
3	**Off-campus internet users**	-	-	-	-	-	-	-
4	**In house library patron**	-	-	-	-	-	-	-
5	**Restricted to affiliated users**	-	-	-	√	-	-	-

Table 5.1.11.2(b) Users' authorised

The table 5.1.11.2 (b) reveals that the CDRI, CIMAP, IGIB, IIIM and IITR KRCs allows the on-campus internet users to access web-based acquisition services, whereas in IHBT it was restricted to only affiliated users and IMTECH allows to all internet users, regardless of institutional affiliation.

(c) Rating the Level of Sophistication

	WEB-BASED ACQUISITION SERVICES	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**None**	-	-	-	-	-	-	-
2	**Basic**	-	-	-	-	-	-	-
3	**Average**	-	√	-	-	-	√	√
4	**Advanced**	√	-	√	√	√	-	-

Table 5.1.11.2(c) Rating the Level of Sophistication

The table 5.1.11.2(c) indicates that the Information Scientists of CDRI, IGIB, IHBT and IIIM rated the level of sophistication of their web-based acquisition service as advanced whereas Information Scientists of CIMAP, IITR and IMTECH rated as average.

5.1.11.3 WEB-BASED CIRCULATION SERVICE- In web-based environment libraries are also striving to provide comprehensive and personalized services to its users. So, the data pertaining to this aspect is presented below.

(a) Web-Based Circulation Services Offered by CSIR KRCs

	WEB-BASED CIRCULATION SERVICES	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**Patron Accounts**	√	NA	-	√	NA	-	√
2	**Status of User Account**	√	NA	-	√	NA	-	√
3	**Circulation (issue/return)**	√	NA	√	√	NA	-	-
4	**Reservation of document**	√	NA	√	√	NA	-	-
5	**Status of Reserved Documents**	√	NA	√	√	NA	-	-
6	**Cancelation of Reserved Document**	√	NA	√	√	NA	-	-
7	**Availability of a Particular Document**	√	NA	√	√	NA	√	-
8	**Renewal of Loaned Document**	√	NA	-	√	NA	-	-
9	**Interaction with user for query**	√	NA	√	√	NA	-	-
10	**Payment of Overdue Charges**	-	NA	-	-	NA	-	-

(NOTE: Here NA= Not available)

Table 5.1.11.3(a) Web-Based Circulation Services

Though the circulation service is most popular service of any library but from the table 5.1.11.3(a) it is clearly evident that all CSIR KRCs do not offer web-based circulation service to its users. Only CDRI, IGIB, IHBT, IITR and IMTECH offers web-based circulation services to its users.

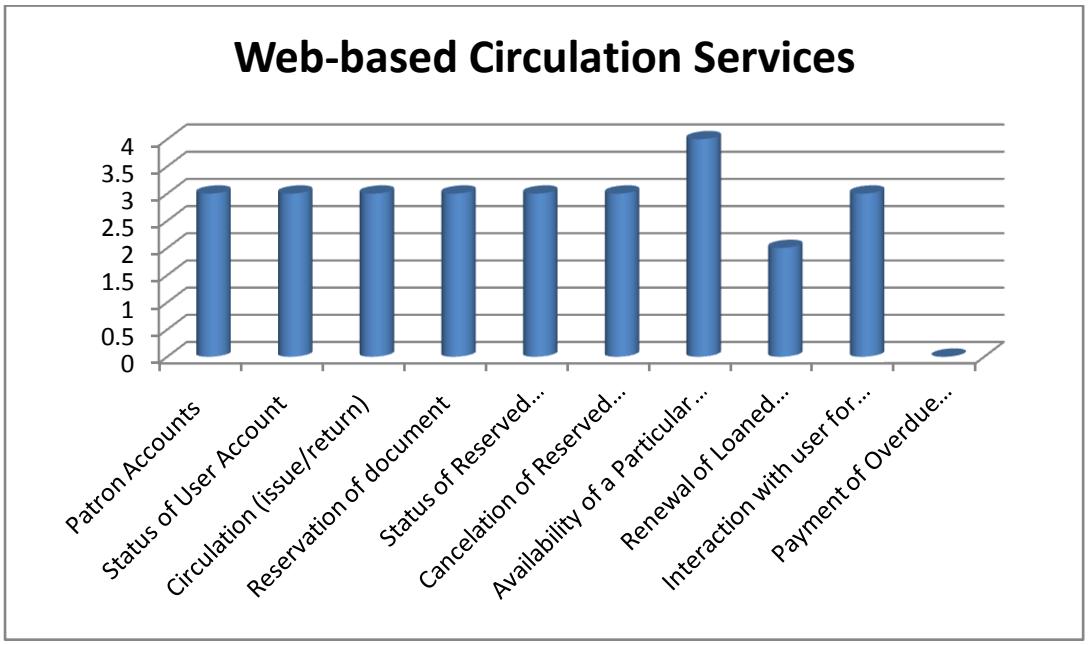

Fig. 5.1.11.3(a) Web-Based Circulation Services

The fig. 5.1.11.3(a) shows that only 4 CSIR KRCs allowed the users to check the availability of particular document whereas only 3 KRCs allowed the users to check patron account, status of user account, issue/ return of documents, reservation of documents, to know the status of reserved documents, cancelation of documents and interaction with user for query.

(b) Users' Authorised to access Web-Based Circulation Services

	USERS' AUTHORISED	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	All internet users, regardless of institutional affiliation	-	NA	-	-	NA	-	√
2	On-campus internet users	√	NA	√	-	NA	√	-
3	Off-campus internet users	-	NA	-	-	NA	-	-
4	In-house library patron	-	NA	-	-	NA	-	-
5	Restricted to affiliated users	-	NA	-	√	NA	-	-

Table 5.1.11.3(b) Users' Authorised

The table 5.1.11.3(b) reveals that the CDRI, IGIB and IITR allowed only on-campus internet users to access their web-based circulation services whereas in IHBT access is restricted to only affiliated users and in IMTECH allowed to all users.

(c) Rating the Level of Sophistication

	LEVEL OF SOPHISTICATION	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	None	-	√	-	-	√	-	-
2	Basic	-	-	-	-	-	√	-
3	Average	-	-	-	-	-	-	-
4	Advanced	√	-	√	√	-	-	√

Table 5.1.11.3(c) Level of Sophistication

The table 5.1.11.3(c) shows that the Information Scientist of CDRI, IGIB, IHBT and IMTECH rated their KRC's web-based circulation services as advanced whereas IITR rated as basic.

5.1.11.4 WEB-BASED CATALOGUING SERVICES- The basic objective of web-based cataloguing service is to assist the users to access library resources from anywhere and anytime in an effective manner. The data pertaining to this aspect is presented below-

(a) Web-Based Cataloguing Services Offered by CSIR KRCs

	WEB-BASED CATALOGUING SERVICES	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**Access to Web-OPAC**	√	-	√	√	√	√	√
2	**Access to Subscribed E-Journals**	√	√	√	√	√	√	√
3	**Access to E-journals through Consortium**	√	√	√	√	√	√	√
4	**Access to Institutional Repository**	√	-	-	√	√	-	√
5	**Access to Online databases**	√	√	√	√	√	-	√
6	**Access to Union Catalogue**	√	-	-	√	√	√	-
7	**Access of Electronic Indexes**	√	-	√	√	√	-	-

Table 5.1.11.4(a) Web-Based Cataloguing Services

The table 5.1.11.4(a) shows that all the 7 CSIR KRCs provide access to subscribed e-journals and access to e-journals through consortium, access to Web-OPAC and access to online databases was provided by the 6 libraries except CIMAP and IITR, respectively. Access to institutional repository was provided by CDRI, IHBT, IIIM, and IMTECH. Access to union catalogue was provided by CDRI, IHBT, IIIM, and IITR. Access to electronic indexes was provided by CDRI, IGIB, IHBT, and IIIM.

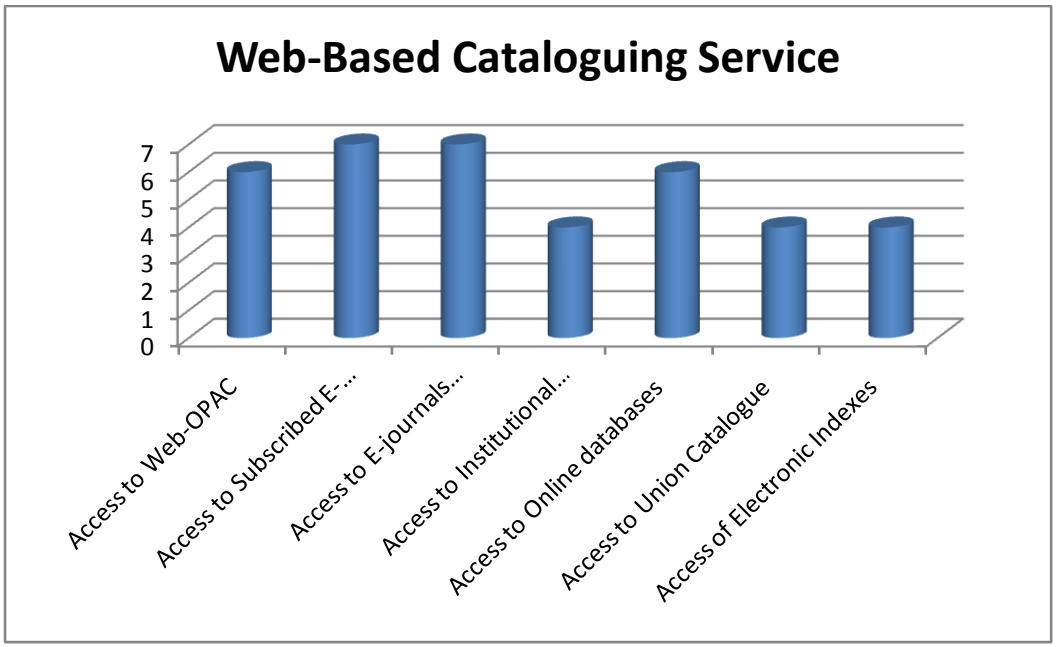

Fig. 5.1.11.4(a) Web-Based Cataloguing Services

The fig. 5.1.11.4(a) clearly indicates that all the 7 KRCs provided access to subscribed e-journals and e-journals through consortium, 6 KRCs provided access to web-OPAC and online databases, whereas 4 KRCs provided access to institutional repository, union catalogue and electronic indexes.

(b) Users' Authorised to Access Web- Based Cataloguing Services

	USERS' AUTHORISED	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**All internet users, regardless of institutional affiliation**	-	-	-	-	-	-	-
2	**On-campus internet users**	√	√	√	-	√	√	√
3	**Off-campus internet users**	-	-	-	-	-	-	-
4	**In-house library patron**	-	-	-	-	-	-	-
5	**Restricted to affiliated users**	√	-	-	√	-	-	-

Table 5.1.11.4(b) Users' Authorised

The table 5.1.11.4(b) clearly shows that CDRI, CIMAP, IGIB, IIIM, IITR and IMTECH allowed only on-campus internet users to access web-based cataloguing services whereas CDRI and IHBT allowed affiliated users of the campus.

(c) Rating the Level of Sophistication

	LEVEL OF SOPHISTICATION	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**None**	-	-	-	-	-	-	-
2	**Basic**	-	-	-	-	-	-	-
3	**Average**	-	√	-	-	-	√	-
4	**Advanced**	√	-	√	√	√	-	√

Table 5.1.11.4(c) Level of Sophistication

The table 5.1.11.4(c) indicates that the information scientists of CDRI, IGIB, IHBT, IIIM and IMTECH rated their web-based cataloguing services as advanced whereas CIMAP and IITR rated as average.

5.1.11.5 WEB-BASED PERIODICAL SERVICES

Web technologies make most of the tasks of periodical subscription such as keeping track of receipts, non-receipt claims, reminders, periodicity change, merger of titles etc, very easier and efficient. Therefore, data was collected to know services related to periodical subscription are provided to users through the websites or not.

(a) Web-Based Periodical Services Offered by CSIR KRCs

	WEB-BASED PERIODICAL SERVICES	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**Pro-active Web-based 'Table of Contents'**	√	√	√	√	-	NA	-
2	**Article alert service**	√	√	√	√	-	NA	-
3	**Electronic Article Delivery**	√	√	√	√	√	NA	√
4	**Recommendation for Subscribing a New journal**	√	-	√	√	-	NA	-
5	**Status of Recommended Journal**	√	-	-	√	-	NA	√
6	**Journal Citation Report(JCR)**	√	-	√	√	-	NA	√
7	**Most Cited paper in Various field Online**	√	-	-	√	-	NA	-

(NOTE: Here NA= Not available)

Table 5.1.11.5(a) Web-Based Periodical Services

The table 5.1.11.5(a) shows that IITR KRC do not offers web-based periodical services to its users. Only electronic article delivery service was provided by all the six libraries. Pro-active web based 'Table of Contents' and article alert service was provided by CDRI, CIMAP, IGIB, and IHBT. Recommendation for subscribing new journals was provided by CDRI, IGIB, and IHBT. Status of recommended journal service was provided by CDRI, IHBT, and IMTECH. Journal citation report service was provided by CDRI, IGIB, IHBT, and IMTECH.

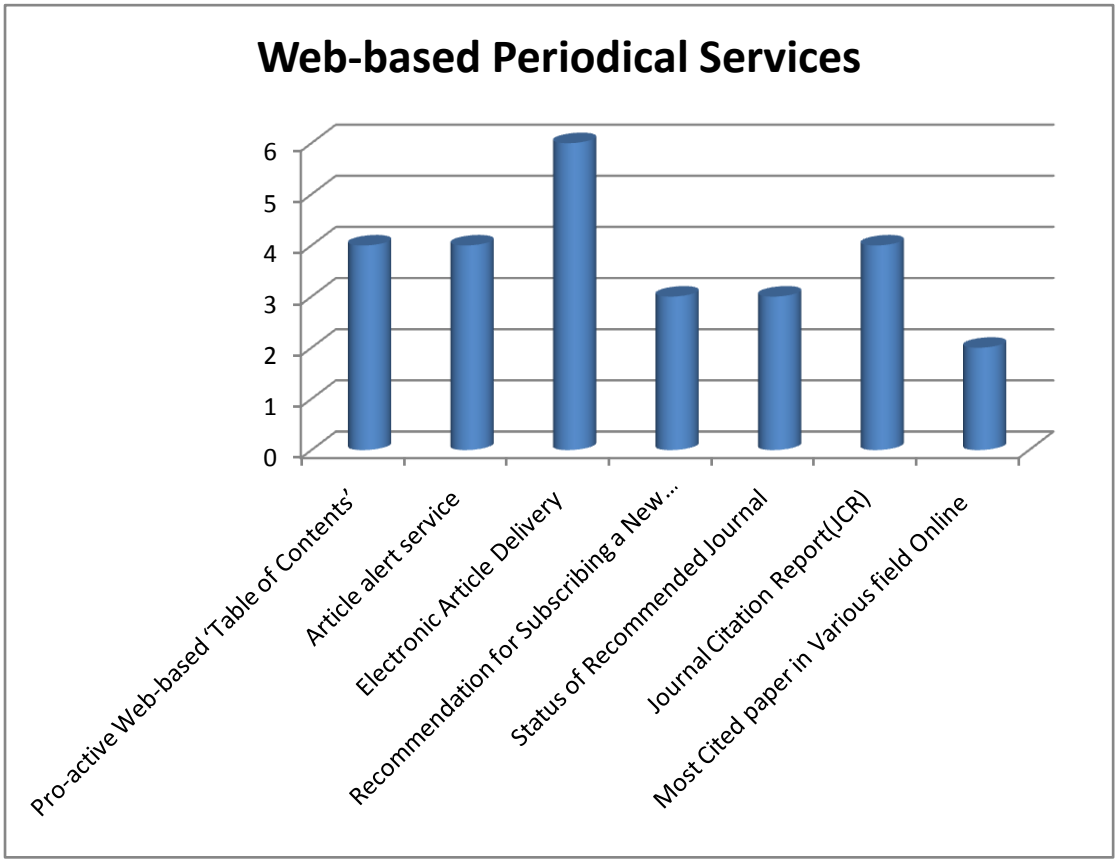

Fig. 5.1.11.5(a) Web-Based Periodical Services

The fig. 5.1.11.5(a) indicates that 6 KRCs provided electronic article delivery service. 4 CSIR KRCs provided pro-active web-based 'Table of Contents', article alert service and journal citation report service to its users. 3 KRCs provided recommendation for subscribing new journals service and status of subscribed journals service to its users, whereas, only 2 KRCs provided access to most cited paper in various field list to its users.

(b) Users' Authorised to Access Web- Based Periodical Services

	USERS' AUTHORISED	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**All internet users, regardless of institutional affiliation**	-	-	-	-	-	NA	-
2	**On-campus internet users**	√	√	√	-	√	NA	√
3	**Off-campus internet users**	-	-	-	-	-	NA	-
4	**In-house library patron**	-	-	-	-	-	NA	-
5	**Restricted to affiliated users**	√	-	-	√	-	NA	-

Table 5.1.11.5(b) Users' Authorised

The table 5.1.11.5(b) clearly shows that CDRI, CIMAP, IGIB, IIIM and IMTECH allowed only on-campus internet users to access web-based periodical services whereas CDRI and IHBT allowed affiliated users of the campus.

(c) Rating the Level of Sophistication\

	RATING THE LEVEL OF SOPHISTICATION	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**None**	-	-	-	-	-	√	-
2	**Basic**	-	-	-	-	-	-	-
3	**Average**	-	√	-	-	√	-	√
4	**Advanced**	√	-	√	√	-	-	-

Table 5.1.11.5(c) Rating the Level of Sophistication

The table 5.1.11.5(c) shows that the information scientists of CDRI, IGIB, and IHBT rated their web-based periodical service as advanced whereas CIMAP, IIIM, and IMTECH as average.

5.1.11.6 WEB-BASED GENERAL/ ADMINISTRATIVE SERVICES

Information about a library like library news, staff list, map of the library, contact details, general library policies, etc. can be called as general/administrative services. This information, if provided on the website of libraries might be very useful for the users. The data pertaining to this aspect is presented below.

(a) Web-Based General Administrative Services Offered by CSIR KRCs

	WEB-BASED ADMINISTRATIVE SERVICES	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1.	**Change Password Online**	-	√	-	-	-	-	-
2.	**Library News**	√	√	-	√	-	-	-
3.	**Map of the Library/Site Map**	√	-	-	-	-	-	-
4.	**E-mail based Services**	√	√	√	√	-	√	-
5.	**Feedback Form**	√	-	√	√	-	√	-
6.	**Contact /Addresses**	√	-	√	√	√	√	-
7.	**Library Holidays List**	√	-	√	√	-	-	-
8.	**FAQ**	√	-	√	√	-	-	-
9.	**Helpdesk Services/Ask-a-Librarian**	√	-	√	√	-	-	√

10	**Web based User Education/ library tutorials**	√	-	√	√	-	-	-
11	**Suggestions Box**	√	-	√		-	-	-
12	**Library Forums (e-mail based)**	√	-	-	√	-	-	-
13	**Library Link**	√	-	-	√	-	-	√
14	**Photo Gallery**	√	-	-	√	√	-	-
15	**In-house Library Bulletin**	√	-	-	√	-	-	-
16	**Information about Special Exhibition/ Seminars**	√	-	-	√	-	-	-

Table 5.1.11.6(a) Web-Based General/Administrative Services

The table 5.1.11.6(a) shows that web-based general/ administrative services was not so popular web-based services in CSIR KRCs. Only 3 KRCs which were CDRI, IGIB, and IHBT provided number of web-based services to its users which includes e-mail based services, feedback form, contact /addresses, library holidays list, faq, helpdesk services/ask-a-librarian, web based user education/ library tutorials and etc. CIMAP offered only 3 services which were change password online, library news and e-mail based services. IITR also provided 3 services which were e-mail based services, contact/addresses and feedback form. IIIM provided access to only two services which were contact/addresses and photo gallery. IMTECH also provided access to only 2 services which were helpdesk services/ask-a-librarian and library link.

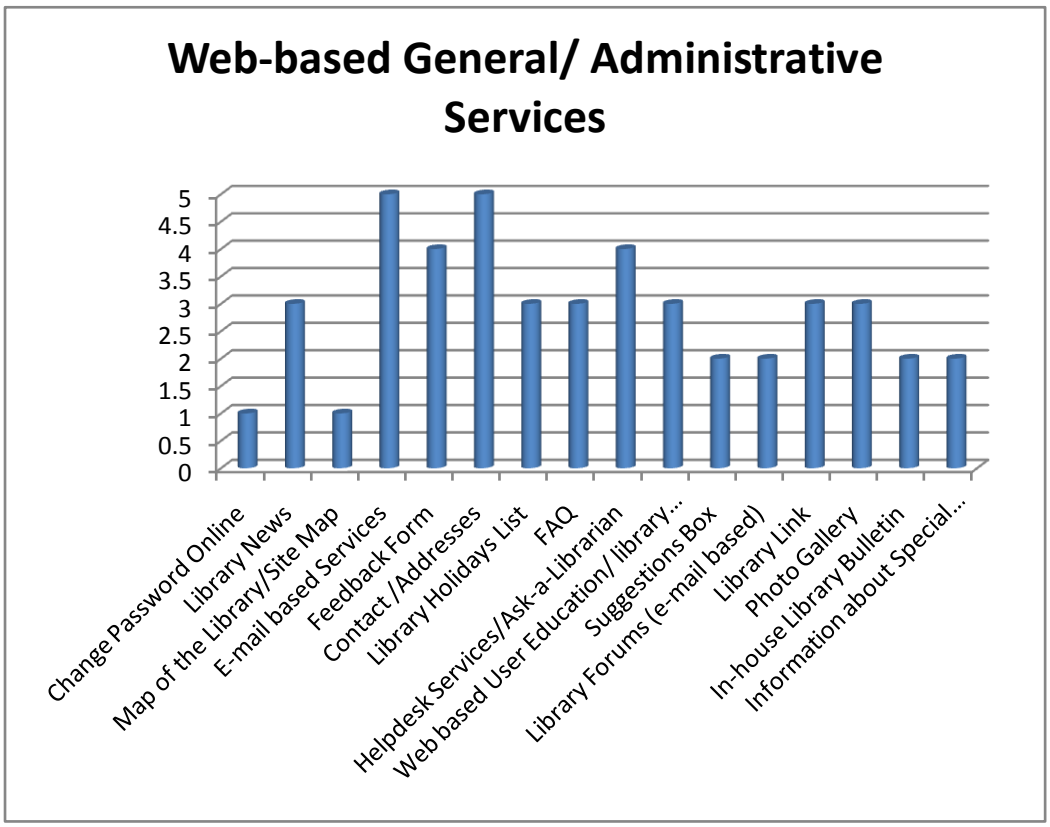

Fig. 5.1.11.6(a) Web-Based General Administrative Services

The fig. 5.1.11.6(a) reveals that overall e-mail based services and access to contact/addresses service was provided by 5 KRCs, followed by feedback form and helpdesk service which were provided by 4 KRCs, followed by library news, library holidays list, FAQ, web-based user education/library tutorials, library link and photogallery which were provided by 3 KRCs. However, 2 KRCs provide suggestion box and library forum facilities and only 1 KRC provide facilities of changing password online and map of the library.

(b) Users' Authorised to Access Web-Based General/ Administrative Services

	USERS' AUTHORISED	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	All internet users, regardless of institutional affiliation	-	-	-	-	-	-	-
2	On-campus internet users	√	√	√	-	√	√	√
3	Off-campus internet users	-	-	-	-	-	-	-
4	In-house library patron	-	-	-	-	-	-	-
5	Restricted to affiliated users	-	-	-	√	-	-	-

Table 5.1.11.6(b) Users' Authorised

The table 5.1.11.6(b) clearly shows that CDRI, CIMAP, IGIB, IIIM. IITR, and IMTECH allowed only on-campus internet users to access web-based general/ administration services whereas IHBT allowed affiliated users of the campus.

(c) Rating the Level of Sophistication

	LEVEL OF SOPHISTICATION	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	None	-	-	-	-	-	-	-
2	Basic	-	-	-	-	-	-	-
3	Average	-	√	√	-	√	√	√
4	Advanced	√	-	-	√	-	-	-

Table 5.1.11.6(c) Level of Sophistication

The table 5.1.11.6(c) shows that the Information Scientists of CDRI and IHBT rated their web-based general services as advanced whereas CIMAP, IGIB, IIIM, IITR, and IMTECH as average.

5.1.11.7 WEB-FORM FACILITY

Library websites are using web-form facility for inviting feedback from users and use different forms for different queries. The data related to what extent the CSIR KRCs are using web-form facility is presented below.

(a) Web-Form Facilities Offered by CSIR KRCs

	WEB-FORM FACILITIES	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**Reference Queries**	√	√	√	√	-	NA	-
2	**Request for Document on ILL/DDS**	√	√	√	√	√	NA	√
3	**Status of Circulation Account**	√	-	-	√	-	NA	√
4	**Reserve/ Cancel/ Renewal Status of Documents**	√	-	-	√	-	NA	-
5	**Request for Article**	√	√	√	√	-	NA	-
6	**Interaction with Reference Staff/ Librarian**	√	√	√	√	-	NA	-
7	**Interaction with Acquisition Staff/ Librarian**	√	√	-	√	-	NA	-
8	**Feedback/ Suggestion for Service**	√	√	√	√	-	NA	-
9	**For Recommending New Book/ Journal**	√	√	-	√	-	NA	-

(NOTE: Here NA= Not available)

Table 5.1.11.7(a) Web-form Facilities

The table 5.1.11.7(a) shows that CDRI and IHBT offers all types of web-form facilities to its users. CIMAP and IGIB offers web-form facilities to some extent to its users which includes reference queries, request for documents on ILL/DDS, request for articles, interaction with reference librarian, feedback service, etc. IMTECH offers only 2 web-form facilities which were request for documents on ILL/DDS and status of circulation account whereas IIIM offers only 1 web-form facility which was request for documents on ILL/DDS. However, IITR do not offer any web form facility.

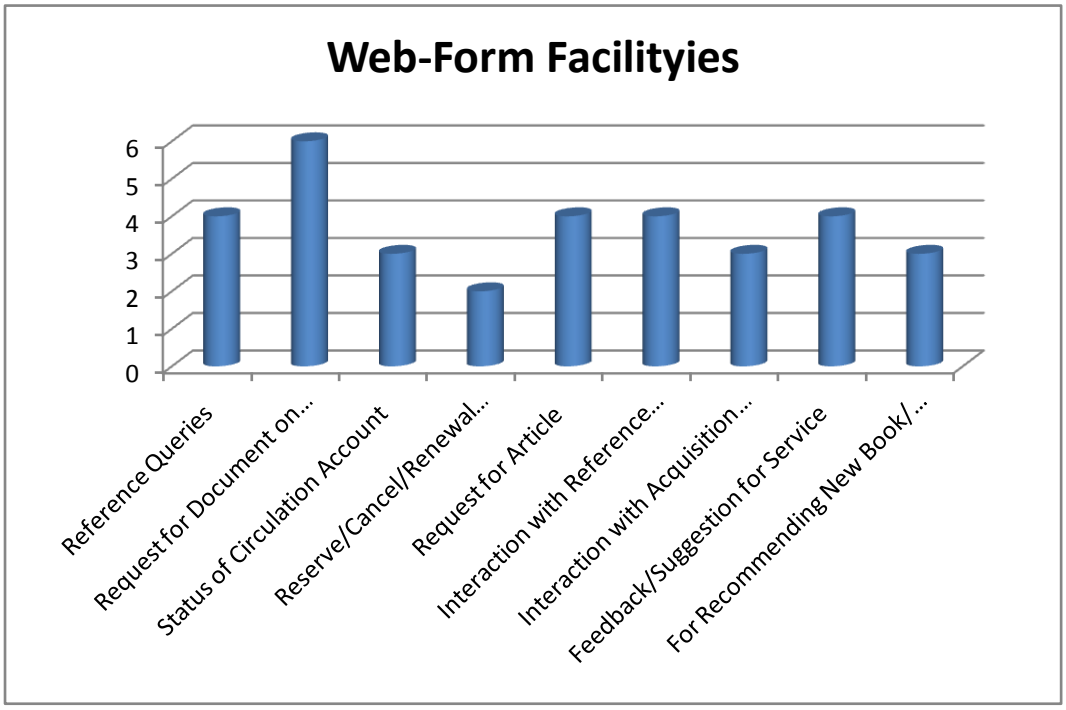

Fig. 5.1.11.7(a) Web-form Facilities

The 5.1.11.7(a) shows that 6 KRCs offer request for documents on ILL/DDS service, 4 KRCs offers reference queries, request for article, interaction with reference librarian and feedback form facilities. 3 KRCs offers Status of circulation account and recommendation for new book/journal facilities

(b) Users' Authorised to Access the Web-Form Facility

	USERS' AUTHORISED	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**All internet users, regardless of institutional affiliation**	-	-	-	-	-	NA	-
2	**On-campus internet users**	-	√	√	-	√	NA	√
3	**Off-campus internet users**	-	-	-	-	-	NA	-
4	**In-house library patron**	-	-	-	-	-	NA	-
5	**Restricted to affiliated users**	√	-	-	√	-	NA	-

Table 5.1.11.7(b) Users' Authorised

The table 5.1.11.7(b) clearly shows that CIMAP, IGIB, IIIM, and IMTECH allowed only on-campus internet users to access web-form facilities whereas CDRI and IHBT allowed only affiliated users of the campus.

(c) Rating the Level of Sophistication

	LEVEL OF SOPHISTICATION	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	None	-	-	-	-	-	√	-
2	Basic	-	-	-	-	-	-	-
3	Average	-	√	√	-	√	-	√
4	Advanced	√	-	-	√	-	-	-

Table 5.1.11.7(c) Level of Sophistication

The table 5.1.11.7(c) shows that the Information Scientists of CDRI and IHBT have rated the web-form facilities of their KRC as advanced and CIMAP, IGIB, IIIM, and IMTECH as average.

5.1.11.8 WEB APPLICATION TOOLS

Adoption of web application technologies in libraries like- wiki, blogs, Instant Messaging, twitter, RSS feeds, facebook, vodcast, podcast and tagging, makes the library services not only effective but it also helps to involve the users in their services.

(a) Social Networking Sites Offered by CSIR KRCs

	WEB APPLICATION TOOLS	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**Facebook**	√	√	NA	√	NA	√	NA
2	**RSS feed**	√	√	NA	√	NA	-	NA
3	**Instant Messaging**	√	√	NA	√	NA	-	NA
4	**Blog**	√	√	NA	√	NA	-	NA
5	**Wiki**	√	√	NA	-	NA	-	NA
6	**Twitter**	√	-	NA	-	NA	√	NA
7	**Tagging**	√	-	NA	-	NA	-	NA
8	**Podcast**	-	-	NA	-	NA	-	NA
9	**Vodcast**	-	-	NA	-	NA	-	NA

(NOTE: Here NA= Not available)

Table 5.1.11.8(a) Web Application Tools

The table 5.1.11.8(a) indicates that IGIB, IIIM, and IMTECH KRCs' do not allow access to web application tools. While CDRI, CIMAP, and IHBT offers numbers of web application tools to its users like- facebook, RSS feed, Instant Messaging, Blog and wiki. However, IITR offers access only to facebook and twitter.

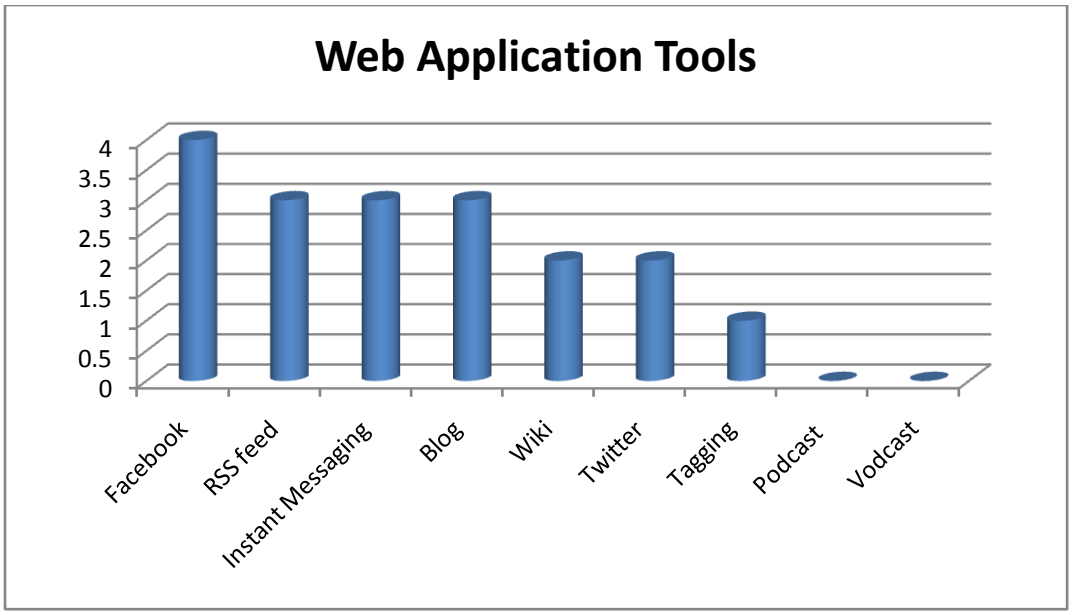

Fig. 5.1.11.8(a) Web Application Tools

The fig. 5.1.11.8(a) clearly show that facebook was the only web application tool offered by 4 KRCs. 3 KRCs offered Instant messaging, RSS feed and Blog, 2 KRCs offered Wiki and Twitter and only 1 KRCs offered Tagging. Podcast and Vodcast are offered by none.

(b) Users' Authorised to Access Web Application Tools

	USERS' AUTHORISED	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**All internet users, regardless of institutional affiliation**	-	√	NA	-	NA	√	NA
2	**On-campus internet users**	√	-	NA	-	NA	-	NA
3	**Off-campus internet users**	-	-	NA	-	NA	-	NA
4	**In-house library patron**	-	-	NA	-	NA	-	NA
5	**Restricted to affiliated users**	-	-	NA	√	NA	-	NA

Table 5.1.11.8(b) Users' Authorised

The Table 5.1.11.8(b) shows that CIMAP and IITR allowed all users regardless of their institutional affiliations to access web application tools, whereas, CDRI allowed only on-campus internet users and in IHBT access to web application tools was restricted to only affiliated users.

(c) Rating the Level of Sophistication

	LEVEL OF SOPHISTICATION	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**None**	-	-	√	-	√	-	√
2	**Basic**	-	√	-	-	-	√	-
3	**Average**	-	-	-	-	-	-	-
4	**Advanced**	√	-	-	√	-	-	-

Table 5.1.11.8(c) Level of Sophistication

The table 5.1.11.8(c) shows that information scientist of CDRI and IHBT rated the web application tools of their KRC as advanced whereas CIMAP and IITR as basic.

5.1.11.9. Purpose of Using Web Application Tools

	PURPOSE	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**Library Advocacy**	√	-	NA	√	NA	-	NA
2	**Virtual Reference Service**	√	-	NA	√	NA	-	NA
3	**Improve the Provision of User Oriented Services (SDI,CAS)**	√	-	NA	√	NA	√	NA

4	**Designing New Web-based Services**	√	-	NA	√	NA	-	NA
5	**User's Feedback/Suggestions**	√	√	NA	√	NA	-	NA
6	**Sharing Library Events/News/Announcements**	√	√	NA	√	NA	-	NA
7	**Marketing/Advertising of Library Service**	-	-	NA	√	NA	√	NA
8	**Information Literacy Tutorials**	√	-	NA	√	NA	-	NA
9	**To Create Research Guides/Courseware**	√	√	NA	-	NA	-	NA
10	**Promoting Library Image among Users**	√	-	NA	√	NA	-	NA

(NOTE: Here NA= Not available)

Table 5.1.11.9 Purposes

The table 5.1.11.9 shows that CDRI and IHBT use the web application tools for library advocacy, virtual reference service, improving the provision of user oriented services like SDI, CAS, etc., designing new web-based services, users' feedback, sharing library events/news/announcements, information literacy tutorials and

promoting library image among users. CIMAP use these tools for users' feedback, sharing library events/news/announcements and to create research guides, whereas IITR use these tools for improving the provision of user oriented services like SDI, CAS, etc., and marketing of library services.

5.1.11.10 Searching Techniques Offered by CSIR KRCs

	SEARCH TECHNIQUES	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**Controlled Vocabulary or Subject**	√	√	-	√	√	NA	√
2	**Keywords**	√	√	√	√	√	NA	-
3	**Boolean Operators**	√	√	√	√	√	NA	-
4	**Truncation and Wild Cards**	√	-	-	√	√	NA	-
5	**Field Specific**	√	-	-	√	√	NA	-
6	**Proximity Locators**	√	-	-	-	√	NA	-
7	**Any Other**	-	-	-	-	-	NA	-

(NOTE: Here NA= Not available)

Table 5.1.11.10. Searching Techniques

The table 5.1.11.10 shows that CDRI and IIIM offered all types of searching techniques to its users like controlled vocabulary, keyword searching, Boolean operators, truncation, field specific and proximity locators. IHBT offered controlled vocabulary, keyword searching, Boolean operators, truncation and field specific searching. CIMAP offered only controlled vocabulary, keyword searching and Boolean operators. IGIB offered only keyword searching and Boolean operators, whereas, IMTECH offered only controlled vocabulary searching.

5.1.11.11. Problems in Implemanting Web Application Tools

	PROBLEMS	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**Lack of Awareness**	N.P.	N.P.	N.P.	N.P.	N.P.	-	N.P.
2	**Lack of Staff Time**	N.P.	N.P.	N.P.	N.P.	N.P.	√	N.P.
3	**Problem in Archiving**	N.P.	N.P.	N.P.	N.P.	N.P.	-	N.P.
4	**Threats to Data Security**	N.P.	N.P.	N.P.	N.P.	N.P.	-	N.P.
5	**Provide Unauthentic Content**	N.P.	N.P.	N.P.	N.P.	N.P.	-	N.P.
6	**Breach Copyright Law**	N.P.	N.P.	N.P.	N.P.	N.P.	-	N.P.
7	**High cost of infrastructure**	N.P.	N.P.	N.P.	N.P.	N.P.	-	N.P.
8	**Overdependence on IT centre/**	N.P.	N.P.	N.P.	N.P.	N.P.	-	N.P.
9	**Information Overload**	N.P.	N.P.	N.P.	N.P.	N.P.	-	N.P.
10	**Affected by Firewalls or Filtering Software**	N.P.	N.P.	N.P.	N.P.	N.P.	-	N.P.

(Note: N.P. = No Problem)

Table 5.1.11.11 Problems

The table 5.1.11.11 shows that no CSIR KRC have faced any problem while implementing web application tools except IITR which faced the problem of lack of staff time.

5.1.12. Process of Initiating New Web-Based Library Services

It is very important for library staff to be aware of the mode of operation use to initiate web-based library services for accomplishing quality goals. The data pertaining to this aspect is presented below.

	PROCESS	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**General Discussion with Staff**	√	√	-	√	√	√	√
2	**Library Advisory Committee**	√	√	√	√	√	-	-
3	**Feedback Obtained from Web Administration Tool**	√	√	-	-	-	-	√
4	**Library Website Committee**	-	-	-	-	-	-	-
5	**With External Expert Feedback**	√	-	-	-	-	-	-
6	**Any Other**	-	-	-	-	-	-	-

Table 5.1.12 Process of Initiation

The table 5.1.12 shows that information scientist of CDRI responded that process for developing new web services was carried out through general discussion with staff,

library advisory committee, feedback obtained from web administration tool and with external expert feedback. CIMAP library responded that process for developing new web services was carried out through general discussion with staff, library advisory committee and feedback obtained from web administration tool. In IHBT and IIIM it was carried through general discussion with staff and library advisory committee. In IMTECH through general discussion with staff and feedback obtained from web administration tool. In IGIB through library advisory committee.

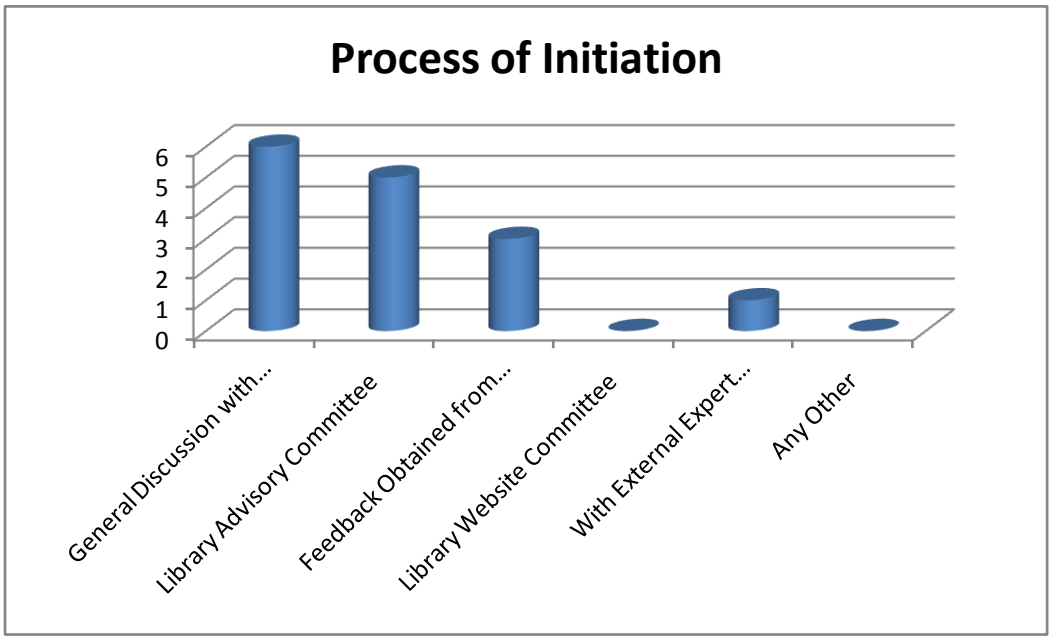

Fig. 5.1.12 Process of Initiation

It is inferred from the fig. 5.1.12 that the process of initiating new web-based library services in CSIR KRCs was mainly through general discussion with staff and library advisory committee.

5.1.13 Frequency of Training to Staff

Library staff do need relevant training for adopting new technologies that provides them necessary skills for delivering resources and services in web environment. So, in order to find out whether the CSIR libraries have made provision for training of their staff or not, the data was collected and presented as below.

	Frequency of Training	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**Yearly**	-	-	√	√	-	-	-
2	**Twice a year**	-	√	-	-	-	-	-
3	**Quarterly**	-	-	-	-	-	-	-
4	**Every Month**	-	-	-	-	-	-	-
5	**Every week**	√	-	-	-	-	-	-
6	**Never**	-	-	-	-	-	√	-
7	**When needed**	-	-	-	-	√	-	√

Table 5.1.13 Frequency of Training

The table 5.1.13 indicates that IGIB and IHBT organizes training program for their staff on yearly basis, CDRI organizes on weekly basis, IIIM and IMTECH organizes training program as and when needed, CIMAP organizes twice a year and IITR have no provision for training of their staff.

5.1.14 Method of Evaluation-

Evaluation of web-based library services is very necessary to assess the performance of services provided in web environment which thereby helps to maintain the user loyalty towards the library. It is an attempt to find out by which method CSIR libraries evaluate the web-based services. The data is presented below.

	Method of Evaluation	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	Usage Statistics	√	-	√	-	-	-	-
2	User Survey	-	√	-	√	√	√	√
3	Any other	-	-	-	-	-	-	-

Table 5.1.14 Method of Evaluation

It is inferred from the table 5.1.14 that CDRI and IGIB libraries assess their web-based library services through usage statistics whereas CIMAP, IHBT, IIIM, IITR and IMTECH assess through user survey technique.

5.1.15 Feedback- Feedback is an important aspect for evaluating and upgrading library services and should be carried out from time to time. To find out whether the libraries have provision for feedback from users or not, the data was collected and presented as below.

	FEEDBACK	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**Yearly**	-	√	-	√	-	-	√
2	**Quarterly**	-	-	-	-	-	-	-
3	**Monthly**	-	-	√	-	√	-	-
4	**Weekly**	-	-	-	-	-	-	-
5	**Daily**	√	-	-	-	-	-	-
6	**Randomly**	-	-	-	-	-	√	-

Table 5.1.15 Feedback

The table 5.1.15 shows that CIMAP, IHBT, and IMTECH KRCs have provision for feedback from users on yearly basis, IGIB and IIIM libraries take feedback on monthly basis, CDRI takes feedback on daily basis and IITR on randomly basis.

5.1.16 Rating the level of Satisfaction

In order to get comprehensive views on the satisfaction towards services, it should be mandatory for the library to rate their services as per users' feedback. The data pertaining to this aspect is presented below.

	LEVEL OF SATISFACTION	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**Very High**	√	-	-	-	-	-	-
2	**High**	-	√	√	√	-	-	√
3	**Average**	-	-	-	-	√	√	-
4	**Below Average**	-	-	-	-	-	-	-
5	**Low**	-	-	-	-	-	-	-

Table 5.1.16 Level of Satisfaction

The table 5.1.16 shows that rate of satisfaction of information scientists was very high in only CDRI, while in CIMAP, IGIB, IHBT, and IMTECH they rated as high and IIIM and IITR as average.

5.1.17 Methods Adopted for Creating Awareness

In order to fully utilize the range of web-based library services by the library users, library should need to organize various awareness programs. In order to know what types of programs are provided by CSIR KRCs to its users, data was collected and presented below.

	METHODS	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**Orientation Programs for the Fresher's**	√	√	√	√	√	√	√
2	**Online- Virtual Tours**	√	√	-	-	-	-	-
3	**Workshop/ Training/ Conferences**	√	-	-	-	-	-	√
4	**Credit based Course**	-	-	-	-	-	-	-
5	**Non-Credit based Course**	-	-	-	-	-	-	-

Table 5.1.17 Methods Adopted for Creating Awareness

The table 5.1.17 shows that orientation program for the fresher's was organized by all the 7 CSIR KRCs, Online Virtual tours was organized by CDRI and CIMAP, whereas, workshop/ training/ conferences was organized by CDRI and IMTECH.

5.1.18 Problems Faced in Providing Web-based Library Services

In spite of adequate infrastructure facility, libraries might face some problems in providing web-based services. To know what type of problems were faced by CDIR KRCs the data was collected and presented below.

	PROBLEMS	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH
1	**Insufficient Terminals for Access**	N.P.	N.P.	-	N.P.	√	-	-
2	**Slow Internet Connectivity**	N.P.	N.P.	-	N.P.	-	-	-
3	**Lack of Appropriate Technological Expertise**	N.P.	N.P.	-	N.P.	-	√	-
4	**Maintenance**	N.P.	N.P.	√	N.P.	-		-
5	**Collaboration with Users**	N.P.	N.P.	-	N.P.	-		-
6	**Insufficient Time and Training**	N.P.	N.P.	-	N.P.	-	√	-
7	**Lack of Awareness among Users**	N.P.	N.P.	-	N.P.	-		-
8	**Management Support**	N.P.	N.P.	-	N.P.	-	√	-
9	**Any Other**	N.P.	N.P.	-	N.P.	-	-	shortage of staff

Table 5.1.18 Problems faced in Providing WBLS

(Note: N.P.= No problem)

It is inferred from the table 5.1.18 that CDRI, CIMAP and IHBT KRCs do not faced any problems in providing web-based library services to its users. IITR faced lack of appropriate technological expertise, insufficient time and training and management support, while IGIB faced maintenance related issues and IMTECH responded that shortage of staff was the biggest hindrance in providing web-based services.

5.2 Analysis of data collected from the users of CSIR KRCs

5.2.1 Awareness

The users in the CSIR libraries were asked to show their awareness about availability of web-based services. The data pertaining to this aspect is presented below.

	Awareness	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH	Total
1	**Yes, use them Regularly**	**66 (79%)**	32 (36%)	23 (37%)	**42 (65%)**	**45 (54%)**	23 (27%)	35 (39%)	**266 (47%)**
2	**Yes, Use them Sometime**	12 (14%)	**38 (42%)**	**28 (44%)**	23 (35%)	29 (34%)	**27 (32%)**	**45 (50%)**	**202 (36%)**
3	**Yes, but Never Used**	5 (6%)	12 (13%)	9 (14%)	0 (0%)	3 (4%)	20 (24%)	10 (11%)	**59 (11%)**
4	**Never Heard**	1 (1%)	8 (9%)	3 (5%)	0 (0%)	7 (8%)	14 (17%)	0 (0%)	**33 (6%)**

Table 5.2.1 Awareness

The data presented in table 5.2.1 shows the overall and institute wise awareness among users about availability services through websites. It is clear that 47% users are aware and use regularly the web-based services but the awareness of web-based services was high in CDRI with 79% users who uses them regularly whereas the awareness level was low in IGIB and IITR with 37% and 27%, respectively.

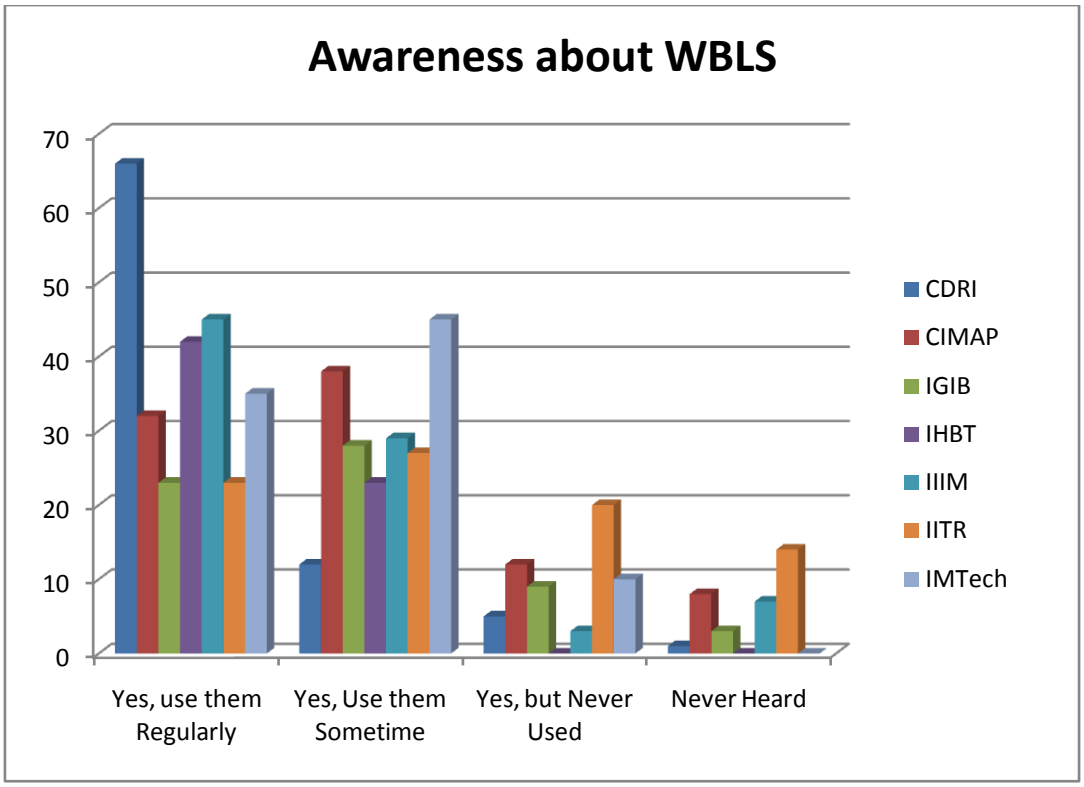

Fig. 5.2.1. Awareness about WBLS

The fig. 5.2.1 shows that overall 47% users of CSIR were aware of web-based services offered to them and use them on regular basis, 36% users responded that they were aware but use web-based services sometimes as needed , 11% users responded that they were aware but have never used them whereas 6% were not even aware of the web-based library services.

5.2.2 Purposes of using Web-based library services

	PURPOSES	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH	Total
1	**To search the books database**	19	27	19	17	20	22	26	**150 (22%)**
2	**To know the availability of a particular**	24	22	15	13	16	20	21	131 (19%)
3	**To search books using**	15	17	12	11	22	14	19	110

	all approaches								(16%)
4	**To reserve a book**	10	13	10	7	12	8	6	66 (10%)
5	**To access Current Awareness Bulletins**	18	20	15	17	12	13	18	113 (16%)
6	**To pay library dues**	2	5	0	2	2	2	2	15 (2%)
7	**To pay for fee based library services, if any**	4	7	1	5	4	9	2	32 (5%)
8	**To know more about services rendered by library**	10	13	6	9	7	11	14	70 (10%)

Table 5.2.2. Purposes of Using WBLS

The data presented in table 5.2.2 shows the overall and institute wise purposes of using web-based library services by the users. It is clear from the table that maximum number of users i.e. 150 (22%) users basically access WBLS to search book databases followed by 131 (19%) users who access to know the availability of the particular documents followed by 113 (16%) & 110 (16%) users who access wbls to access current awareness bulletin and to access books using all approaches, respectively. While 66 (10%) and 70 (10%) users access to reserve books and to know more about services rendered by library, respectively. However only 32 (5%) users access to pay for fee based library services and 15 (2%) users access to pay library dues.

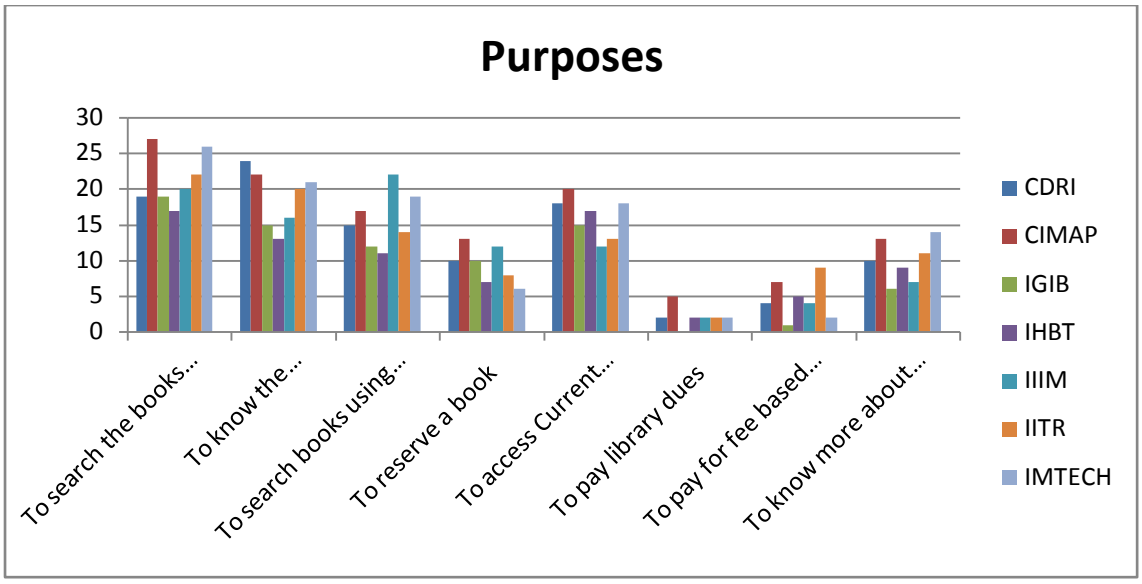

Fig. 5.2.2 Purposes of Using WBLS

The fig.5.2.2 indicates that maximum number of users i.e. 22% users basically access wbls to search book databases and minimum number of users i.e. 2% users access to pay library dues.

5.2.3. Preference either to Web-based library services or Traditional services according to their interactive level

The web environment of library is offering its users lots of benefits like access to timely and up to date information. So, in order to find out preference level of the CSIR users based on the interactive level of web-based library service or traditional services, the data was collected and presented as below.

	Preference according to interactive level	**CDRI**	**CIMAP**	**IGIB**	**IHBT**	**IIIM**	**IITR**	**IMTECH**	**Total**
1	WBLS	80 (95)	77 (86)	50 (79)	49 (75)	72 (86)	61 (73)	79 (88)	**468 (84)**
2	Traditional	4 (5)	13 (14)	13 (21)	16 (25)	12 (14)	23 (27)	11 (12)	92 (16)

(Note: Figures in parenthesis indicate percentage value)

Table 5.2.3 Preference according to interactive level

The table 5.2.3 clearly shows that the overall popularity level of web-based library services selected in CSIR institutes was 84%. It was clear that the users of CDRI and IMTECH prefered WBLS very much with 95% and 88%, respectively. In CIMAP and IIIM 86% users prefered to use WBLS, and in IGIB, IHBT, and IITR 79%, 75%, and 73% users prefered WBLS, respectively.

5.2.4. Factors Affecting the Preference towards Web-based Library Services

	FACTORS	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH	Total
1	**24×7 Availability of Services**	23 (26%)	29 (27%)	19 (24%)	25 (34%)	28 (30%)	26 (25%)	34 (31%)	184 (28%)
2	**Save Time and Travelling Cost**	18 (20%)	32 (30%)	25 (31%)	21 (28%)	23 (24%)	20 (19%)	23 (21%)	162 (25%)
3	**Easy Access and Faster Service**	22 (25%)	26 (25%)	21 (26%)	17 (23%)	19 (20%)	23 (22%)	28 (26%)	156 (24%)
4	**Allow Self Service**	12 (14%)	11 (10%)	9 (11%)	7 (10%)	12 (13%)	11 (11%)	14 (13%)	76 (11%)
5	**Interaction with Library Staff**	13 (15%)	8 (8%)	6 (8%)	4 (5%)	12 (13%)	24 (23%)	10 (9%)	77 (12%)
6	**Any Other**	-	-	-	-	-	-	-	-

Table 5.2.4 Factors Affecting the Preference

The table 5.2.4 shows the overall and institute wise factors affecting the preference level towards WBLS. It was clear that overall 28% users of CSIR opined that they prefered WBLS because of the 24×7 availability of services, 25% opined that it saves time and travelling cost, 24% thinks that it provides easy access and faster service, 12% opined that it makes easier to interact with library staff online and only 11% thinks that it allows self service.

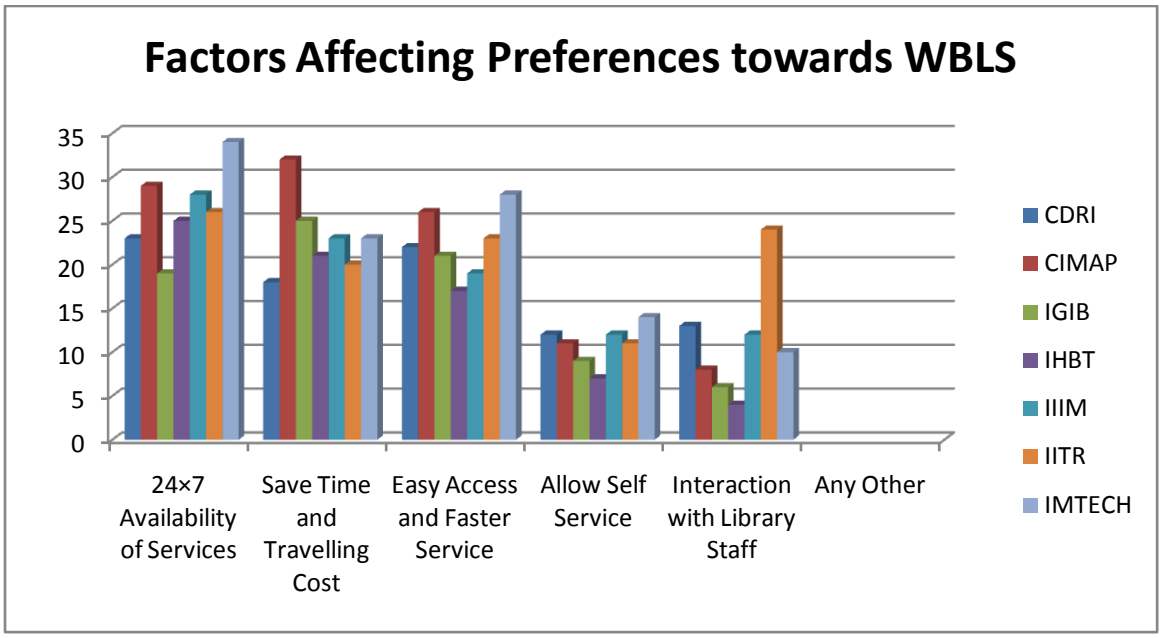

Fig. 5.2.4 Factors Affecting Preferences towards WBLS

Figure 5.2.4 shows the users of all the 7 CSIR KRCs uses web-based library services mainly because of its 24×7 availability, time savvy and cost savvy, easy and fast service and helps in interaction with library staff.

5.2.5 Frequency of using WBLS

Web environment in library has influenced the perception of users towards library services. The library websites now become gateway to the resources and services. So, it is necessary to know the frequency of users visit to library websites. So, the data pertaining to this aspect is presented below.

	FREQUENCY	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH	Total
1	**Daily**	54 (64%)	43 (48%)	28 (44%)	29 (44%)	42 (50%)	41 (47%)	24 (26%)	261 (47%)
2	**Weekly**	5 (6%)	24 (27%)	17 (27%)	15 (23%)	20 (24%)	23 (29%)	26 (29%)	130 (23%)
3	**Fortnightly**	8 (10%)	7 (8%)	2 (3%)	9 (14%)	11 (13%)	9 (11%)	8 (9%)	54 (10%)
4	**Monthly**	0 (0%)	5 (5%)	3 (5%)	5 (8%)	2 (2%)	3 (4%)	7 (8%)	25 (4%)
5	**Occasionally**	17 (20%)	11 (12%)	13 (21%)	7 (11%)	9 (11%)	8 (9%)	25 (28%)	90 (16%)

Table 5.2.5 Frequency of Visits

The table 5.2.5 shows that users of all 7 CSIR KRCs used to access web-based library services on daily basis, but in CDRI 64% of users prefered to access WBLS on daily basis. It was followed by the users who prefered to access WBLS on weekly basis, in which the users of IMTECH prefered more which was 29%. Then followed by the users who prefered to access occasionally in which also users of IMTECH were more i.e. 28%. However, overall the least number of users preferred to use WBLS on monthly basis.

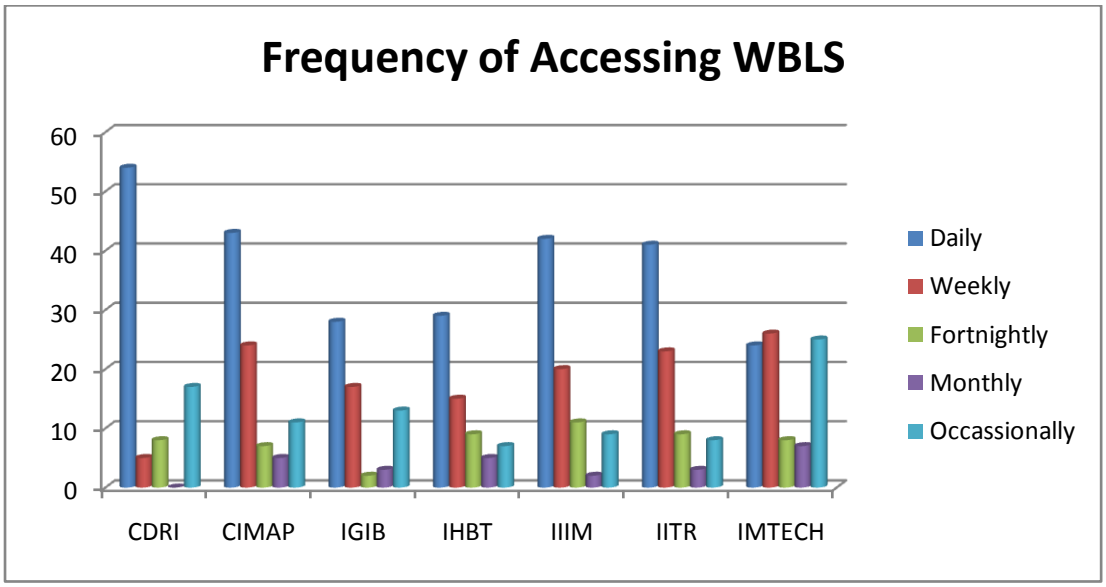

Fig. 5.2.5 Frequency of accesing WBLS

The fig. 5.2.5 clearly reveals that 47% users access WBLS on daily basis, which is followed by 23% of users who preferred to access on weekly basis However, 16 % users access occasionally, whereas, 10% access it fortnightly and only 4% on monthly basis.

5.2.6. Time spent on Web-based Library Services

It is an attempt to find out how much the users of CSIR institutes spend in searching information through web-based library services, the data was collected and presented below.

	TIME SPENT	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH	Total
1	**Less than 1 hr a week**	4 (5%)	8 (9%)	9 (14%)	5 (8%)	7 (8%)	9 (11%)	6 (7%)	48 (8%)
2	**2-3 hrs a week**	16 (19%)	10 (11%)	9 (14%)	8 (12%)	8 (10%)	21 (25%)	11 (12%)	83 (15%)
3	**5-6 hrs a week**	22 (26%)	20 (22%)	13 (21%)	11 (17%)	16 (19%)	14 (17%)	15 (17%)	111 (20%)
4	**7-9 hrs a week**	13 (16%)	23 (26%)	16 (25%)	13 (20%)	21 (25%)	11 (13%)	27 (30%)	124 (22%)
5	**10-20 hrs a week**	11 (13%)	16 (18%)	10 (16%)	16 (25%)	14 (17%)	12 (14%)	11 (12%)	90 (16%)
6	**Over 20 hrs a week**	18 (21%)	13 (14%)	6 (10%)	12 (18%)	18 (21%)	17 (20%)	20 (22%)	104 (19%)

Table 5.2.6 Time Spent

The table 5.2.6 clearly shows that overall maximum number of users i.e. 22% of users from all the selected CSIR institutes spent 7-9 hrs a week in accessing information from WBLS followed by 20% users who spend 5-6 hrs a week in accessing

information and 19% spend 20 hrs a week in accessing. However, 16% of total population spent 10-20 hrs on WBLS, followed by 15% who spent only 2-3 hrs a week and only 8% spent even less than 1 hr a week on WBLS.

5.2.7. Awareness about National Knowledge Resource Consortium

National Knowledge Resource Consortium of CSIR was established in 2009. Through this consortium, all the CSIR libraries are provided online access to additional journals of various publishers, in addition to regular subscribed journals of each library. In order to know whether the users of CSIR institutes are aware of the NKRC services available to them or not, the data was collected and presented below.

	AWARENESS	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH	Total
1	**YES**	63 (75%)	67 (74%)	51 (81%)	57 (88%)	77 (92%)	61 (73%)	74 (82%)	450 (80%)
2	**NO**	21 (25%)	23 (26%)	12 (19%)	8 (12%)	7 (8%)	23 (27%)	16 (18%)	110 (20%)

Table 5.2.7 Awareness about NKRC

The table 5.2.7 clearly shows the overall and institute wise awareness level of users about NKRC. It is clear from the table that overall 80% of users were aware of the National Knowledge Resource Consortium, whereas only 20% users responded that they were unaware of the NKRC.

5.2.8. Preference to Journals of NKRC

	RESOURCES	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH	TOTAL
1	**ACS (American Chemical Society)**	13 (8.4%)	11 (7%)	10 (5.2%)	3 (1.5%)	10 (7%)	21 (21%)	19 (10%)	87 (8%)
2	**ACM (Association for Computing Machinery)**	7 (4.6%)	-	-	-	2 (1%)	-	6 (3%)	15 (1%)
3	**AIP (American Institute of**	-	6 (4%)	-	2 (1%)	1	-	-	9(1%)

	Physics)					(1%)			
4	**Annual Reviews**	13 (8.4%)	14 (9%)	23 (12%)	12 (6%)	3 (2%)	11 (11%)	7 (4%)	83 (7%)
5	**ASCE (American Society of Civil Engineers)**	-	-	-	-	2 (1%)	-	-	2 (0%)
6	**ASME (American Society of Mechanical Engineer)**	-	-	-	9 (4.5%)	1 (1%)	-	-	10 (1%)
7	**ASTM (American Society for Testing and Materials)**	-	-	12 (6.2%)	-	1(1%)	-	-	13 (1%)
8	**CUP (Cambridge University Press)**	9 (6%)	-	12 (6.2%)	10 (5%)	2 (1%)	-	5 (3%)	38 (3%)
9	**CSIRO**	14 (9%)	-	-	10 (5%)	2 (1%)	-	12 (6%)	38 (3%)
10	**Elsevier**	11 (7%)	17 (11%)	11 (6%)	14 (7%)	4 (3%)	-	11 (6%)	68 (6%)
11	**Emerald**	-	-	-	11 (5.5%)	1 (1%)	-	-	12 (1%)
12	**ICE (Institute of Civil Engineers)**	-	-	-	-	1 (1%)	-	-	1 (0%)
13	**IEEE (Institute of Electrical & Electronic Engineers)**	-	-	-	9 (4.5%)	1 (1%)	-	4 (2%)	14 (1%)
14	**Indian Journals**	12 (8%)	15 (9%)	13 (6.7%)	11 (5.5%)	3 (2%)	13 (13%)	12 (6%)	79 (7%)

15	**IOP (Institute of Physics)**	-	-	-	6 (3%)	2 (1%)	-	9 (5%)	17 (2%)
16	**Maney Publishing**	-	-	-	-	1 (1%)	-	-	1 (0%)
17	**NPG (Nature Publishing Group)**	7 (5%)	11 (7%)	13 (6.7%)	10 (5%)	13 (9%)	-	7 (4%)	61 (5%)
18	**OSA (Optical Society of America)**	-	-	-	-	6 (4%)	-	2 (1%)	8 (1%)
19	**OUP (Oxford University press)**	9 (6%)	12 (7.4%)	14 (7%)	8 (4%)	12 (9%)	-	5 (3%)	60 (5%)
20	**NRC**	-	-	-	9 (4.5%)	8 (6%)	-	-	17 (2%)
21	**RSC (Roya; Society of Chemistry)**	8 (5%)	-	12 (6.2%)	13 (6.5%)	11 (8%)	11 (11%)	5 (3%)	60 (5%)
22	**SAGE**	-	17 (11%)	-	-	-	-	11 (6%)	28 (2%)
23	**Science**	11 (7%)	11 (7%)	14 (7%)	12 (6%)	13 (9%)	-	18 (10%)	79 (7%)
24	**Springer**	14 (9%)	12 (7.4%)	15 (7.8%)	15 (7.5%)	17(12 %)	14 (14%)	19 (7%)	106 (9%)
25	**Taylor & Francis**	12 (8%)	14 (9%)	16 (8%)	13 (6.5%)	12 (9%)	17 (17%)	13 (7%)	97 (9%)
26	**Wiley & Blackwell**	13 (8.4%)	13 (8%)	15 (7.8%)	14 (7%)	12 (9%)	-	15 (8%)	82 (7%)
27	**WorldScientific**	2 (1.2%)	8 (5%)	12 (6.2%)	7 (3.5%)	-	11 (11%)	6 (3%)	46(4%)

Table 5.2.8 Awareness about NKRC

The table 5.2.8 shows the overall and institute wise preference to the journals of NKRC. It was also clear from the table that users of all the 7 CSIR institutes preferred every journal more or less. It shows that 9% users preferred Springer and Taylor & Francis journals most, which was followed by 8% users who preferred ACS journal, followed by 7% users who preferred Science, Wiley & Blackwell, Indian Journals and Annual Reviews, followed by 6% users who preferred Elsevier and so on.

5.2.9 Problems in Accessing Web Resources

This was an attempt to know what types of problems were faced by the users of CSIR institute in accessing web-based resources. The data pertaining to this aspect is presented below.

	PROBLEMS FACED	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH	TOTAL
1	**Slow access speed**	33 (34%)	25 (26%)	9 (12%)	21 (24%)	32 (35%)	31 (32%)	38 (32%)	189 (29%)
2	**Difficulty in finding relevant information**	13 (13%)	24 (25%)	20 (28%)	11 (13%)	20 (22%)	12 (12%)	24 (21%)	124 (19%)
3	**Overload of information on the Internet**	25 (26%)	16 (16%)	21 (29%)	26 (30%)	24 (26%)	17 (17%)	13 (11%)	142 (21%)
4	**It takes too long to view/ download pages**	19 (19%)	23 (24%)	10 (14%)	22 (26%)	9 (10%)	23 (23%)	25 (21%)	131 (20%)
5	**Privacy problem**	8 (8%)	9 (9%)	12 (17%)	6 (4%)	7 (7%)	16 (16%)	17 (15%)	75 (11%)
6	**Any other please specify**	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Table 5.2.9 Problems faced in Accessing E-resources

The table 5.2.9 shows the overall and institute wise problems faced by the users of all the selected 7 CSIR institutes. It was clear from the table that 29% users from all CSIR institutes experiences slow access speed as a major hindrance in accessing web resources, followed by 21% users who experiences overloading of information on internet as a major problem, followed by 20% users who experiences issues in downloading pages, followed by 19% users who faces difficulty in finding relevant information from internet and only 11% users have faced the privacy problems in accessing web resources.

5.2.10. Web-based Library Services

The data pertaining to extent of web-based library services used by the users of the CSIR libraries offered through six sections: reference, acquisition, circulation, cataloguing, periodical and general/administrative presented below.

5.2.10.1 Web-based Reference service

	WEB- BASED REFERENCE SERVICE	CDRI					CIMAP					IGIB					IHBT					IIIM					IITR					IMTECH					TOTAL				
		0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4
1	SDI	19 (22.62)	37 (44.05)	12 (14.29)	5 (5.95)	7 (8.33)	23 (25.56)	24 (26.67)	15 (16.67)	17 (18.89)	11 (12.22)	5 (7.94)	13 (20.63)	22 (34.92)	20 (31.75)	0 (0)	18 (27.69)	12 (18.46)	14 (21.54)	11 (16.92)	10 (15.38)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	65 (21.67)	86 (28.67)	63 (21)	53 (17.67)	28 (9.33)
2	CAS	11 (13.1)	24 (28.57)	40 (47.62)	3 (3.57)	1 (1.19)	13 (14.44)	21 (23.33)	26 (28.89)	18 (20)	12 (13.33)	12 (19.05)	32 (50.79)	18 (28.57)	0 (0)	0 (0)	12 (18.46)	10 (15.38)	15 (23.08)	11 (16.92)	17 (26.15)	12 (14.29)	11 (13.1)	18 (21.43)	23 (27.38)	20 (23.81)	12 (14.29)	21 (25)	24 (28.57)	17 (20.24)	10 (11.9)	21 (23.33)	25 (27.78)	19 (21.11)	14 (15.56)	11 (12.22)	93 (16.61)	144 (25.71)	160 (28.57)	86 (15.36)	71 (12.68)
3	DDS	0 (0)	3 (3.57)	60 (71.43)	14 (16.67)	7 (8.33)	11 (12.22)	14 (15.56)	20 (22.22)	24 (26.67)	21 (23.33)	8 (12.7)	16 (25.4)	21 (33.33)	14 (22.22)	2 (3.17)	13 (20)	11 (16.92)	11 (16.92)	23 (35.38)	7 (10.77)	10 (11.9)	10 (11.9)	21 (25)	22 (26.19)	21 (25)	9 (10.71)	16 (19.05)	17 (20.24)	22 (26.19)	20 (23.81)	(0)	(0)	(0)	(0)	(0)	51 (10.85)	70 (14.89)	150 (31.91)	119 (25.32)	78 (16.6)
4	Web- base Reference Tools	7 (8.33)	12 (14.29)	16 (19.05)	40 (47.62)	9 (10.71)	19 (21.11)	17 (18.89)	21 (23.33)	19 (21.11)	14 (15.56)	(0)	(0)	(0)	(0)	(0)	13 (20)	10 (15.38)	22 (33.85)	8 (12.31)	12 (18.46)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	39 (16.32)	39 (16.32)	59 (24.69)	67 (28.03)	35 (14.64)
5	Virtual Reference Desk	22 (26.19)	37 (44.05)	12 (14.29)	5 (5.95)	8 (9.52)	23 (25.56)	27 (30)	16 (17.78)	11 (12.22)	13 (14.44)	(0)	(0)	(0)	(0)	(0)	12 (18.46)	13 (20)	11 (16.92)	18 (27.69)	11 (16.92)	(0)	(0)	(0)	(0)	(0)	22 (26.19)	29 (34.52)	13 (15.48)	8 (9.52)	12 (14.29)	(0)	(0)	(0)	(0)	(0)	79 (24.46)	106 (32.82)	52 (16.1)	42 (13)	44 (13.62)
6	Online Current Awareness Bulletin	22 (26.19)	15 (17.86)	35 (41.67)	6 (7.14)	4 (4.76)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	12 (18.46)	3 (4.62)	22 (33.85)	5 (7.69)	23 (35.38)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	34 (22.82)	18 (12.08)	57 (38.26)	11 (7.38)	27 (18.12)
7	Inter-Library Loan Based Service	33 (39.29)	38 (45.24)	9 (10.71)	0 (0)	0 (0)	15 (16.67)	17 (18.89)	19 (21.11)	21 (23.33)	18 (20)	33 (52.38)	24 (38.1)	6 (9.52)	0 (0)	0 (0)	25 (38.46)	20 (30.77)	12 (18.46)	4 (6.15)	4 (6.15)	(0)	(0)	(0)	(0)	(0)	10 (11.9)	14 (16.67)	18 (21.43)	20 (23.81)	22 (26.19)	(0)	(0)	(0)	(0)	(0)	116 (30.05)	113 (29.27)	64 (16.58)	45 (11.66)	44 (11.4)
	Total	**114 (19.39)**	**166 (28.23)**	**184 (31.29)**	**73 (12.41)**	**36 (6.12)**	**104 (19.26)**	**120 (22.22)**	**117 (21.67)**	**110 (20.37)**	**89 (16.48)**	**58 (0.1315)**	**85 (0.1927)**	**67 (0.1519)**	**34 (0.0771)**	**2 (0.0045)**	**105 (23.08)**	**79 (17.36)**	**107 (23.52)**	**80 (17.58)**	**84 (18.46)**	**22 (13.1)**	**21 (12.5)**	**39 (23.21)**	**45 (26.79)**	**41 (24.4)**	**53 (15.77)**	**80 (23.81)**	**72 (21.43)**	**67 (19.94)**	**64 (19.05)**	**21 (23.33)**	**25 (27.78)**	**19 (21.11)**	**14 (15.56)**	**11 (12.22)**	**477 (19.81)**	**576 (23.92)**	**605 (25.12)**	**423 (17.57)**	**327 (13.58)**

(Note: (here 0= don't, 1= rare, 2= occasionally, 3= frequently & 4= highly) and figures in parenthesis are denoting percentage)

Table5.2.10.1(a) Web-based Reference Service

The table 5.2.10.1 shows the overall and institute wise use of web-based reference services in 7 CSIR institutes. It was clear that services like SDI and Virtual Reference Desk were preferred rarely by the 28.67% and 32.82% of users, respectively. Services like CAS, DDS and Online Current Awareness Bulletin were preferred occasionally by the 28.57%, 31.91% and 38.26% users, respectively. It was clear that 28.03% users preferred to use web-based reference tools frequently. However 30.05% users responded that they have never preferred to use ILL service. The table also shows that overall web-based reference service comes under the occasionally used web-based services with 25.12% from all the 7 CSIR KRCs.

	Web-based reference service	CDRI (%)		CIMAP (%)		IGIB (%)		IHBT (%)		IIIM (%)		IITR (%)		IMTECH (%)		TOTAL (%)	
		NP	P	NP	P	NP	P	NP	P	NP	P	NP	P	NP	P	NP	P
1	**SDI**	66.67	28.57	52.22	47.78	28.57	66.67	46.15	53.85	0.00	0.00	0.00	0.00	0.00	0.00	50.33	48.00
2	**CAS**	41.67	52.38	37.78	62.22	69.84	28.57	33.85	66.15	27.38	72.62	39.29	60.71	51.11	48.89	42.32	56.61
3	**DDS**	3.57	96.43	27.78	72.22	38.10	58.73	36.92	63.08	23.81	76.19	29.76	70.24	0.00	0.00	25.74	73.83
4	**Web- base Reference Tools**	22.62	77.38	40.00	60.00	0.00	0.00	35.38	64.62	0.00	0.00	0.00	0.00	0.00	0.00	32.64	67.36
5	**Virtual Reference Desk**	70.24	29.76	55.56	44.44	0.00	0.00	38.46	61.54	0.00	0.00	60.71	39.29	0.00	0.00	57.28	42.72

6	**Online Current Awareness Bulletin**	44.05	53.57	0.00	0.00	0.00	0.00	23.08	76.92	0.00	0.00	0.00	0.00	0.00	0.00	34.90	63.76
7	**Inter-Library Loan Based Service**	84.52	10.71	35.56	64.44	90.48	9.52	69.23	30.77	0.00	0.00	28.57	71.43	0.00	0.00	59.33	39.64
	TOTAL	**48.87**	**51.13**	**41.48**	**58.52**	**58.13**	**41.87**	**40.44**	**59.56**	**25.60**	**74.40**	**39.58**	**60.42**	**51.11**	**48.89**	**43.73**	**56.27**

(Note: here- NP= Non preferred and P= Preferred)

Table 5.2.10.1(b) Web-based Reference Services

The table 5.2.10.1(b) indicates the overall and institute-wise preference status of various web-based reference services by the users of all 7 CSIR institutes. From the table it was clear that the SDI, virtual reference desk and inter-library loan services were not preferred web-based services with 50.33%, 57.28% and 59.33%, respectively, whereas, CAS, DDS, web-based reference tools and online current awareness bulletin were preferred web-based services with 56.61%, 73.83%, 67.36% and 63.76%, respectively. So, it is also clear that DDS was the most preferred service with 73.83% whereas inter-library loan was the least preferred service with 39.64%.

Overall 56.27% users from all the 7 CSIR KRCs used to prefer web-based reference service.

5.2.10.2 Web-based Acquisition Service

	Web-based Acquisition Services	CDRI					CIMAP					IGIB					IHBT					IIIM					IITR					IMTECH					Total				
		0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4
1	List of new arrivals	(0)	(0)	(0)	(0)	(0)	8 (8.9)	11 (12.2)	38 (42.2)	18 (20)	15 (16.7)	(0)	(0)	(0)	(0)	(0)	16 (24.6)	12 (18.5)	14 (21.5)	10 (15.4)	13 (20)	12 (14.3)	14 (16.7)	17 (20.2)	20 (23.8)	21 (25)	22 (26.2)	18 (21.4)	17 (20.2)	16 (19.1)	11 (13.1)	7 (7.8)	13 (14.4)	42 (46.7)	18 (20)	10 (11.1)	65 (15.7)	68 (16.5)	**128 (31)**	82 (19.9)	70 (16.9)
2	Alert services for New Addition	11 (13.1)	22 (26.2)	30 (35.7)	13 (15.5)	4 (4.8)	9 (10)	9 (10)	37 (41.1)	14 (15.6)	21 (23.3)	7 (11.1)	10 (15.9)	14 (22.2)	19 (30.2)	13 (20.6)	13 (20)	11 (16.9)	22 (33.9)	13 (20)	6 (9.2)	21 (25)	20 (23.8)	16 (19.1)	19 (22.6)	8 (9.5)	(0)	(0)	(0)	(0)	(0)	13 (14.4)	9 (10)	35 (38.9)	11 (12.2)	22 (24.4)	74 (15.5)	81 (17)	**154 (32.4)**	89 (18.7)	74 (15.5)
3	Status of Items (on order, processing,	8 (9.5)	12 (14.3)	17 (20.2)	22 (26.2)	22 (26.2)	(0)	(0)	(0)	(0)	(0)	17 (27)	22 (34.9)	15 (19.1)	7 (11.1)	2 (3.2)	20 (30.8)	11 (16.9)	14 (21.5)	10 (15.4)	10 (15.4)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	17 (18.9)	33 (36.7)	22 (24.4)	8 (8.9)	10 (11.1)	62 (20.5)	**78 (25.8)**	68 (22.5)	47 (15.6)	44 (14.6)
4	Request for Documents	12 (14.3)	6 (7.1)	20 (23.8)	24 (28.6)	15 (17.9)	(0)	(0)	(0)	(0)	(0)	5 (12.7)	9 (15.9)	20 (36.5)	17 (34.9)	12 (0)	10 (15.4)	9 (13.9)	16 (24.6)	18 (27.7)	12 (18.5)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	24 (26.7)	20 (22.2)	18 (20)	16 (17.8)	12 (13.3)	51 (16.9)	44 (14.6)	74 (24.5)	**75 (24.8)**	51 (16.9)
5	Status of Suggested document	16 (19.1)	11 (13.1)	20 (23.8)	26 (31)	9 (10.7)	(0)	(0)	(0)	(0)	(0)	(28.6)	(38.1)	(33.3)	(0)	(0)	8 (12.3)	12 (18.5)	25 (38.5)	11 (16.9)	9 (13.9)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	24 (16.1)	23 (15.4)	**45 (30.2)**	37 (24.8)	18 (12.1)
6	Forthcoming items	11 (13.1)	10 (11.9)	19 (22.6)	25 (29.8)	0 (0)	(0)	(0)	(0)	(0)	(0)	(30.2)	(20.6)	(30.2)	(17.5)	(0)	14 (21.5)	10 (15.4)	24 (36.9)	11 (16.9)	6 (9.2)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	25 (16.8)	20 (13.4)	**43 (28.9)**	36 (24.2)	6 (4)
7	**Total**	58 (13.8)	61 (14.5)	106 (25.2)	110 (26.2)	50 (11.9)	17 (9.4)	20 (11.1)	75 (41.7)	32 (17.8)	36 (20)	29 (18.25)	41 (20.9)	49 (23.54)	43 (15.61)	27 (3.97)	81 (20.8)	65 (16.7)	115 (29.5)	73 (18.7)	56 (14.4)	33 (19.6)	34 (20.2)	33 (19.6)	39 (23.2)	29 (17.3)	22 (26.2)	18 (21.4)	17 (20.2)	16 (19.1)	11 (13.1)	61 (16.9)	75 (20.8)	117 (32.5)	53 (14.7)	54 (15)	301 (17.1)	314 (17.9)	**512 (29.2)**	366 (20.8)	263 (15)

(Note: (here 0= don't, 1= rare, 2= occasionally, 3= frequently & 4= highly) and figures in parenthesis are denoting percentage)

Table 5.2.10.2(a) Web-based Acquisition Services

The table 5.2.10.2(a) shows the overall and institute wise use of web-based acquisition service. It was clear from the table that services like list of new arrivals, alert service for new arrivals, status of suggested documents and forthcoming items were the most occasionally preferred services by the CSIR users with 31%, 32.4%, 30.2% and 28.9%, respectively. Whereas request for documents was frequently used service with 24.8% and status of items service was rarely used service with 25.8%. So, it is

clear from the table that web-based acquisition service was basically occasionally used service in all 7 CSIR institutes with 29.2%.

	Web-based Acquisition Service	CDRI (%)		CIMAP (%)		IGIB (%)		IHBT (%)		IIIM (%)		IITR (%)		IMTECH (%)		TOTAL (%)	
		NP	P	NP	P	NP	P	NP	P	NP	P	NP	P	NP	P	NP	P
1	List of new arrivals	0.00	0.00	21.11	78.89	0.00	0.00	43.08	56.92	30.95	69.05	47.62	52.38	22.22	77.78	32.20	67.80
2	Alert services for New Addition	39.29	55.95	20.00	80.00	26.98	73.02	36.92	63.08	48.81	51.19	0.00	0.00	24.44	75.56	32.56	66.60
3	Status of Items (on order, processing, etc.)	23.81	72.62	0.00	0.00	61.90	38.10	47.69	52.31	0.00	0.00	0.00	0.00	55.56	44.44	46.36	52.65

4	**Request for Documents**	21.43	70.24	0.00	0.00	22.22	77.78	29.23	70.77	0.00	0.00	0.00	0.00	48.89	51.11	31.46	66.23
5	**Status of Suggested document**	32.14	65.48	0.00	0.00	0.00	0.00	30.77	69.23	0.00	0.00	0.00	0.00	0.00	0.00	31.54	67.11
6	**Forthcoming items**	25.00	52.38	0.00	0.00	0.00	0.00	36.92	63.08	0.00	0.00	0.00	0.00	0.00	0.00	30.20	57.05
	TOTAL	**30.91**	**69.09**	**20.56**	**79.44**	**37.04**	**62.96**	**37.44**	**62.56**	**39.88**	**60.12**	**47.62**	**52.38**	**37.78**	**62.22**	**35.02**	**64.98**

(NOTE: here- NP= Non preferred and P= Preferred)

Table 5.2.10.2(b) Web-based Acquisition Services

The table 5.2.10.2(b) indicates the overall and institute-wise preference status of various web-based acquisition services by the users of all 7 CSIR institutes. From the table it is clear that all the services offered under web-based acquisition service are preferred, like lists of new arrivals with 67.80%, alert services for new additions with 66.70%, status of items with 52.65%, request for documents with 66.23%, status of suggested documents with 67.11% and forthcoming items with 57.05%

Overall 64.98%% users from all the 7 CSIR KRCs used to prefer web-based acquisition service.

5.2.10.3 Web-based Circulation Service

	WEB-BASED CIRCULATION SERVICES	CDRI					CIMAP					IGIB					IHBT					IIIM					IITR					IMTECH					TOTAL				
		0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4
1	Patron Accounts	38 (45.2)	27 (32.1)	12 (14.3)	5 (6)	2 (2.4)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	14 (21.5)	11 (16.9)	18 (27.7)	10 (15.4)	12 (18.5)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	33 (36.7)	15 (16.7)	18 (20)	10 (11.1)	14 (15.6)	**85 (35.6)**	53 (22.2)	48 (20.1)	25 (10.5)	28 (11.7)
2	Status of User Account	18 (21.4)	25 (29.8)	20 (23.8)	11 (13.1)	10 (11.9)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	15 (23.1)	15 (23.1)	17 (26.2)	10 (15.4)	8 (12.3)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	30 (33.3)	25 (27.8)	12 (13.3)	15 (16.7)	8 (8.9)	63 (26.4)	**65 (27.2)**	49 (20.5)	36 (15.1)	26 (10.9)
3	Circulation (issue/return)	21 (25)	27 (32.1)	13 (15.5)	15 (17.9)	8 (9.5)	(0)	(0)	(0)	(0)	(0)	22 (34.9)	24 (38.1)	14 (22.2)	0 (0)	3 (4.8)	7 (10.8)	10 (15.4)	19 (29.2)	15 (23.1)	14 (21.5)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	50 (23.6)	61 (28.8)	46 (21.7)	30 (14.2)	25 (11.8)
4	Reservation of document	19 (22.6)	16 (19.1)	21 (25)	19 (22.6)	9 (10.7)	(0)	(0)	(0)	(0)	(0)	12 (19.1)	30 (47.6)	7 (11.1)	9 (14.3)	5 (7.9)	5 (7.7)	20 (30.8)	19 (29.2)	11 (16.9)	10 (15.4)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	36 (17)	**66 (31.1)**	47 (22.2)	39 (18.4)	24 (11.3)
5	Status of Reserved Documents	28 (33.3)	25 (29.8)	16 (19.1)	8 (9.5)	7 (8.3)	(0)	(0)	(0)	(0)	(0)	19 (30.2)	33 (47.6)	11 (17.5)	0 (0)	0 (0)	11 (16.9)	12 (18.5)	20 (30.8)	14 (21.5)	8 (12.3)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	58 (27.4)	**70 (33)**	47 (22.2)	22 (10.4)	15 (7.1)
6	Cancelation of Reserved Document	30 (35.7)	22 (26.2)	18 (21.4)	8 (9.5)	6 (7.1)	(0)	(0)	(0)	(0)	(0)	44 (69.8)	17 (27)	2 (3.2)	0 (0)	0 (0)	22 (33.9)	21 (32.3)	12 (18.5)	7 (10.8)	3 (4.6)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	**96 (45.3)**	60 (28.3)	32 (15.1)	15 (7.1)	9 (4.2)
7	Availability of a Particular Document	20 (23.8)	15 (17.9)	29 (34.5)	11 (13.1)	9 (10.7)	(0)	(0)	(0)	(0)	(0)	5 (7.9)	17 (27)	33 (52.4)	8 (12.7)	0 (0)	6 (9.2)	9 (13.9)	12 (18.5)	23 (35.4)	15 (23.1)	(0)	(0)	(0)	(0)	(0)	20 (23.8)	17 (20.2)	26 (31)	12 (14.3)	9 (10.7)	(0)	(0)	(0)	(0)	(0)	51 (17.2)	58 (19.6)	**100 (33.8)**	54 (18.2)	33 (11.1)
8	Renewal of Loaned Document	32 (38.1)	26 (31)	13 (15.5)	9 (10.7)	4 (4.8)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	12 (18.5)	11 (16.9)	20 (30.8)	13 (20)	9 (13.9)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	**44 (29.5)**	37 (24.8)	33 (22.1)	22 (14.8)	13 (8.7)
9	Interaction with online librarian for query	31 (36.9)	22 (26.2)	18 (21.4)	8 (9.5)	5 (6)	(0)	(0)	(0)	(0)	(0)	8 (12.7)	10 (15.9)	30 (47.6)	12 (19.1)	3 (4.8)	20 (30.8)	16 (24.6)	9 (13.9)	12 (18.5)	8 (12.3)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	**59 (27.8)**	48 (22.6)	57 (26.9)	32 (15.1)	16 (7.5)
10	Payment of Overdue Charges	34 (40.5)	22 (26.2)	10 (11.9)	12 (14.3)	6 (7.1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	**34 (40.5)**	22 (26.2)	10 (11.9)	12 (14.3)	6 (7.1)
11	TOTAL	271 (32.3)	227 (27)	170 (20.2)	106 (12.6)	66 (7.9)	(0)	(0)	(0)	(0)	(0)	110 (17.5)	131 (20.3)	97 (15.4)	29 (4.6)	11 (1.8)	112 (19.2)	125 (21.4)	146 (25)	115 (19.7)	87 (14.9)	(0)	(0)	(0)	(0)	(0)	20 (23.8)	17 (20.2)	26 (31)	12 (14.3)	9 (10.7)	63 (35)	40 (22.2)	30 (16.7)	25 (13.9)	22 (12.2)	**576 (27.9)**	540 (26.1)	469 (22.7)	287 (13.9)	195 (9.4)

(Note: (here 0= don't, 1= rare, 2= occasionally, 3= frequently & 4= highly) and figures in parenthesis are denoting percentage)

Table 5.2.10.3(a) Web-based Circulation Services

The table 5.2.10.3(a) shows the overall and institute wise use of web-based circulation service. The table clearly shows that services like patrons account (35.6%), cancellation of reserved documents (45.3%), renewal of loaned documents (29.5%), interaction with online librarians (27.8%) and payment of overdue charges (40.5%) were never used by the users, whereas status of users' account (27.2%), circulation service (28.8%), reservation of documents (31.1%) and status of reserved documents (33%) were rarely preferred by the users and only, availability of documents service was frequently used by the users with 33.8%.

So, it is clear from the table that web-based circulation service was basically not preferred service in CSIR KRCs' with overall 27.9% and only 9.4% users highly prefer this service.

It is also clear from the table that in CDRI, IITR and IMTECH web-based circulation service was never used by 32.3%, 23.8% and 35% users, respectively, whereas in IGIB it was rarely used by 20.3% users and in IHBT it was occasionally used by 25% users.

WEB-BASED CIRCULATION SERVICES		CDRI (%)		CIMAP (%)		IGIB (%)		IHBT (%)		IIIM (%)		IITR (%)		IMTECH (%)		TOTAL (%)	
		NP	P	NP	P	NP	P	NP	P	NP	P	NP	P	NP	P	NP	P
1	**Patron Accounts**	77.38	22.62	0.00	0.00	0.00	0.00	38.46	61.54	0.00	0.00	0.00	0.00	53.33	46.67	57.74	42.26
2	**Status of User Account**	51.19	48.81	0.00	0.00	0.00	0.00	46.15	53.85	0.00	0.00	0.00	0.00	61.11	38.89	53.56	46.44
3	**Circulation (issue/return)**	57.14	42.86	0.00	0.00	73.02	26.98	26.15	73.85	0.00	0.00	0.00	0.00	0.00	0.00	52.36	47.64
4	**Reservation of document**	41.67	58.33	0.00	0.00	66.67	33.33	38.46	61.54	0.00	0.00	0.00	0.00	0.00	0.00	48.11	51.89
5	**Status of Reserved Documents**	63.10	36.90	0.00	0.00	82.54	17.46	35.38	64.62	0.00	0.00	0.00	0.00	0.00	0.00	60.38	39.62
	Cancelation of Reserved	61.90	38.10	0.00	0.00	96.83	3.17	66.15	33.85	0.00	0.00	0.00	0.00	0.00	0.00	73.58	26.42

6	**Document**																
7	**Availability of a Particular Document**	9.09	12.73	0.00	0.00	11.64	21.69	3.85	12.82	0.00	0.00	44.05	55.95	0.00	0.00	36.82	63.18
8	**Renewal of Loaned Document**	69.05	30.95	0.00	0.00	0.00	0.00	35.38	64.62	0.00	0.00	0.00	0.00	0.00	0.00	54.36	45.64
9	**Interaction with online librarian for query**	63.10	36.90	0.00	0.00	28.57	71.43	55.38	44.62	0.00	0.00	0.00	0.00	0.00	0.00	50.47	49.53
10	**Payment of Overdue Charges**	14.55	7.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	66.67	33.33
11	**TOTAL**	**59.29**	**40.71**	**0.00**	**0.00**	**63.76**	**36.24**	**40.51**	**59.49**	**0.00**	**0.00**	**44.05**	**55.95**	**57.22**	**42.78**	**53.99**	**46.01**

(NOTE- Here, NP= Non preferred and P= preferred)

Table 5.2.10.3(b) Web-based Circulation Service

The table 5.2.10.3(b) clearly shows the overall and institute wise preference level of web-based circulation level. It is clear that services like patron accounts, status of user account, circulation, status of reserved documents, cancelation of reserved document, renewal of loaned document, interaction with online librarian for query and payment of overdue charges were not preferred services with 57.74%, 53.56%, 52.36%, 60.38%, 73.58%, 54.36%, 50.47% and 66.67%, respectively, whereas only reservation of document and availability of a particular document were preferred services with 51.89% and 63.18% respectively.

So, it is clear that web-based reference was basically not preferred service by 53.99% of users in all the 7 CSIR KRCs'.

The table also shows that in CDRI, IGIB and IMTECH web-based circulation services were not preferred by with 59.29%, 63.76% and 57.22% users, respectively, whereas only in IHBT and IITR they were preferred with 59.49% and 55.95% users, respectively.

5.2.10.4 Web-based Cataloguing Service

	WEB-BASED CATALOGUING SERVICES	CDRI					CIMAP					IGIB					IHBT					IIIM					IITR					IMTECH					TOTAL				
		0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4
1	Access to Web OPAC	18 (21.4)	20 (23.8)	24 (28.6)	12 (14.3)	10 (11.9)	(0)	(0)	(0)	(0)	(0)	14 (0)	12 (0)	25 (0)	12 (0)	0 (0)	24 (36.9)	11 (16.9)	14 (21.5)	13 (20)	3 (4.6)	21 (25)	22 (26.2)	23 (27.4)	10 (11.9)	8 (9.5)	23 (27.4)	24 (28.6)	21 (25)	9 (10.7)	7 (8.3)	25 (27.8)	29 (32.2)	14 (15.6)	13 (14.4)	9 (10)	**125 (26.6)**	118 (25.1)	121 (25.7)	69 (14.7)	37 (7.9)
2	Access to Subscribed E-Journals	10 (11.9)	11 (13.1)	15 (17.9)	27 (32.1)	21 (25)	9 (10)	6 (6.7)	19 (21.1)	31 (34.4)	25 (27.8)	1 (1.6)	3 (4.8)	29 (47.6)	17 (27)	13 (15.9)	5 (7.7)	8 (12.3)	22 (33.9)	17 (26.2)	13 (20)	7 (8.3)	9 (10.7)	16 (19.1)	28 (33.3)	24 (28.6)	13 (15.5)	11 (13.1)	18 (21.4)	22 (26.2)	20 (23.8)	11 (12.2)	13 (14.4)	17 (18.9)	27 (30)	22 (24.4)	56 (10)	61 (10.9)	136 (24.3)	**169 (30.2)**	138 (24.6)
3	Access to E-journals through Consortium	8 (9.5)	10 (11.9)	19 (22.6)	25 (29.8)	22 (26.2)	25 (27.8)	19 (21.1)	26 (28.9)	11 (12.2)	9 (10)	11 (17.5)	13 (20.6)	10 (15.9)	20 (31.8)	9 (14.3)	7 (10.8)	9 (13.9)	13 (20)	20 (30.8)	16 (24.6)	10 (11.9)	12 (14.3)	16 (19.1)	25 (29.8)	21 (25)	21 (25)	16 (19.1)	30 (35.7)	9 (10.7)	8 (9.5)	22 (24.4)	17 (18.9)	32 (35.6)	10 (11.1)	9 (10)	104 (18.6)	96 (17.1)	**146 (26.1)**	120 (21.4)	94 (16.8)
4	Access to Institutional Repository	9 (10.7)	4 (4.8)	18 (21.4)	30 (35.7)	22 (26.2)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	19 (29.2)	27 (41.5)	7 (10.8)	7 (10.8)	5 (7.7)	29 (34.5)	22 (26.2)	18 (21.4)	9 (10.7)	6 (7.1)	(0)	(0)	(0)	(0)	(0)	24 (26.7)	21 (23.3)	26 (28.9)	10 (11.1)	9 (10)	**81 (25.1)**	74 (22.9)	69 (21.4)	56 (17.3)	42 (13)
5	Access to Online databases	13 (15.5)	5 (6)	22 (26.2)	25 (29.8)	19 (22.6)	10 (11.1)	12 (13.3)	27 (30)	17 (18.9)	24 (26.7)	0 (0)	14 (22.2)	27 (42.9)	8 (12.7)	14 (22.2)	7 (10.8)	14 (21.5)	19 (29.2)	12 (18.5)	13 (20)	10 (11.9)	9 (10.7)	22 (26.2)	24 (28.6)	19 (22.6)	(0)	(0)	(0)	(0)	(0)	12 (13.3)	14 (15.6)	29 (32.2)	13 (14.4)	22 (24.4)	52 (10.9)	68 (14.3)	**146 (30.7)**	99 (20.8)	111 (23.3)
6	Access to Union Catalogue	40 (47.6)	25 (29.8)	11 (13.1)	4 (4.8)	4 (4.8)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	21 (32.3)	20 (30.8)	12 (18.5)	7 (10.8)	5 (7.7)	35 (41.7)	22 (26.2)	11 (13.1)	9 (10.7)	7 (8.3)	37 (44.1)	22 (26.2)	11 (13.1)	8 (9.5)	6 (7.1)	(0)	(0)	(0)	(0)	(0)	**133 (42)**	89 (28.1)	45 (14.2)	28 (8.8)	22 (6.9)
7	Access of Electronic Indexes	9 (10.7)	16 (19.1)	19 (22.6)	29 (34.5)	11 (13.1)	(0)	(0)	(0)	(0)	(0)	8 (61.9)	10 (36.5)	13 (0)	18 (0)	14 (0)	8 (12.3)	11 (16.9)	16 (24.6)	19 (29.2)	11 (16.9)	11 (13.1)	14 (16.7)	20 (23.8)	27 (32.1)	12 (14.3)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	36 (12.2)	51 (17.2)	68 (23)	**93 (31.4)**	48 (16.2)
	TOTAL	107 (18.2)	91 (15.5)	128 (21.8)	**152 (25.9)**	109 (18.5)	44 (16.3)	37 (13.7)	**72 (26.7)**	59 (21.9)	58 (21.5)	34 (20.2)	52 (21)	**104 (26.6)**	75 (17.9)	50 (13.1)	91 (20)	100 (22)	**103 (22.6)**	95 (20.9)	66 (14.5)	123 (20.9)	110 (18.7)	126 (21.4)	**132 (22.5)**	97 (16.5)	**94 (28)**	73 (21.7)	80 (23.8)	48 (14.3)	41 (12.2)	94 (20.9)	94 (20.9)	**118 (26.2)**	73 (16.2)	71 (15.8)	587 (19.6)	557 (18.6)	**731 (24.4)**	634 (21.1)	492 (16.4)

(Note: (here 0= don't, 1= rare, 2= occasionally, 3= frequently & 4= highly) and figures in parenthesis are denoting percentage)

Table 5.2.10.4(a) Web-based Cataloguing Services

The table 5.2.10.4(a) show the overall and institute wise use of web-based cataloguing services in 7 CSIR KRC's. It is clear that services like access to web-OPAC by 26.6% of users, institutional repository by 25.1% of users and union catalogue by 42% of users were never preferred by CSIR users. Whereas services like access to e-journals through consortium and online

databases were occasionally used services by 26.1% and 30.7% users, respectively. However services like access to subscribed e-journals and electronic indexes were highly used web-based services with 30.2% and 31.4% users, respectively. So, it is clear from the table that web-based cataloguing services was occasionally preferred service with overall 24.4% of users of CSIR.

The table also reveals that in CDRI and IIIM it was frequently used service with 25.9% and 22.5% users, whereas in CIMAP, IGIB, IHBT and IMTECH it was occasionally used service with 26.7%, 26.6%, 22.6% and 26.2% users, respectively. However only in IITR it was never used service with 28% users.

WEB-BASED CATALOGUING SERVICES		**CDRI (%)**		**CIMAP (%)**		**IGIB (%)**		**IHBT (%)**		**IIIM (%)**		**IITR (%)**		**IMTECH (%)**		**TOTAL (%)**	
		NP	**P**	**NP**	**P**	**NP**	**P**	**NP**	**P**	**NP**	**P**	**NP**	**P**	**NP**	**P**	**NP**	**P**
1	**Access to Web-OPAC**	45.24	54.76	0.00	0.00	41.27	58.73	53.85	46.15	51.19	48.81	55.95	44.05	60.00	40.00	51.70	48.30
2	**Access to Subscribed E-Journals**	25.00	75.00	16.67	83.33	6.35	93.65	20.00	80.00	19.05	80.95	28.57	71.43	26.67	73.33	20.89	79.11
3	**Access to E-journals**	21.43	78.57	48.89	51.11	38.10	61.90	24.62	75.38	26.19	73.81	44.05	55.95	43.33	56.67	35.71	64.29

	through Consortium																
4	**Access to Institutional Repository**	15.48	83.33	0.00	0.00	0.00	0.00	70.77	29.23	60.71	39.29	0.00	0.00	50.00	50.00	47.99	51.70
5	**Access to Online databases**	21.43	78.57	24.44	75.56	22.22	77.78	32.31	67.69	22.62	77.38	0.00	0.00	28.89	71.11	25.21	74.79
6	**Access to Union Catalogue**	77.38	22.62	0.00	0.00	0.00	0.00	63.08	36.92	67.86	32.14	70.24	29.76	0.00	0.00	70.03	29.97
7	**Access of Electronic Indexes**	29.76	70.24	0.00	0.00	28.57	71.43	29.23	70.77	29.76	70.24	0.00	0.00	0.00	0.00	29.39	70.61
	TOTAL	**33.73**	**66.27**	**30.00**	**70.00**	**27.30**	**72.70**	**41.98**	**58.02**	**39.63**	**60.37**	**49.70**	**50.30**	**41.78**	**58.22**	**38.13**	**61.90**

(NOTE- here- NP= Non preferred and P= Preferred)

Table 5.2.10.4(b) Web-based Cataloguing Services

The table 5.2.10.4(b) clearly shows that services like access to subscribed e-journals, e-journals through consortium, institutional repository, online databases and electronic indexes were preferred by 79.11%, 64.29%, 51.7%, 74.79% and 70.61% users of CSIR, respectively. Whereas services like access to web-OPAC and union catalogue were not preferred by 51.7% and 70.03% users, respectively.

The table also reveals that in all the selected 7 CSIR institutes web-based cataloguing service was overall preferred service like in CDRI with 66.27%, CIMAP with 70%, IGIB with 72.7%, IHBT with 58.02%, IIIM with 60.37%, IITR with 50.3% and IMTECH with 58.22% users.

So, it is clear that overall 61.9% users from all the selected 7 CSIR institutes preferred to use web-based cataloguing service.

5.2.10.5 Web-based Periodical Service

	WEB-BASED PERIODICAL SERVICES	CDRI					CIMAP					IGIB					IHBT					IIIM					IITR					IMTECH					TOTAL				
		0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4
1	Pro-active Web based 'Table of Contents'	18 (21.4)	27 (32.1)	21 (25)	13 (15.5)	5 (6)	10 (11.1)	13 (14.4)	26 (28.9)	19 (21.1)	22 (24.4)	15 (28.6)	20 (33.3)	11 (28.6)	10 (4.8)	7 (1.6)	23 (35.4)	11 (16.9)	10 (15.4)	13 (20)	8 (12.3)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	66 (21.9)	**71 (23.5)**	68 (22.5)	55 (18.2)	42 (13.9)
2	Article alert service	11 (13.1)	13 (15.5)	23 (27.4)	19 (22.6)	18 (21.4)	15 (16.7)	17 (18.9)	24 (26.7)	21 (23.3)	13 (14.4)	6 (12.7)	9 (14.3)	14 (34.9)	24 (20.6)	10 (15.9)	20 (30.8)	19 (29.2)	9 (13.9)	10 (15.4)	7 (10.8)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	52 (17.2)	58 (19.2)	70 (23.2)	**74 (24.5)**	48 (15.9)
3	Electronic Article Delivery	11 (13.1)	13 (15.5)	22 (26.2)	20 (23.8)	18 (21.4)	18 (20)	13 (14.4)	19 (21.1)	23 (25.6)	17 (18.9)	9 (7.9)	10 (11.1)	10 (30.2)	21 (27)	13 (22.2)	11 (16.9)	10 (15.4)	17 (26.2)	15 (23.1)	12 (18.5)	10 (11.9)	12 (14.3)	24 (28.6)	21 (25)	17 (20.2)	(0)	(0)	(0)	(0)	(0)	18 (20)	10 (11.1)	19 (21.1)	28 (31.1)	15 (16.7)	77 (16.2)	68 (14.3)	111 (23.3)	**128 (26.9)**	92 (19.3)
4	Recommendation for Subscribing a New journal	23 (27.4)	20 (23.8)	19 (22.6)	13 (15.5)	9 (10.7)	(0)	(0)	(0)	(0)	(0)	10 (30.2)	12 (23.8)	18 (22.2)	15 (14.3)	8 (6.4)	11 (16.9)	13 (20)	13 (20)	18 (27.7)	10 (15.4)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	44 (20.8)	45 (21.2)	**50 (23.6)**	46 (21.7)	27 (12.7)
5	Status of Recommended Journal	23 (27.4)	26 (31)	21 (25)	9 (10.7)	5 (6)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	19 (29.2)	12 (18.5)	14 (21.5)	11 (16.9)	9 (13.9)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	21 (23.3)	15 (16.7)	20 (22.2)	18 (20)	16 (17.8)	**63 (26.4)**	53 (22.2)	55 (23)	38 (15.9)	30 (12.6)
6	Journal Citation Report(JCR)	18 (21.4)	22 (26.2)	26 (31)	9 (10.7)	9 (10.7)	(0)	(0)	(0)	(0)	(0)	3 (17.5)	22 (23.8)	31 (31.8)	7 (11.1)	0 (14.3)	13 (20)	14 (21.5)	17 (26.2)	10 (15.4)	11 (16.9)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	22 (24.4)	14 (15.6)	26 (28.9)	15 (16.7)	13 (14.4)	56 (18.5)	72 (23.8)	**100 (33.1)**	41 (13.6)	33 (10.9)
7	Most Cited paper in Various field Online	9 (10.7)	12 (14.3)	17 (20.2)	25 (29.8)	21 (25)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	8 (12.3)	10 (15.4)	12 (18.5)	16 (24.6)	19 (29.2)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	17 (11.4)	22 (14.8)	29 (19.5)	**41 (27.5)**	40 (26.8)
	TOTAL	113 (19.2)	133 (22.6)	**149 (25.3)**	108 (18.4)	85 (14.5)	43 (15.9)	43 (15.9)	**69 (25.6)**	63 (23.3)	52 (19.3)	43 (19.4)	73 (21.3)	**84 (29.5)**	77 (15.6)	38 (12.1)	**105 (23.1)**	89 (19.6)	92 (20.2)	93 (20.4)	76 (16.7)	10 (11.9)	12 (14.3)	**24 (28.6)**	21 (25)	17 (20.2)	(0)	(0)	(0)	(0)	(0)	61 (22.6)	39 (14.4)	**65 (24.1)**	61 (22.6)	44 (16.3)	375 (18.9)	389 (19.6)	**483 (24.4)**	423 (21.3)	312 (15.7)

(Note: (here 0= don't, 1= rare, 2= occasionally, 3= frequently & 4= highly) and figures in parenthesis are denoting percentage)

Table 5.2.10.5(a) Web-based Periodical Services

The table 5.2.10.5(a) shows the overall and institute wise use of web-based periodical service in 7 CSIR KRCs'. It was found that services like article alert service, electronic article delivery and online availability of most cited paper in various field were accessed frequently with 24.5%, 26.9% and 27.5% users, respectively. Whereas services like recommendation for subscribing new journals and journal citation report were accessed on occasional basis by 23.6% and 33.1% users, respectively. However, only pro-active web-based 'Table of Content' service was accessed on rarely basis by 23.5% and status of recommended journals was never used service with 26.4% users. It can also be seen from the table that in CDRI, CIMAP, IGIB, IIIM and IMTECH web-based reference service was mostly accessed on occasional basis with 25.3%, 25.6%, 29.5%, 28.6% and 24.1% users, respectively.

So, it is clear that web-based periodical service was basically occasionally used service in all 7 CSIR KRCs' with 24.4% users.

	WEB-BASED PERIODICAL SERVICES	**CDRI (%)**		**CIMAP (%)**		**IGIB (%)**		**IHBT (%)**		**IIIM (%)**		**IITR (%)**		**IMTECH (%)**		**TOTAL (%)**	
		NP	**P**	**NP**	**P**	**NP**	**P**	**NP**	**P**	**NP**	**P**	**NP**	**P**	**NP**	**P**	**NP**	**P**
1	**Pro-active Web-based 'Table of Contents'**	53.57	46.43	27.38	79.76	41.67	33.33	40.48	36.90	0.00	0.00	0.00	0.00	0.00	0.00	45.36	54.64
2	**Article alert service**	28.57	71.43	35.56	64.44	23.81	76.19	60.00	40.00	0.00	0.00	0.00	0.00	0.00	0.00	36.42	63.58

3	**Electronic Article Delivery**	28.57	71.43	34.44	65.56	30.16	69.84	32.31	67.69	26.19	73.81	0.00	0.00	31.11	68.89	30.46	69.54
4	**Recommendation for Subscribing a New journal**	51.19	48.81	0.00	0.00	34.92	65.08	36.92	63.08	0.00	0.00	0.00	0.00	0.00	0.00	41.98	58.02
5	**Status of Recommended Journal**	58.33	41.67	0.00	0.00	0.00	0.00	47.69	52.31	0.00	0.00	0.00	0.00	40.00	60.00	48.54	51.46
6	**Journal Citation Report(JCR)**	47.62	52.38	0.00	0.00	39.68	60.32	41.54	58.46	0.00	0.00	0.00	0.00	40.00	60.00	42.38	57.62
7	**Most Cited paper in Various field Online**	25.00	75.00	0.00	0.00	0.00	0.00	27.69	72.31	0.00	0.00	0.00	0.00	0.00	0.00	26.17	73.83
	TOTAL	**43.31**	**60.21**	**27.48**	**58.79**	**36.83**	**63.17**	**42.64**	**57.36**	**26.19**	**73.81**	**0.00**	**0.00**	**37.04**	**62.96**	**38.55**	**61.45**

(NOTE: here- NP= Non preferred and P= preferred))

Table5.2.10.5(b) Web-based Periodical Services

The table 5.2.10.5(b) that in CDRI, CIMAP, IGIB, IHBT, IIIM and IMTECH web-based periodical services was preferred by 60.21%, 58.79%, 63.17%, 57.36%, 73.81% and 62.96% users, respectively. However, IITR KRC do not offers web-based periodical service.

So, it is clear from the table that overall 61.4% users preferred to use web-based periodical services.

5.2.10.6 Web-based Administrative Service

	GENERAL/ADMINISTRATIVE SERVICES	CDRI					CIMAP					IGIB					IHBT					IIIM					IITR					IMTECH					TOTAL				
		0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4
1	Change Password Online	25 (29.8)	23 (27.4)	19 (22.6)	11 (13.1)	6 (7.1)	23 (25.6)	26 (28.9)	21 (23.3)	12 (13.3)	8 (8.9)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	48 (27.6)	**49 (28.2)**	40 (23)	23 (13.2)	14 (8)
2	Library News	13 (15.5)	28 (33.3)	20 (23.8)	15 (17.9)	7 (8.3)	18 (20)	27 (30)	22 (24.4)	13 (14.4)	10 (11.1)	(0)	(0)	(0)	(0)	(0)	17 (26.2)	22 (33.9)	14 (21.5)	5 (7.7)	7 (10.8)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	48 (20.1)	**77 (32.2)**	56 (23.4)	33 (13.8)	24 (10)
3	Map of the Library/Site Map	7 (8.3)	15 (17.9)	34 (40.5)	16 (19.1)	10 (11.9)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	7 (8.3)	15 (17.9)	**34 (40.5)**	16 (19)	10 (11.9)
4	E-mail based Services	7 (8.3)	11 (13.1)	24 (28.6)	22 (26.2)	20 (23.8)	(0)	(0)	(0)	(0)	(0)	13 (20.6)	10 (15.9)	25 (39.7)	9 (14.3)	5 (7.9)	17 (26.2)	15 (23.1)	14 (21.5)	10 (15.4)	9 (13.9)	(0)	(0)	(0)	(0)	(0)	21 (25)	17 (20.2)	20 (23.8)	15 (17.9)	11 (13.1)	(0)	(0)	(0)	(0)	(0)	58 (19.6)	53 (17.9)	**83 (28)**	56 (18.9)	45 (15.2)
5	Feedback Form	39 (46.4)	20 (23.8)	15 (17.9)	7 (8.3)	3 (3.6)	35 (38.9)	24 (26.7)	21 (23.3)	6 (6.7)	4 (4.4)	6 (9.5)	10 (15.9)	15 (23.8)	18 (31.8)	14 (22.2)	20 (30.8)	10 (15.4)	14 (21.5)	12 (18.5)	9 (13.9)	(0)	(0)	(0)	(0)	(0)	24 (28.6)	21 (25)	19 (22.6)	11 (13.1)	9 (10.7)	(0)	(0)	(0)	(0)	(0)	124 (32.1)	**85 (22)**	84 (21.8)	54 (14.5)	39 (10.1)
6	Contact /Addresses	8 (9.5)	5 (6)	24 (28.6)	27 (32.1)	20 (23.8)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	20 (30.8)	18 (27.7)	12 (18.5)	10 (15.4)	5 (7.7)	9 (10.7)	10 (11.9)	18 (21.4)	27 (32.1)	20 (23.8)	11 (13.1)	12 (14.3)	26 (31)	18 (21.4)	17 (20.2)	(0)	(0)	(0)	(0)	(0)	48 (12.4)	45 (11.7)	80 (20.7)	**82 (21.2)**	62 (16.1)
7	Library Holidays List	11 (13.1)	12 (14.3)	21 (25)	25 (29.8)	15 (17.9)	(0)	(0)	(0)	(0)	(0)	8 (12.7)	13 (20.6)	11 (17.5)	21 (33.3)	10 (15.9)	21 (32.3)	17 (26.2)	12 (18.5)	9 (13.9)	6 (9.2)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	40 (18.9)	42 (19.8)	44 (20.8)	**55 (25.9)**	31 (14.6)
8	FAQ	21 (25)	17 (20.2)	20 (23.8)	15 (17.9)	11 (13.1)	(0)	(0)	(0)	(0)	(0)	6 (9.5)	8 (12.7)	18 (28.6)	20 (31.8)	11 (17.5)	5 (7.7)	11 (16.9)	22 (33.9)	17 (26.2)	10 (15.4)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	32 (15.1)	36 (17)	**60 (28.3)**	52 (24.5)	32 (15.1)
9	Helpdesk Services/Ask-a-Librarian	22 (26.2)	18 (21.4)	20 (23.8)	13 (15.5)	11 (13.1)	(0)	(0)	(0)	(0)	(0)	7 (11.1)	6 (9.5)	21 (33.3)	17 (27)	12 (19.1)	22 (33.9)	12 (18.5)	15 (23.1)	9 (13.9)	7 (10.8)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	23 (25.6)	24 (26.7)	20 (22.2)	11 (12.2)	12 (13.3)	74 (24.5)	60 (19.9)	**76 (25.2)**	50 (16.6)	42 (13.9)
10	User Education/ library	21 (25)	22 (26.2)	19 (22.6)	12 (14.3)	10 (11.9)	(0)	(0)	(0)	(0)	(0)	7 (11.1)	12 (19.1)	21 (33.3)	14 (22.2)	9 (14.3)	21 (32.3)	11 (16.9)	16 (24.6)	9 (13.9)	7 (10.8)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	49 (23.1)	45 (21.2)	**56 (26.4)**	35 (16.5)	26 (12.3)
11	Suggestions Box	23 (27.4)	20 (23.8)	22 (26.2)	10 (11.9)	9 (10.7)	(0)	(0)	(0)	(0)	(0)	22 (34.9)	15 (23.8)	19 (30.2)	3 (4.8)	3 (4.8)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	**45 (30.6)**	35 (23.8)	41 (27.9)	13 (8.8)	12 (8.2)
12	Library Forums (e-mail based)	23 (27.4)	19 (22.6)	18 (21.4)	13 (15.5)	11 (13.1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	22 (33.9)	19 (29.2)	17 (26.2)	7 (10.8)	0 (0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	**45 (30.2)**	38 (25.5)	35 (23.5)	20 (13.4)	11 (7.4)
13	Library Link	18 (21.4)	16 (19.1)	20 (23.8)	18 (21.4)	12 (14.3)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	21 (32.3)	16 (24.6)	18 (27.7)	6 (9.2)	4 (6.2)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	21 (23.3)	25 (27.8)	19 (21.1)	13 (14.4)	12 (13.3)	**60 (25.1)**	57 (23.8)	57 (23.8)	37 (15.5)	28 (11.7)
14	Photo Gallery	24 (28.6)	21 (25)	19 (22.6)	11 (13.1)	9 (10.7)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	8 (12.3)	10 (15.4)	20 (30.8)	15 (23.1)	12 (18.5)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	32 (21.5)	31 (20.8)	**39 (26.2)**	26 (17.4)	21 (14.1)
15	In-house Library Bulletin	11 (13.1)	12 (14.3)	26 (31)	18 (21.4)	16 (19.1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	21 (32.3)	14 (21.5)	16 (24.6)	8 (12.3)	6 (9.2)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	32 (21.5)	26 (17.4)	**42 (28.2)**	26 (17.4)	22 (14.8)
16	Information about Special Exhibition/ Seminars	10 (11.9)	12 (14.3)	18 (21.4)	23 (27.4)	20 (23.8)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	18 (27.7)	9 (13.9)	10 (15.4)	17 (26.2)	11 (16.9)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	28 (18.8)	21 (14.1)	28 (18.8)	**40 (26.8)**	31 (20.8)
	Total	**283 (21.1)**	**271 (20.2)**	**339 (25.2)**	**256 (19.1)**	**190 (14.1)**	**76 (28.2)**	**77 (28.5)**	64 (23.7)	31 (11.5)	22 (8.2)	69 (15.7)	**74 (16.8)**	130 (29.5)	102 (23.6)	64 (14.5)	**233 (25.6)**	184 (20.2)	200 (22)	134 (14.7)	93 (10.2)	9 (10.7)	10 (11.9)	18 (21.4)	**27 (32.1)**	20 (23.8)	56 (22.2)	50 (19.8)	**65 (25.8)**	44 (17.5)	37 (14.7)	44 (24.44)	**49 (27.22)**	39 (21.67)	24 (13.33)	24 (13.33)	770 (22.6)	715 (21)	**855 (25.1)**	618 (18.2)	450 (13.2)

(Note: (here 0= don't, 1= rare, 2= occasionally, 3= frequently & 4= highly) and figures in parenthesis are denoting percentage)

Table 5.2.10.6(a) Web-based General/Administrative Services

The table 5.2.10.6(a) shows the overall and institute wise use of web-based administrative services in 7 CSIR institute. It was found that the services like changing password online with 28.2% of users, library news with 32.2% of users and feedback forms with 22% of users were preferred rarely by the users of CSIR. Whereas, services like map of the library with 40.5% of users, e-mail based services with 28% of users, FAQ with 28.3% of users, helpdesk services with 25.2% of users, user education with 26.4% of users, photo gallery with 26.2% of users and in-house bulletin with 28.2% of users preferred to use on occasional basis. Services like contact address with 21.2% users, library holiday list with 25.9% of users and information about seminars/exhibitions with 26.8% of users were preferred frequently. However, services like suggestion box with 30.6% of users, library forums with 30.2% of users and library link with 25.1% users were never preferred services in 7 CSIR institutes.

It was also found that in CDRI and IITR it was occasionally preferred service by 25.2% and 25.8% of users, respectively, whereas, in CIMAP, IGIB and IMTECH it was rarely used service by 28.5%, 16.8% and 27.2% of users, respectively, whereas in IIIM it was used frequently by 32.1% and in IHBT it was never used by 25.6% users.

So, it is clear from the table that overall web-based administrative service was occasionally used service in 7 CSIR institute by 25.1% users.

	WEB-BASED GENERAL/ADMINISTRATIVE SERVICES	CDRI (%)		CIMAP (%)		IGIB (%)		IHBT (%)		IIIM (%)		IITR (%)		IMTECH (%)		TOTAL (%)	
		NP	**P**	**NP**	**P**	**NP**	**P**	**NP**	**P**	**NP**	**P**	**NP**	**P**	**NP**	**P**	**NP**	**P**
1	**Change Password Online**	57.14	42.86	58.33	48.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**55.75**	44.25
2	**Library News**	48.81	50.00	50.00	50.00	0.00	0.00	60.00	40.00	0.00	0.00	0.00	0.00	0.00	0.00	**52.30**	47.28
3	**Map of the Library/Site Map**	26.19	71.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.19	**71.43**
4	**E-mail based Services**	21.43	78.57	0.00	0.00	36.51	61.90	49.23	50.77	0.00	0.00	45.24	54.76	0.00	0.00	37.50	**62.16**
5	**Feedback Form**	70.24	29.76	65.56	34.44	25.40	74.60	46.15	53.85	0.00	0.00	53.57	46.43	0.00	0.00	**54.15**	45.85
6	**Contact /Addresses**	15.48	84.52	0.00	0.00	0.00	0.00	58.46	41.54	22.62	77.38	27.38	72.62	0.00	0.00	29.34	**70.66**
7	**Library Holidays List**	27.38	72.62	0.00	0.00	33.33	66.67	58.46	41.54	0.00	0.00	0.00	0.00	0.00	0.00	38.68	**61.32**
8	**FAQ**	6.69	8.10	0.00	0.00	4.44	15.56	3.52	10.77	0.00	0.00	0.00	0.00	0.00	0.00	32.08	**67.92**

9	**Helpdesk Services/Ask-a-Librarian**	47.62	52.38	0.00	0.00	20.63	79.37	52.31	47.69	0.00	0.00	0.00	0.00	52.22	47.78	44.37	**55.63**
10	**Web based User Education/ library tutorials**	51.19	48.81	0.00	0.00	30.16	69.84	49.23	49.23	0.00	0.00	0.00	0.00	0.00	0.00	44.34	**55.19**
11	**Suggestions Box**	7.57	7.22	0.00	0.00	11.75	7.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**54.42**	44.90
12	**Library Forums (e-mail based)**	50.00	50.00	0.00	0.00	0.00	0.00	63.08	36.92	0.00	0.00	0.00	0.00	0.00	0.00	**55.70**	44.30
13	**Library Link**	40.48	59.52	0.00	0.00	0.00	0.00	56.92	43.08	0.00	0.00	0.00	0.00	51.11	48.89	48.95	**51.05**
14	**Photo Gallery**	7.92	6.87	0.00	0.00	0.00	0.00	3.96	10.33	0.00	0.00	0.00	0.00	0.00	0.00	42.28	**57.72**
15	**In-house Library Bulletin**	27.38	71.43	0.00	0.00	0.00	0.00	53.85	46.15	0.00	0.00	0.00	0.00	0.00	0.00	38.93	**60.40**
16	**Information about Special Exhibition/ Seminars**	26.19	72.62	0.00	0.00	0.00	0.00	41.54	58.46	0.00	0.00	0.00	0.00	0.00	0.00	32.89	**66.44**
	Total	41.37	**58.63**	**56.67**	43.33	32.57	**67.43**	49.41	**50.59**	22.62	**77.38**	42.06	**57.94**	**51.67**	48.33	43.57	**56.43**

(NOTE: here- NP= Non preferred and P= prefrred)

Table 5.2.10.6(b) Web-based General/Administrative Services

The table 5.2.10.6(b) clearly shows that services like changing password online with 55.75% of users, library news with 52.3% of users, feedback form with 54.15% of users, suggestion box with 54.42% of users and library forums with 55.70% of users were not preferred services in CSIR Institutes, whereas services like map of library with 71.43% of users, e-mail based services with 62.16% of users, contacts with 70.66% of users, library holidays with 61.32% of users, FAQ with 67.92% of users, help desk services with 55.63% of users, web-based users education program with 55.19% of users, library link with 51.05% of users, photo gallery with 57.72% of users, in-house library bulletin with 60.40% of users and information about exhibitions/seminars with 66.44% of users were preferred in CSIR institutes.

It was also found that in CDRI, IGIB, IHBT, IIIM and IITR web administrative services were preferred by 58.63%, 67.43%, 50.59%, 77.38% and 57.94% of users, respectively. Whereas in CIMAP and IMTECH it was not preferred by 56.67% and 51.67% of users, respectively.

So, it is clear that web administrative services were preferred by overall 56.43% of users from all the selected 7 CSIR institutes.

5.2.10.7 Web-Form Facility

	WEB FORM FACILITY	CDRI					CIMAP					IGIB					IHBT					IIIM					IITR					IMTECH					Total				
		0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4
1	Reference Queries	11 (13.1)	20 (23.8)	15 (17.9)	20 (23.8)	18 (21.4)	6 (6.7)	11 (12.2)	30 (33.3)	22 (24.4)	21 (23.3)	33 (52.4)	19 (30.2)	11 (17.5)	0 (0)	0 (0)	24 (36.9)	20 (30.8)	11 (16.9)	5 (7.7)	5 (7.7)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	**74 (24.5)**	70 (23.2)	67 (22.2)	47 (15.6)	44 (14.6)
2	Request for Document on ILL/DDS	9 (10.7)	13 (15.5)	24 (28.6)	21 (25)	17 (20.2)	8 (8.9)	22 (24.4)	19 (21.1)	21 (23.3)	20 (22.2)	7 (11.1)	13 (20.6)	27 (42.9)	16 (25.4)	0 (0)	16 (24.6)	15 (23.1)	16 (24.6)	10 (15.4)	8 (12.3)	7 (8.3)	10 (11.9)	24 (28.6)	22 (26.2)	21 (25)	(0)	(0)	(0)	(0)	(0)	(0)	13 (14.4)	14 (15.6)	18 (20)	24 (26.7)	21 (23.3)	60 (12.6)	87 (18.3)	**128 (26.9)**	114 (23.9)	87 (18.3)
3	Status of Circulation Account	10 (11.9)	21 (25)	20 (23.8)	17 (20.2)	16 (19.1)	(0)	(0)	(0)	(0)	(0)	48 (76.2)	11 (17.5)	4 (6.4)	0 (0)	0 (0)	22 (33.9)	19 (29.2)	17 (26.2)	4 (6.2)	2 (3.1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	11 (12.2)	14 (15.6)	23 (25.6)	20 (22.2)	22 (24.4)	**91 (30.1)**	65 (21.5)	64 (21.2)	41 (13.6)	40 (13.2)
4	Reserve/Cancel/Renewal Status of Documents	12 (14.3)	22 (26.2)	19 (22.6)	17 (20.2)	14 (16.7)	(0)	(0)	(0)	(0)	(0)	54 (85.7)	9 (14.3)	0 (0)	0 (0)	0 (0)	13 (20)	17 (26.2)	15 (23.1)	11 (16.9)	9 (13.9)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	**79 (37.3)**	48 (22.6)	34 (16)	28 (13.2)	23 (10.8)
5	Request for Article	7 (8.3)	10 (11.9)	25 (29.8)	22 (26.2)	20 (23.8)	7 (7.8)	9 (10)	20 (22.2)	33 (36.7)	21 (23.3)	14 (22.2)	19 (30.2)	22 (34.9)	7 (11.1)	1 (1.6)	4 (6.2)	8 (12.3)	18 (27.7)	20 (30.8)	15 (23.1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	32 (10.6)	46 (15.2)	**85 (28.1)**	82 (27.2)	57 (18.9)
6	Interaction with Reference Staff/ Librarian	12 (14.3)	14 (16.7)	21 (25)	19 (22.6)	18 (21.4)	18 (20)	21 (23.3)	21 (23.3)	19 (21.1)	11 (12.2)	31 (49.2)	15 (23.8)	17 (27)	0 (0)	0 (0)	18 (27.7)	16 (24.6)	13 (20)	10 (15.4)	8 (12.3)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	**79 (26.2)**	66 (21.9)	72 (23.8)	48 (15.9)	37 (12.3)
7	Interaction with Acquisition Staff/ Librarian	21 (25)	23 (27.4)	20 (23.8)	11 (13.1)	9 (10.7)	24 (26.7)	20 (22.2)	18 (20)	17 (18.9)	11 (12.2)	49 (77.8)	14 (22.2)	0 (0)	0 (0)	0 (0)	19 (29.2)	20 (30.8)	12 (18.5)	9 (13.9)	5 (7.7)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	**113 (37.4)**	77 (25.5)	50 (16.6)	37 (12.3)	25 (8.3)
8	Feedback/Suggestion for Service	19 (22.6)	24 (28.6)	26 (31)	9 (10.7)	6 (7.1)	10 (11.1)	19 (21.1)	23 (25.6)	21 (23.3)	17 (18.9)	47 (74.6)	13 (20.6)	3 (4.8)	0 (0)	0 (0)	22 (33.9)	20 (30.8)	16 (24.6)	5 (7.7)	1 (1.5)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	**98 (32.5)**	76 (25.2)	68 (22.5)	35 (11.6)	24 (7.9)
9	For Recommending New Book/ Journal	10 (11.9)	13 (15.5)	19 (22.6)	22 (26.2)	20 (23.8)	9 (10)	14 (15.6)	20 (22.2)	21 (23.3)	23 (25.6)	9 (14.3)	18 (28.6)	22 (34.9)	11 (17.5)	3 (4.8)	11 (16.9)	9 (13.9)	15 (23.1)	16 (24.6)	14 (21.5)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	39 (12.9)	54 (17.9)	**76 (25.2)**	70 (23.2)	60 (19.9)
	Total	111 (14.7)	160 (21.2)	**189 (25)**	158 (20.9)	138 (18.3)	82 (13)	116 (18.4)	151 (24)	**154 (24.4)**	124 (19.7)	**292 (51.5)**	131 (23.1)	106 (18.7)	34 (6)	4 (0.7)	**149 (25.5)**	144 (24.6)	133 (22.7)	90 (15.4)	67 (11.5)	7 (8.3)	10 (11.9)	**24 (28.6)**	22 (26.2)	21 (25)	(0)	(0)	(0)	(0)	(0)	(0)	24 (13.3)	28 (15.6)	41 (22.8)	**44 (24.4)**	43 (23.9)	**665 (23.8)**	589 (21.1)	644 (23)	502 (17.9)	397 (14.2)

(Note: (here 0= don't, 1= rare, 2= occasionally, 3= frequently & 4= highly) and figures in parenthesis are denoting percentage)

Table 5.2.10.7(a) Web-form Facilities

The Table 5.2.10.7(a) shows the overall and institute wise use of web-form facility by the users of 7 CSIR institutes. It was found that services like reference queries with 24.5% of users, status of circulation account with 30.1% of users, reserve/cancel/renewal status of documents by 37.3% of users, interaction with reference staff with 26.2% of users, interaction with acquisition staff with 37.4% and feedback/suggestion service with 32.5% of users never preferred web-form facility of the CSIR KRCs. Whereas, services like request for documents on ILL/DDS with 26.9% of users, request for article with 28.1% of users and recommending new book/journal with 25.2% of users preferred to frequently use the web form facility. It is also clear that IITR do not offer web form facility in their KRC.

It is also found that in CDRI and IIIM web-form facility was preferred occasionally by 25% and 28.6% of users, respectively. Whereas in CIMAP and IMTECH it was preferred frequently by 24.4% of users from both the institute. However in IGIB and IHBT it was never preferred by 51.5% and 25.5% of users, respectively.

So, it is clear that overall web-form facility was never used service in all the 7 CSIR institute with 23.8% users.

	WEB FORM FACILITY	CDRI (%)		CIMAP (%)		IGIB (%)		IHBT (%)		IIIM (%)		IITR (%)		IMTECH (%)		TOTAL (%)	
		NP	P	NP	P	NP	P	NP	P	NP	P	NP	P	NP	P	NP	P
1	Reference Queries	36.90	63.10	20.24	86.90	61.90	13.10	52.38	25.00	0.00	0.00	0.00	0.00	0.00	0.00	47.68	52.32
2	Request for Document on ILL/DDS	26.19	73.81	33.33	66.67	31.75	68.25	47.69	52.31	20.24	79.76	0.00	0.00	30.00	70.00	30.88	69.12
3	Status of Circulation Account	36.90	63.10	0.00	0.00	93.65	6.35	63.08	35.38	0.00	0.00	0.00	0.00	27.78	72.22	51.66	48.01
4	Reserve/Cancel/ Renewal Status of Documents	40.48	59.52	0.00	0.00	100.00	0.00	46.15	53.85	0.00	0.00	0.00	0.00	0.00	0.00	59.91	40.09
5	Request for Article	20.24	79.76	17.78	82.22	52.38	47.62	18.46	81.54	0.00	0.00	0.00	0.00	0.00	0.00	25.83	74.17

6	**Interaction with Reference Staff/ Librarian**	30.95	69.05	43.33	56.67	73.02	26.98	52.31	47.69	0.00	0.00	0.00	0.00	0.00	0.00	48.01	51.99
7	**Interaction with Acquisition Staff/ Librarian**	52.38	47.62	48.89	51.11	100.00	0.00	60.00	40.00	0.00	0.00	0.00	0.00	0.00	0.00	62.91	37.09
8	**Feedback/Suggestion for Service**	7.57	7.22	9.27	19.49	19.05	0.95	9.23	4.84	0.00	0.00	0.00	0.00	0.00	0.00	57.62	42.05
9	**For Recommending New Book/ Journal**	27.38	72.62	25.56	71.11	42.86	57.14	30.77	69.23	0.00	0.00	0.00	0.00	0.00	0.00	30.79	68.21
	Total	35.85	64.15	31.58	68.42	74.60	25.40	50.26	49.74	20.24	79.76	0.00	0.00	28.89	71.11	44.83	55.17

(NOTE: here- NP= Non preferred and P= preferred)

Table 5.2.10.7(b) Web-form Facilities

The table 5.2.10.7(b) shows that services like status of circulation account with 51.66% of users, reserve/cancel/renewal status of documents with 59.91% of users, interaction with acquisition staff/librarian with 62.91% of users and feedback/suggestion for service with 57.62% of users do not preferred to use web-form facilities of the selected CSIR KRCs. Whereas services like reference queries with 52.32% of users, request for document on ILL/DDS with 69.12% of users, request for article with 74.17% of users, interaction with reference staff/librarian 51.99% of users and for recommending new book/journal with 68.21% of users preferred to use web form facility from all 7 institutes of CSIR.

It was also found that in CDRI, CIMAP, IIIM and IMTECH users preferred to use web-form facility by 64.15%, 68.42%,79.76% and 71.11% of users, respectively. Whereas in IGIB 74.60% of users and in IHBT 50.26% of users do not preferred to use web-form facilities, respectively.

5.2.10.8 Searching Techniques

	SEARCHING TECHNIQUES	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH	TOTAL
1	**Controlled Vocabulary or Subject**	26 (17%)	28 (23%)	0	32 (24%)	34 (19%)	23 (23%)	40 (38%)	**185 (22%)**
2	**Keywords**	37 (24%)	43 (36%)	42 (61%)	34 (26%)	42 (24%)	32 (32%)	20 (19%)	**250 (29%)**
3	**Boolean Operators**	28 (19%)	50 (51%)	27 (39%)	17 (13%)	32 (18%)	13 (13%)	22 (21%)	**189 (22%)**
4	**Truncation and wild cards**	11 (7%)	0	0	23 (17%)	16 (9%)	9 (9%)	3 (3%)	**62 (7%)**
5	**Field specific**	33 (22%)	0	0	27 (20%)	40(22 %)	12 (12%)	11 (11%)	**124 (14%)**
6	**Proximity locators**	17 (11%)	0	0	0	14 (8%)	11 (11%)	8 (8%)	**50 (6%)**

Table 5.2.10.8 Searching Techniques

The table 5.2.10.8 shows the overall and institute wise preference to searching techniques given by the users of selected 7 CSIR institutes. It was found that keyword searching was preferred by maximum number users which was 250 users i.e. 29% of users, followed by Boolean operators searching by 189 users i.e. 24%, followed by controlled vocabulary searching by 185 users i.e. 20%, then by field searching by 124 users i.e. 14% and then by truncation and wild cards searching by 62 users i.e. 7% and least by proximity locators searching by 50 users i.e. 6% of users.

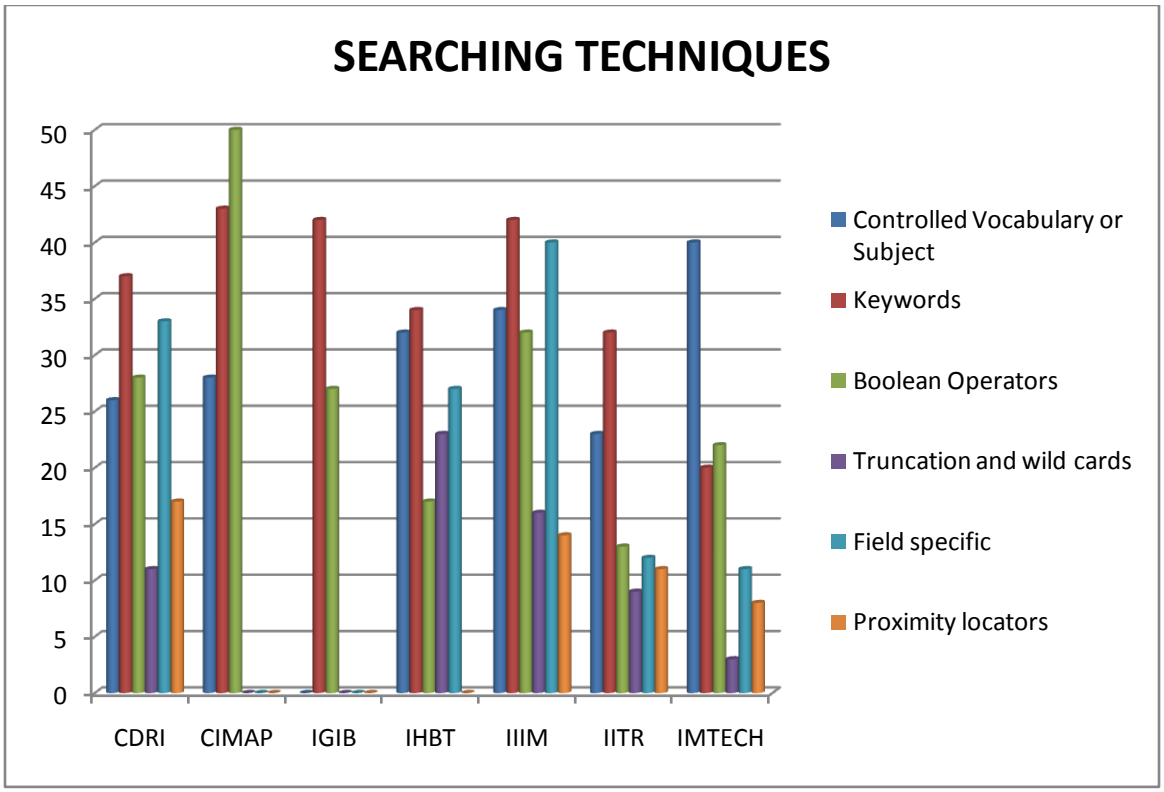

Figure 5.2.10.8 Searching Techniques

The fig. 5.2.10.8 clearly shows the institute wise preference given to searching techniques. It was found the in CDRI, IGIB, IHBT, IIIM and IITR Keyword searching was preferred more, whereas in CIMAP users preferred searching more by BOOLEAN operator and in IMTECH by Controlled Vocabulary.

5.2.10.9 Web Application Tools

	WEB APPLICATION TOOLS	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH	TOTAL
1	**Facebook**	30 (24%)	54 (43%)	0	41 (51%)	0	69 (70%)	0	**194 (45%)**
2	**RSS feed**	15 (12%)	16 (13%)	0	7 (9%)	0	0	0	**38 (9%)**
3	**Instant Messaging**	21 (17%)	12 (9%)	0	19 (24%)	0	0	0	**52 (12%)**
4	**Blog**	13 (11%)	8 (6%)	0	13 (16%)	0	0	0	**34 (8%)**
5	**Wiki**	33 (27%)	37 (29%)	0	0	0	0	0	**70 (16%)**
6	**Twitter**	8 (7%)	0	0	0	0	29 (30%)	0	**37 (9%)**
7	**Tagging**	3 (2%)	0	0	0	0	0	0	**3 (1%)**
8	**Podcast**	0	0	0	0	0	0	0	**0**
9	**Vodcast**	0	0	0	0	0	0	0	**0**

Table 5.2.10.9 Web Application Tools

The table 5.2.10.9 shows the overall and institute wise use of web application tools by the users of selected CSIR institutes. It was found that maximum number of users who used to prefer facebook was 194 i.e. 45% of users, followed by the users who preferred wiki was 70 i.e. 16% of users, followed by the users who preferred instant messaging which

was 52 i.e. 12% of users, followed by the users who used RSS feed and twitter which was 38 i.e. 9% and 39 i.e. 9% of users, respectively, and then by the users who used blog was 34 i.e. 8% of users and only 3 users i.e. only 1% of users responded that they used tagging.

It was also found that only CDRI, CIMAP, IHBT and IITR allowed the usage of web application tools to the users in their campus whereas in IGIB, IIIM, and IMTECH it was not allowed.

5.2.11 Environment Quality of Web- based services

5.2.11.1(a) Access and Collection

Access and collection	CDRI					CIMAP					IGIB					IHBT					IIIM					IITR					IMTECH					TOTAL				
	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2
The WBLS provides trusted information	46 (54.8)	25 (29.8)	5 (6)	3 (3.6)	2 (2.4)	27 (30)	35 (38.9)	19 (21.1)	6 (6.7)	3 (3.3)	12 (19.1)	38 (60.3)	7 (11.1)	4 (6.4)	0 (0)	22 (33.9)	25 (38.5)	14 (21.5)	2 (3.1)	0 (0)	44 (52.4)	34 (40.5)	5 (6)	0 (0)	0 (0)	46 (54.8)	25 (29.8)	5 (6)	3 (3.6)	2 (2.4)	5 (5.6)	58 (64.4)	15 (16.7)	9 (10)	0 (0)	202 (36.1)	**240 (42.9)**	70 (12.5)	27 (4.8)	7 (1.3)
The service provides access to a wide range of electronic resources	31 (36.9)	34 (40.5)	11 (13.1)	1 (1.2)	3 (3.6)	26 (28.9)	32 (35.6)	17 (18.9)	9 (10)	6 (6.7)	12 (19.1)	31 (49.2)	16 (25.4)	0 (0)	0 (0)	18 (27.7)	24 (36.9)	13 (20)	6 (9.2)	2 (3.1)	35 (41.7)	44 (52.4)	0 (0)	0 (0)	0 (0)	12 (14.3)	11 (13.1)	17 (20.2)	21 (25)	23 (27.4)	10 (11.1)	37 (41.1)	25 (27.8)	10 (11.1)	5 (5.6)	144 (25.7)	**213 (38)**	99 (17.7)	47 (8.4)	39 (7)
Clear arrangement of online information	16 (19.1)	21 (25)	28 (33.3)	10 (11.9)	7 (8.3)	31 (34.4)	33 (36.7)	21 (23.3)	5 (5.6)	0 (0)	7 (11.1)	35 (55.6)	11 (17.5)	1 (1.6)	0 (0)	24 (36.9)	23 (35.4)	11 (16.9)	4 (6.2)	1 (1.5)	38 (45.2)	30 (35.7)	6 (7.1)	0 (0)	0 (0)	18 (21.4)	21 (25)	23 (27.4)	12 (14.3)	10 (11.9)	26 (28.9)	37 (41.1)	9 (10)	13 (14.4)	1 (1.1)	160 (28.6)	**200 (35.7)**	109 (19.5)	45 (8)	19 (3.4)
The Web site has all working links	11 (13.1)	19 (22.6)	15 (17.9)	21 (25)	16 (19.1)	17 (18.9)	28 (31.1)	20 (22.2)	15 (16.7)	10 (11.1)	13 (20.6)	22 (34.9)	19 (30.2)	1 (1.6)	0 (0)	12 (18.5)	25 (38.5)	16 (24.6)	6 (9.2)	4 (6.2)	18 (21.4)	39 (46.4)	22 (26.2)	4 (4.8)	0 (0)	10 (11.9)	15 (17.9)	18 (21.4)	24 (28.6)	17 (20.2)	7 (7.8)	20 (22.2)	39 (43.3)	14 (15.6)	9 (10)	88 (15.7)	**168 (30)**	149 (26.6)	85 (15.2)	56 (10)
The Web site is convenient to access	23 (27.4)	34 (40.5)	10 (11.9)	5 (6)	3 (3.6)	37 (41.1)	31 (34.4)	15 (16.7)	4 (4.4)	3 (3.3)	16 (25.4)	34 (54)	9 (14.3)	0 (0)	1 (1.6)	11 (16.9)	23 (35.4)	25 (38.5)	3 (4.6)	1 (1.5)	31 (36.9)	44 (52.4)	5 (6)	4 (4.8)	0 (0)	16 (19.1)	22 (26.2)	10 (11.9)	19 (22.6)	17 (20.2)	27 (6)	38 (42.2)	13 (14.4)	10 (11.1)	0 (0)	161 (28.8)	**226 (40.4)**	87 (15.5)	45 (8)	25 (4.5)
TOTAL	127 (30.2)	**133 (31.7)**	69 (16.4)	40 (9.5)	31 (7.4)	138 (30.7)	**159 (35.3)**	92 (20.4)	39 (8.7)	22 (4.9)	60 (19.1)	**160 (50.8)**	62 (19.7)	6 (1.9)	1 (0.3)	87 (26.8)	**120 (36.9)**	79 (24.3)	21 (6.5)	8 (2.5)	166 (39.5)	**191 (45.5)**	38 (9.1)	8 (1.9)	0 (0)	**102 (24.3)**	94 (22.4)	73 (17.4)	79 (18.8)	69 (16.4)	75 (16.7)	**190 (42.2)**	101 (22.4)	56 (12.4)	15 (3.3)	755 (27.8)	**1047 (38.6)**	514 (19)	249 (9.2)	146 (5.4)

Note: (here 2= Strongly agree, 1= Agree, 0= Uncertain, -1= Disagree & -2= Strongly disagree) and figures in parenthesis are denoting percentage)

Table 5.2.11.1(a) Access and Collection

The table 5.2.11.1(a) clearly shows the overall and institute wise opinion of the selected CSIR institutes users with regards to the access and collection provided by web-based library services. It was found that 38.6% of users agreed that the access and collection provided by WBLS were overall satisfactory.

	Access and collection	CDRI (%)		CIMAP (%)		IGIB (%)		IHBT (%)		IIIM (%)		IITR (%)		IMTECH (%)		TOTAL (%)	
		P	**N**	**P**	**N**	**P**	**N**	**P**	**N**	**P**	**N**	**P**	**N**	**P**	**N**	**P**	**N**
1	**The WBLS provides trusted information**	84.5	11.9	68.9	31.1	79.4	17.5	72.3	24.6	92.9	6.0	84.5	11.9	70.0	26.7	78.9	18.6
2	**The service provides access to a wide range of electronic resources**	77.4	17.9	64.4	35.6	68.3	25.4	64.6	32.3	94.0	0.0	27.4	72.6	52.2	44.4	63.8	33.0
3	**Clear arrangement of online information resources by subject**	44.0	53.6	71.1	28.9	66.7	19.0	72.3	24.6	81.0	7.1	46.4	53.6	70.0	25.6	64.3	30.9
4	**The Web site**	35.7	61.	50.0	50.0	55.	31.	56.	40.0	67.	31.	29.	70.	30.0	68.9	45.7	51.8

	has all working links		9			6	7	9		9	0	8	2				
5	**The Web site is convenient to access**	67.9	21.4	75.6	24.4	79.4	15.9	52.3	44.6	89.3	10.7	45.2	54.8	72.2	25.6	69.1	28.0
	TOTAL	65.0	35.0	66.0	34.0	76.1	23.9	65.7	34.3	88.6	11.4	47.0	53.0	60.6	39.4	66.5	33.5

(NOTE: here- P= Positive and N= Negative)

Table 5.2.11.1(b) Access and Collection

The table 5.2.11.1(b) clearly shows the overall satisfaction level with the access and collection provided by WBLS to the users. It was found that 78.9% of users responded positively that they can trust the information provided by WBLS, 63.8% of users responded that WBLS provides access to a wide range of electronic resources, 64.3% of users responded that WBLS offers clear arrangement of online information resources by subject and 69.1% of users responded that web site is convenient to access. Whereas, 51.8% users responded negatively that Web site has all working links.

So, it is clear from the table that overall 66.5% users were satisfied with the access and collection provided by web-based library services.

5.2.11.2 Equipments

Equipment	CDRI					CIMAP					IGIB					IHBT					IIIM					IITR					IMTECH					TOTAL				
	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2
The no. of ports available for laptop to access WBLS are enough	6 (7.1)	10 (11.9)	24 (28.6)	18 (21.4)	26 (31)	21 (23.3)	42 (46.7)	12 (13.3)	9 (10)	6 (6.7)	7 (6.4)	11 (17.5)	19 (30.2)	17 (27)	9 (14.3)	17 (26.2)	21 (32.3)	10 (15.4)	9 (13.9)	8 (12.3)	15 (17.9)	34 (40.5)	24 (28.6)	7 (8.3)	4 (4.8)	8 (9.5)	12 (14.3)	33 (39.3)	21 (25)	10 (11.9)	10 (11.1)	35 (38.9)	38 (42.2)	5 (5.6)	2 (2.2)	84 (15)	151 (27)	160 (28.6)	86 (15.4)	65 (11.6)
The no. of working computers to access Web-based services are enough	9 (10.7)	10 (11.9)	27 (32.1)	21 (25)	17 (20.2)	21 (23.3)	30 (33.3)	17 (18.9)	14 (15.6)	8 (8.9)	14 (3.2)	19 (33.3)	12 (3.2)	11 (42.9)	7 (9.5)	14 (21.5)	17 (26.2)	12 (18.5)	12 (18.5)	10 (15.4)	18 (21.4)	21 (25)	11 (13.1)	22 (26.2)	11 (13.1)	13 (15.5)	22 (26.2)	34 (40.5)	8 (9.5)	7 (8.3)	19 (21.1)	29 (32.2)	32 (35.6)	5 (5.6)	5 (5.6)	108 (19.3)	136 (24.3)	145 (25.9)	93 (16.6)	65 (11.6)

(Note: (here 2= Strongly agree, 1= Agree, 0= Uncertain, -1= Disagree & -2= Strongly disagree) and figures in parenthesis are denoting percentage)

Table 5.2.11.2(a) Equipments

The table 5.2.11.2(a) clearly shows the overall and institute wise opinion of the selected CSIR institutes users with regards to the equipments provided by web-based library services. It was found that the maximum number i.e. 25.9% of users were uncertain about the quantity of equipments provided by the CSIR KRCs were enough or not.

	Equipments	CDRI (%)		CIMAP (%)		IGIB (%)		IHBT (%)		IIIM (%)		IITR (%)		IMTECH (%)		TOTAL (%)	
		P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
1	The no. of ports available for laptop to access WBLS are enough	19.0	81.0	70.0	30.0	28.6	71.4	58.5	41.5	58.3	41.7	23.8	76.2	50.0	50.0	42.0	55.5
2	The no. of working computers to access Web-based services are enough	22.6	77.4	56.7	21.7	52.4	47.6	47.7	52.3	46.4	52.4	41.7	58.3	53.3	46.7	43.6	54.1
	Total	20.8	79.2	63.3	36.7	40.5	59.5	53.1	46.9	52.7	47.3	32.7	67.3	51.7	48.3	43.8	56.2

(Note: here-P= Positive & N=Negative)

Table 5.2.11.2(b) Equipments

The table 5.2.11.2(b) clearly shows the overall satisfaction level of the users with the number of equipments provided by CSIR KRCs. It was found that 55.5% of users and 54.1% of users responded negatively that the no. of ports provided for laptops and number of working computes were not enough to access WBLS, respectively.

So, it is clear that overall the maximum number i.e. 56.2% of users were not satisfied with the no. of equipments provided by the libraries, however, 43.8% users were agreed that the no. of equipments provided were enough to access web-based library services.

5.2.12. WEB SERVICES DELIVERY QUALITY

5.2.12.1 Patron Support

Patron support	CDRI					CIMAP					IGIB					IHBT					IIIM					IITR					IMTECH					TOTAL				
	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2
Online librarians always interacts very politely	32 (38.1)	36 (42.86)	9 (10.71)	7 (8.33)	0 (0)	31 (34.44)	36 (40)	13 (14.44)	7 (7.78)	3 (3.33)	10 (15.87)	26 (41.27)	19 (30.16)	8 (12.7)	0 (0)	9 (13.85)	10 (15.38)	20 (30.77)	14 (21.54)	12 (18.46)	32 (38.1)	36 (42.86)	9 (10.71)	7 (8.33)	0 (0)	19 (22.62)	22 (26.19)	17 (20.24)	15 (17.86)	11 (13.1)	15 (16.67)	27 (30)	19 (21.11)	16 (17.78)	13 (14.44)	148 (26.43)	**193 (34.46)**	106 (18.93)	74 (13.21)	39 (93.04)
Online librarians are always eager to help very enthusiastically	34 (40.48)	30 (35.71)	17 (20.24)	3 (3.57)	0 (0)	27 (30)	30 (33.33)	21 (23.33)	8 (8.89)	4 (4.44)	13 (20.63)	22 (34.92)	27 (42.86)	1 (1.59)	0 (0)	10 (15.38)	13 (20)	23 (35.38)	11 (16.92)	8 (12.31)	34 (40.48)	30 (35.71)	17 (20.24)	3 (3.57)	0 (0)	12 (14.29)	16 (19.05)	32 (38.1)	14 (16.67)	10 (11.9)	22 (24.44)	34 (37.78)	27 (30)	5 (5.56)	2 (2.22)	152 (27.14)	175 (31.25)	**164 (29.29)**	45 (8.04)	24 (95.71)
Online librarians understand the exact information needs	36 (42.86)	33 (39.29)	12 (14.29)	1 (1.19)	2 (2.38)	26 (28.89)	37 (41.11)	17 (18.89)	8 (8.89)	2 (2.22)	6 (9.52)	24 (38.1)	33 (52.38)	0 (0)	0 (0)	11 (16.92)	24 (36.92)	13 (20)	10 (15.38)	7 (10.77)	36 (42.86)	33 (39.29)	12 (14.29)	1 (1.19)	2 (2.38)	9 (10.71)	12 (14.29)	27 (32.14)	22 (26.19)	14 (16.67)	10 (11.11)	24 (26.67)	35 (38.89)	12 (13.33)	9 (10)	134 (23.93)	**187 (33.39)**	149 (26.61)	54 (9.64)	36 (93.57)
TOTAL	**102 (40.48)**	99 (39.29)	38 (15.08)	11 (4.37)	2 (0.79)	84 (31.11)	**103 (38.15)**	51 (18.89)	23 (8.52)	9 (3.33)	29 (15.34)	72 (38.1)	**79 (41.8)**	9 (4.76)	0 (0)	30 (15.38)	47 (24.1)	**56 (28.72)**	35 (17.95)	27 (13.85)	**102 (40.48)**	99 (39.29)	38 (15.08)	11 (4.37)	2 (0.79)	40 (15.87)	50 (19.84)	**76 (30.16)**	51 (20.24)	35 (13.89)	47 (17.41)	**85 (31.48)**	81 (30)	33 (12.22)	24 (8.89)	434 (25.83)	**555 (33.04)**	419 (24.94)	173 (10.3)	99 (5.9)

(Note: (here 2= Strongly agree, 1= Agree, 0= Uncertain, -1= Disagree & -2= Strongly disagree) and figures in parenthesis are denoting percentage)

Table 5.2.12.1(a) Patron Support

The table 5.2.12.1(a) clearly shows the overall and institute wise opinion of the selected CSIR institutes users with regards to the support provided by the information scientists to its patrons through web-based library services. It was found that 33.04% of users agreed that the patron support was provided by the information scientists through WBLS.

	Patron support	CDRI (%)		CIMAP (%)		IGIB (%)		IHBT (%)		IIIM (%)		IITR (%)		IMTECH (%)		TOTAL (%)	
		P	**N**	**P**	**N**	**P**	**N**	**P**	**N**	**P**	**N**	**P**	**N**	**P**	**N**	**P**	**N**
1	**Online librarians always interacts very politely**	81.0	19.0	74.4	25.6	57.1	42.9	29.2	70.8	81.0	19.0	48.8	51.2	46.7	53.3	60.9	39.1
2	**Online librarians are always eager to help very enthusiastically**	76.2	23.8	63.3	36.7	55.6	44.4	35.4	64.6	76.2	23.8	33.3	66.7	62.2	37.8	58.4	41.6
3	**Online librarians understand the exact information needs**	82.1	17.9	70.0	30.0	47.6	52.4	53.8	46.2	82.1	17.9	25.0	75.0	37.8	62.2	57.3	42.7
	TOTAL	79.8	20.2	69.3	30.7	53.4	46.6	39.5	60.5	79.8	20.2	35.7	64.3	52.4	54.8	**58.9**	41.1

(NOTE: here- P= positive, N= negative)

Table 5.2.12.1(b) Patron Support

The table 5.2.12.1(b) clearly shows the overall satisfaction level of the users with patron support provided by CSIR KRCs. It was found that 60.9% of users, 58.4% of users and 57.3% of users responded positively that online librarians interacts politely, are eager to help very enthusiastically and understand the exact information needs, respectively.

So, it was clear that overall 58.9% of users were satisfied with the patron support whereas 41.1% of users were not satisfied.

5.2.12.2 Personalisation

Personalisation	CDRI					CIMAP					IGIB					IHBT					IIIM					IITR					IMTECH					TOTAL				
	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2
The library system stores all the preferences to offer the users additional information.	21 (25)	25 (29.76)	22 (26.19)	11 (13.1)	5 (5.95)	24 (26.67)	28 (31.11)	22 (24.44)	9 (10)	7 (7.78)	15 (23.81)	26 (41.27)	22 (34.92)	0 (0)	0 (0)	20 (30.77)	24 (36.92)	12 (18.46)	6 (9.23)	3 (4.62)	24 (28.57)	31 (36.9)	17 (20.24)	8 (9.52)	4 (4.76)	17 (20.24)	16 (19.05)	25 (29.76)	14 (16.67)	12 (14.29)	20 (22.22)	26 (28.89)	24 (26.67)	12 (13.33)	8 (8.89)	141 (25.18)	176 (31.43)	144 (25.71)	60 (10.71)	39 (6.96)
It offers the facility to set up an alert for new materials of the users' interests.	10 (11.9)	12 (14.29)	23 (27.38)	21 (25)	18 (21.43)	20 (22.22)	24 (26.67)	23 (25.56)	13 (14.44)	10 (11.11)	17 (26.98)	27 (42.86)	15 (23.81)	4 (6.35)	0 (0)	13 (20)	18 (27.69)	21 (32.31)	9 (13.85)	4 (6.15)	15 (17.86)	20 (23.81)	28 (33.33)	19 (22.62)	2 (2.38)	8 (9.52)	21 (25)	32 (38.1)	13 (15.48)	10 (11.9)	12 (13.33)	17 (18.89)	28 (31.11)	18 (20)	15 (16.67)	95 (16.96)	139 (24.82)	**170 (30.36)**	97 (17.32)	59 (10.54)
It offers the facility to save the searches and display the search history.	21 (25)	19 (22.62)	20 (23.81)	14 (16.67)	10 (11.9)	23 (25.56)	25 (27.78)	21 (23.33)	12 (13.33)	9 (10)	20 (31.75)	33 (52.38)	10 (15.87)	0 (0)	0 (0)	16 (24.62)	23 (35.38)	18 (27.69)	5 (7.69)	3 (4.62)	44 (52.38)	34 (40.48)	1 (1.19)	5 (5.95)	0 (0)	10 (11.9)	14 (16.67)	26 (30.95)	21 (25)	12 (14.29)	16 (17.78)	30 (33.33)	17 (18.89)	14 (15.56)	13 (14.44)	150 (26.79)	**178 (31.79)**	113 (20.18)	71 (12.68)	47 (8.39)
TOTAL	52 (20.63)	56 (22.22)	**65 (25.79)**	46 (18.25)	33 (13.1)	67 (24.81)	**77 (28.52)**	66 (24.44)	34 (12.59)	26 (9.63)	**52 (27.51)**	86 (45.5)	47 (24.87)	4 (2.12)	0 (0)	49 (25.13)	**65 (33.33)**	51 (26.15)	20 (10.26)	10 (5.13)	83 (32.94)	**85 (33.73)**	46 (18.25)	32 (12.7)	6 (2.38)	35 (13.89)	51 (20.24)	**83 (32.94)**	48 (19.05)	34 (13.49)	48 (17.78)	**73 (27.04)**	69 (25.56)	44 (16.3)	36 (13.33)	386 (22.99)	**493 (29.36)**	427 (25.43)	228 (13.58)	145 (8.64)

(Note: (here 2= Strongly agree, 1= Agree, 0= Uncertain, -1= Disagree & -2= Strongly disagree) and figures in parenthesis are denoting percentage)

Table 5.2.12.2(a) Personalisation

The table 5.2.12.2(a) clearly shows the overall and institute wise opinion of the selected CSIR institutes users with regards to the personal support they get by the WBLS. It was found that overall 29.36% of users agreed that the personal support they got through WBLS are satisfactory.

	Personalisation	**CDRI (%)**		**CIMAP (%)**		**IGIB (%)**		**IHBT (%)**		**IIIM (%)**		**IITR (%)**		**IMTECH (%)**		**TOTAL (%)**	
		P	**N**	**P**	**N**	**P**	**N**	**P**	**N**	**P**	**N**	**P**	**N**	**P**	**N**	**P**	**N**
1	**The library system stores all the preferences to offer the users additional information.**	54.8	45.2	57.8	42.2	65.1	34.9	67.7	32.3	65.5	34.5	39.3	60.7	51.1	48.9	**56.6**	43.4
2	**It offers the facility to set up an alert for new materials of the users' interests.**	26.2	73.8	48.9	51.1	69.8	30.2	47.7	52.3	41.7	58.3	34.5	65.5	32.2	67.8	41.8	**58.2**

3	**It offers the facility to save the searches and display the search history.**	47.6	52.4	53.3	46.7	84.1	15.9	60.0	40.0	92.9	7.1	28.6	70.2	51.1	48.9	**58.6**	41.3
	TOTAL	42.9	57.1	53.3	46.7	73.0	27.0	58.5	41.5	66.7	33.3	34.1	65.5	44.8	55.2	**52.4**	47.6

(NOTE: here- P= positive & N= negative)

Table 5.2.12.2(b) Personalisation

The table 5.2.12.2(b) clearly shows the overall satisfaction level of the users with personal support provided by CSIR KRCs. It was found that 56.6% of users and 58.6% of users responded positively that the library system stores all the preferences to offer additional information and facilitates to save the searches and display the search history, respectively. Whereas 58.2% of users responded negatively that WBLS do not facilitates an alert for new materials of the users' interests.

So, it is clear from the table that 52.4% of users positively agreed that they were satisfied with the personal support they get through WBLS.

5.2.12.3 Patron Relationship

Patron Relationship	CDRI					CIMAP					IGIB					IHBT					IIIM					IITR					IMTECH					TOTAL				
	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2
The instructions are easy to follow.	19 (22.62)	24 (28.57)	20 (23.81)	12 (14.29)	9 (10.71)	23 (25.56)	26 (28.89)	20 (22.22)	13 (14.44)	8 (8.89)	13 (20.63)	19 (30.16)	17 (26.98)	9 (14.29)	5 (7.94)	11 (16.92)	20 (30.77)	15 (23.08)	13 (20)	6 (9.23)	21 (25)	31 (36.9)	15 (17.86)	12 (14.29)	5 (5.95)	20 (23.81)	18 (21.43)	26 (30.95)	12 (14.29)	8 (9.52)	13 (14.44)	27 (30)	30 (33.33)	9 (10)	11 (12.22)	120 (21.43)	**165 (29.46)**	143 (25.54)	80 (14.29)	52 (9.29)
Instructions are clear and precise in nature.	17 (20.24)	21 (25)	25 (29.76)	13 (15.48)	8 (9.52)	19 (21.11)	27 (30)	23 (25.56)	12 (13.33)	9 (10)	7 (11.11)	9 (14.29)	18 (28.57)	13 (20.63)	16 (25.4)	5 (7.69)	17 (26.15)	20 (30.77)	15 (23.08)	8 (12.31)	19 (22.62)	29 (34.52)	17 (20.24)	10 (11.9)	9 (10.71)	12 (14.29)	17 (20.24)	34 (40.48)	11 (13.1)	10 (11.9)	23 (25.56)	28 (31.11)	18 (20)	11 (12.22)	10 (11.11)	102 (18.21)	148 (26.43)	**155 (27.68)**	85 (15.18)	70 (12.5)
WBLS allow the users the convenience of sending a query/comment online	21 (25)	23 (27.38)	26 (30.95)	8 (9.52)	6 (7.14)	25 (27.78)	26 (28.89)	22 (24.44)	10 (11.11)	7 (7.78)	8 (12.7)	12 (19.05)	19 (30.16)	13 (20.63)	11 (17.46)	7 (10.77)	24 (36.92)	13 (20)	11 (16.92)	10 (15.38)	27 (32.14)	32 (38.1)	13 (15.48)	8 (9.52)	4 (4.76)	9 (10.71)	13 (15.48)	28 (33.33)	22 (26.19)	12 (14.29)	12 (13.33)	18 (20)	29 (32.22)	21 (23.33)	10 (11.11)	109 (19.46)	148 (26.43)	**150 (26.79)**	93 (16.61)	60 (10.71)
TOTAL	57 (22.62)	68 (26.98)	**71 (28.17)**	33 (13.1)	23 (9.13)	67 (24.81)	**79 (29.26)**	65 (24.07)	35 (12.96)	24 (8.89)	28 (14.81)	40 (21.16)	**54 (28.57)**	35 (18.52)	32 (16.93)	23 (11.79)	**61 (31.28)**	48 (24.62)	39 (20)	24 (12.31)	67 (26.59)	**92 (36.51)**	45 (17.86)	30 (11.9)	18 (7.14)	41 (16.27)	48 (19.05)	**88 (34.92)**	45 (17.86)	30 (11.9)	48 (17.78)	73 (27.04)	**77 (28.52)**	41 (15.19)	31 (11.48)	331 (19.7)	**461 (27.44)**	448 (26.67)	258 (15.36)	182 (10.83)

(Note: (here 2= Strongly agree, 1= Agree, 0= Uncertain, -1= Disagree & -2= Strongly disagree) and figures in parenthesis are denoting percentage)

Table 5.2.12.3(a) Patron Relationship

The table 5.2.12.3(a) clearly shows the overall and institute wise opinion of the selected CSIR institutes users with regards to the patron relationship with WBLS. It was found that 27.68% of users and 26.79% of users were uncertain about the

instructions available while accessing WBLS were clear and precise and it allows the facility of sending queries online, respectively. While 29.46% of users were agreed that the instructions were easy to follow in WBLS.

So, it is clear that overall 27.44% of users were agreed that the patron relationship with WBLS are satisfactory.

	Patron Relationship	**CDRI (%)**		**CIMAP (%)**		**IGIB (%)**		**IHBT (%)**		**IIIM (%)**		**IITR (%)**		**IMTECH (%)**		**TOTAL (%)**	
		P	**N**	**P**	**N**	**P**	**N**	**P**	**N**	**P**	**N**	**P**	**N**	**P**	**N**	**P**	**N**
1	**The instructions are easy to follow.**	51.2	48.8	54.4	45.6	50.8	49.2	47.7	52.3	61.9	38.1	45.2	54.8	44.4	55.6	**50.9**	49.1
2	**Instructions are clear and precise in nature.**	45.2	54.8	51.1	48.9	25.4	74.6	33.8	66.2	57.1	42.9	34.5	65.5	56.7	43.3	44.6	**55.4**
3	**WBLS allow the users the convenience of sending a query/commen**	52.4	47.6	56.7	43.3	31.7	68.3	47.7	52.3	70.2	29.8	26.2	73.8	33.3	66.7	45.9	**54.1**

	t online															
	TOTAL	49.6	**50.4**	**54.1**	45.9	36.0	**64.0**	43.1	**56.9**	**63.1**	36.9	35.3	**64.7**	44.8	**55.2**	47.2	**52.9**

(NOTE: here- P= positive & N= negative)

Table 5.2.12.3(b) Patron Relationship

The table 5.2.12.3(b) clearly shows the overall satisfaction level of the users with patron relationship provided by CSIR KRCs. It was found that overall 50.9% of users positively responded that the instructions were easy to follow. Whereas 55.4% of users and 54.1% of users negatively responded that the instructions provided were not clear and precise and users were not allowed the convenience of sending query online, respectively.

So, it is clear that overall maximum number i.e. 52.9% of users were not satisfied with the patron relationship of WBLS of CSIR KRCs, however, 47.2% of users were satisfied.

5.2.13 Web Services Outcome Quality

5.2.13.1 Functional Benefit

Functional Benefits	CDRI					CIMAP					IGIB					IHBT					IIM					IITR					IMTECH					TOTAL				
	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2
WBLS helps the users to easily get the information they are looking for most of the time.	30 (35.71)	32 (38.1)	15 (17.86)	4 (4.76)	3 (3.57)	31 (34.44)	34 (37.78)	17 (18.89)	5 (5.56)	3 (3.33)	15 (23.81)	27 (42.86)	14 (22.22)	2 (3.17)	5 (7.94)	12 (18.46)	23 (35.38)	14 (21.54)	10 (15.38)	6 (9.23)	35 (41.67)	34 (40.48)	15 (17.86)	0 (0)	0 (0)	10 (11.9)	16 (19.05)	35 (41.67)	14 (16.67)	9 (10.71)	19 (21.11)	45 (50)	12 (13.33)	10 (11.11)	4 (4.44)	152 (27.14)	**211 (37.68)**	122 (21.79)	45 (8.04)	30 (5.36)
WBLS allows the users to get the information they are looking for in minimal time and effort	33 (39.29)	31 (36.9)	13 (15.48)	5 (5.95)	2 (2.38)	19 (21.11)	33 (36.67)	25 (27.78)	8 (8.89)	5 (5.56)	11 (17.46)	21 (33.33)	19 (30.16)	10 (15.87)	2 (3.17)	9 (13.85)	15 (23.08)	22 (33.85)	13 (20)	6 (9.23)	29 (34.52)	13 (15.48)	6 (7.14)	4 (4.76)	14 (16.67)	19 (22.62)	29 (34.52)	12 (14.29)	10 (11.9)	22 (24.44)	41 (45.56)	16 (17.78)	8 (8.89)	3 (3.33)	140 (25)	**189 (33.75)**	137 (24.46)	62 (11.07)	32 (5.71)
TOTAL	**63 (37.5)**	**63 (37.5)**	28 (16.67)	9 (5.36)	5 (2.98)	50 (27.78)	**67 (37.22)**	42 (23.33)	13 (7.22)	8 (4.44)	26 (20.63)	**48 (38.1)**	33 (26.19)	12 (9.52)	7 (5.56)	21 (16.15)	**38 (29.23)**	36 (27.69)	23 (17.69)	12 (9.23)	**67 (39.88)**	63 (37.5)	28 (16.67)	6 (3.57)	4 (2.38)	24 (14.29)	35 (20.83)	**64 (38.1)**	26 (15.48)	19 (11.31)	41 (22.78)	**86 (47.78)**	28 (15.56)	18 (10)	7 (3.89)	292 (26.07)	**400 (35.71)**	259 (23.13)	107 (9.55)	62 (5.54)

(Note: (here 2= Strongly agree, 1= Agree, 0= Uncertain, -1= Disagree & -2= Strongly disagree) and figures in parenthesis are denoting percentage)

Table 5.2.13.1(a) Functional Benefits

The table 5.2.13.1(a) clearly shows the overall and institute wise opinion of the selected CSIR institutes users with regards to the functional benefits they got through WBLS. It was found that 37.68% of users and 33.75% of users were agreed that they easily got the information they were looking for most of the time and in minimum time and effort through WBLS, respectively.

So, it is clear that overall 35.71% of users got functional benefits while accessing information through WBLS.

	Functional Benefits	CDRI (%)		CIMAP (%)		IGIB (%)		IHBT (%)		IIIM (%)		IITR (%)		IMTECH (%)		TOTAL (%)	
		P	**N**	**P**	**N**	**P**	**N**	**P**	**N**	**P**	**N**	**P**	**N**	**P**	**N**	**P**	**N**
1	**WBLS helps the users to easily get the information they are looking for most of the time.**	73.8	26.2	72.2	27.8	66.7	33.3	53.8	46.2	82.1	17.9	31.0	69.0	71.1	28.9	**64.8**	35.2
2	**WBLS allows the users to get the information they are looking for in minimal time and effort**	76.2	23.8	57.8	42.2	50.8	49.2	36.9	63.1	72.6	27.4	39.3	60.7	70.0	30.0	**58.8**	41.3
	TOTAL	75.0	25.0	65.0	35.0	58.7	41.3	45.4	54.6	77.4	22.6	35.1	64.9	70.6	29.4	**61.8**	38.2

(NOTE: here- P= positive, N= negative)

Table 5.2.13.1(b) Functional Benefits

The table 5.2.13.1(b) clearly shows the overall satisfaction level of the users with functional benefits they get from WBLS. It was found that 64.8% and 58.8% of users responded positively that they do got functional benefits in accessing information through WBLS.

So, it is clear that overall 61.8% of users think that they do got functional benefits via WBLS while 38.2% of users think they do not got functional benefits.

5.2.13.2 Emotional Benefit

Emotional Benefits	CDRI					CIMAP					IGIB					IHBT					IIIM					IITR					IMTECH					Total				
	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2
Users feel very happy when they get what they want from WBLS	33 (39.29)	27 (32.14)	17 (20.24)	5 (5.95)	2 (2.38)	26 (28.89)	31 (34.44)	21 (23.33)	8 (8.89)	4 (4.44)	37 (58.73)	22 (34.92)	4 (6.35)	0 (0)	0 (0)	15 (23.08)	23 (35.38)	19 (29.23)	5 (7.69)	3 (4.62)	40 (47.62)	35 (41.67)	8 (9.52)	1 (1.19)	0 (0)	12 (14.29)	18 (21.43)	27 (32.14)	17 (20.24)	10 (11.9)	43 (47.78)	28 (31.11)	15 (16.67)	4 (4.44)	0 (0)	**206 (36.79)**	184 (32.86)	111 (19.82)	40 (7.14)	19 (3.39)
The innovative feature of WBLS are interesting to use	26 (30.95)	29 (34.52)	21 (25)	8 (9.52)	0 (0)	8 (8.89)	11 (12.22)	33 (36.67)	20 (22.22)	18 (20)	28 (44.44)	32 (50.79)	3 (4.76)	0 (0)	0 (0)	12 (18.46)	21 (32.31)	17 (26.15)	9 (13.85)	6 (9.23)	27 (32.14)	31 (36.9)	16 (19.05)	6 (7.14)	3 (3.57)	6 (7.14)	13 (15.48)	32 (38.1)	21 (25)	12 (14.29)	23 (25.56)	39 (43.33)	20 (22.22)	5 (5.56)	3 (3.33)	130 (23.21)	**176 (31.43)**	142 (25.36)	69 (12.32)	42 (7.5)
WBLS makes the users feel that library is seriously devoted in fulling the users information needs	20 (23.81)	24 (28.57)	18 (21.43)	13 (15.48)	9 (10.71)	20 (22.22)	29 (32.22)	23 (25.56)	10 (11.11)	8 (8.89)	11 (17.46)	12 (19.05)	24 (38.1)	14 (22.22)	2 (3.17)	11 (16.92)	16 (24.62)	24 (36.92)	10 (15.38)	4 (6.15)	21 (25)	25 (29.76)	19 (22.62)	11 (13.1)	8 (9.52)	7 (8.33)	11 (13.1)	32 (38.1)	20 (23.81)	14 (16.67)	22 (24.44)	35 (38.89)	21 (23.33)	7 (7.78)	5 (5.56)	112 (20)	152 (27.14)	**161 (28.75)**	85 (15.18)	50 (8.93)
TOTAL	79 (31.35)	**80 (31.75)**	56 (22.22)	26 (10.32)	11 (4.37)	54 (20)	71 (26.3)	**77 (28.52)**	38 (14.07)	30 (11.11)	**76 (40.21)**	66 (34.92)	31 (16.4)	14 (7.41)	2 (1.06)	38 (19.49)	**60 (30.77)**	**60 (30.77)**	24 (12.31)	13 (6.67)	88 (34.92)	**91 (36.11)**	43 (17.06)	18 (7.14)	11 (4.37)	25 (9.92)	42 (16.67)	**91 (36.11)**	58 (23.02)	36 (14.29)	88 (32.59)	**102 (37.78)**	56 (20.74)	16 (5.93)	8 (2.96)	448 (26.68)	**512 (30.49)**	414 (24.66)	194 (11.55)	111 (6.61)

(Note: (here 2= Strongly agree, 1= Agree, 0= Uncertain, -1= Disagree & -2= Strongly disagree) and figures in parenthesis are denoting percentage)

Table 5.2.13.2(a) Emotional Benefits

The table 5.2.13.2 (a) clearly shows the overall and institute wise opinion of the selected CSIR institutes users with regards to the emotional benefits they got through WBLS. It was found that 36.79% of users were strongly agreed that they feel happy when they got what they want through WBLS, whereas 31.4% of users agreed that the innovative features in WBLS are interesting to use while 28.7% of users were uncertain that WBLS makes them feel that the library is seriously devoted in fulfilling the users information needs.

So, it is clear that overall 30.49% of users agreed that they got emotional benefits from WBLS.

	Emotional Benefits	CDRI (%)		CIMAP (%)		IGIB (%)		IHBT (%)		IIIM (%)		IITR (%)		IMTECH (%)		TOTAL (%)	
		P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
1	Users feel very happy when they get what they want from WBLS	71.4	28.6	63.3	36.7	93.7	6.3	58.5	41.5	89.3	10.7	35.7	64.3	78.9	21.1	69.6	30.4
2	The innovative feature of WBLS are interesting to use	65.5	34.5	21.1	78.9	95.2	4.8	50.8	49.2	69.0	29.8	22.6	77.4	68.9	31.1	54.6	45.2
3	WBLS makes the users feel that library is seriously devoted in fulfilling the users information needs	52.4	47.6	54.4	45.6	36.5	63.5	41.5	58.5	54.8	45.2	21.4	78.6	63.3	36.7	47.1	52.9
	TOTAL	63.1	36.9	46.3	53.7	75.1	24.9	50.3	49.7	71.0	28.6	26.6	73.4	70.4	29.6	57.2	42.8

(NOTE: here- P=positive & N= negative)

Table 5.2.13.2(b) Emotional Benefits

The table 5.2.13.2(b) clearly shows the overall satisfaction level of the users with emotional benefits they get from WBLS. It was found that 69.6% of users and 54.6% of users responded positively that they felt happy when they get what they want and innovative features of WBLS are interesting to use, respectively. Whereas, 52.9% of users responded negatively that they don't think WBLS makes them felt that library is seriously devoted in fulfilling the users information needs.

So, it is clear that overall 57.2% of users think that they do got emotional benefits while accessing WBLS whereas 42.8% of users don't think they got emotional benefits.

5.2.13.3 Reliability

Reliability	CDRI					CIMAP					IGIB					IHBT					IIIM					IITR					IMTECH					TOTAL				
	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2	2	1	0	-1	-2
Online document delivery requests are dealt with in promised time.	21 (25)	24 (28.57)	19 (22.62)	11 (13.1)	9 (10.71)	21 (23.33)	25 (27.78)	33 (36.67)	8 (8.89)	3 (3.33)	11 (17.46)	22 (34.92)	19 (30.16)	9 (14.29)	2 (3.17)	10 (15.38)	14 (21.54)	23 (35.38)	11 (16.92)	7 (10.77)	21 (25)	44 (52.38)	13 (15.48)	6 (7.14)	0 (0)	14 (16.67)	17 (20.24)	40 (47.62)	10 (11.9)	3 (3.57)	15 (16.67)	26 (28.89)	33 (36.67)	10 (11.11)	6 (6.67)	113 (20.18)	172 (30.71)	**180 (32.14)**	65 (11.61)	30 (5.36)
Online interlibrary loan requests are dealt with in promised time	18 (21.43)	20 (23.81)	23 (27.38)	13 (15.48)	10 (11.9)	20 (22.22)	21 (23.33)	27 (30)	12 (13.33)	10 (11.11)	14 (22.22)	20 (31.75)	17 (26.98)	7 (11.11)	5 (7.94)	13 (20)	12 (18.46)	24 (36.92)	10 (15.38)	6 (9.23)	20 (23.81)	34 (40.48)	16 (19.05)	9 (10.71)	5 (5.95)	11 (13.1)	16 (19.05)	34 (40.48)	14 (16.67)	9 (10.71)	18 (20)	28 (31.11)	31 (34.44)	9 (10)	4 (4.44)	114 (20.36)	151 (26.96)	**172 (30.71)**	74 (13.21)	49 (8.75)
Total	39 (23.21)	**44 (26.19)**	42 (25)	24 (14.29)	19 (11.31)	41 (22.78)	46 (25.56)	**60 (33.33)**	20 (11.11)	13 (7.22)	25 (19.84)	**42 (33.33)**	36 (28.57)	16 (12.7)	7 (5.56)	23 (17.69)	26 (20)	**47 (36.15)**	21 (16.15)	13 (10)	41 (24.4)	**78 (46.43)**	29 (17.26)	15 (8.93)	5 (2.98)	25 (14.88)	33 (19.64)	**74 (44.05)**	24 (14.29)	12 (7.14)	33 (18.33)	54 (30)	**64 (35.56)**	19 (10.56)	10 (5.56)	227 (20.27)	323 (28.84)	**352 (31.43)**	139 (12.41)	79 (7.05)

(Note: (here 2= Strongly agree, 1= Agree, 0= Uncertain, -1= Disagree & -2= Strongly disagree) and figures in parenthesis are denoting percentage)

Table 5.2.13.3(a) Reliablity

The table 5.2.13.3(a) clearly shows the overall and institute wise opinion of the selected CSIR institutes users with regards to the reliability issues related to WBLS. It was found that 32.14% and 30.71% of users were uncertain that their online document delivery requests and interlibrary loan requests were dealt in promised time or not.

So, it is clear from the table that 31.43% of users were unsure with the reliability issues related with WBLS.

	Reliability	**CDRI (%)**		**CIMAP (%)**		**IGIB (%)**		**IHBT (%)**		**IIIM (%)**		**IITR (%)**		**IMTECH (%)**		**TOTAL (%)**	
		P	**N**	**P**	**N**	**P**	**N**	**P**	**N**	**P**	**N**	**P**	**N**	**P**	**N**	**P**	**N**
1	**Online document delivery requests are reliable and dealt with in promised time.**	53.6	46.4	51.1	48.9	52.4	47.6	36.9	63.1	77.4	22.6	36.9	63.1	45.6	54.4	**50.9**	49.1
2	**Online interlibrary loan requests are reliable dealt with in promised time**	45.2	54.8	45.6	54.4	54.0	46.0	38.5	61.5	64.3	35.7	32.1	67.9	51.1	48.9	47.3	**52.7**
	TOTAL	49.4	50.6	48.3	51.7	53.2	46.8	37.7	62.3	70.8	29.2	34.5	65.5	48.3	51.7	49.1	**50.9**

(NOTE; here- P= positive & N= negative)

Table 5.2.13.3(b) Reliability

The table 5.2.13.3(b) clearly shows the overall satisfaction level of the users with the reliability issues related with WBLS. It was found that 50.9% of users responded positively that their online document delivery requests are reliable and dealt within promised time at the same time 52.7% of users responded negatively that their online interlibrary were not dealt within promised time.

So, it is clear from the table that overall 50.9% of users were not satisfied with reliability issues related with WBLS.

5.2.14 Need for Training

	NEED FOR TRAINING	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH	Total
1	**Not Required at All**	4	2	0	1	0	1	0	8 (1.43%)
2	**No, One Can Learn from Experience**	24	29	4	11	15	17	2	102 (18.21%)
3	**Yes Training Might be Useful**	33	25	12	24	32	34	26	186 (33.21%)
4	**Yes, Training is Essential for Best Utilization**	23	34	47	29	37	32	62	264 (47.14%)

Table 5.2.14 Need for Training

The table 5.2.14 clearly shows the overall and institute wise requirement of training for optimal utilization of web-based services. It is clear from the table that 47.14% of users responded that training should be provided and is essential for better utilization of web-based services whereas 33.21% of users thinks that training should be provided as it might be useful for maximum utilization, whereas 18.21% of users thinks that training is

not necessary as one can learn from experiences. However, it can be noted that only 1.45% users thinks that training is not required at all.

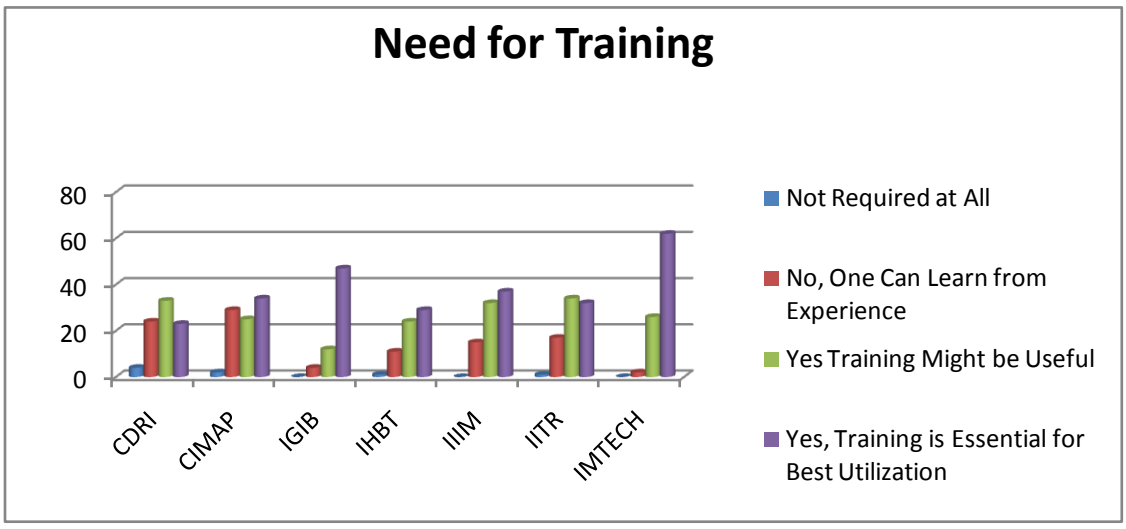

Fig. 5.2.14 Need for Training

The fig. 5.1.14 clearly indicates that the maximum number of users who responded that training is essential and should be provided for best utilization were from IMTECH and IGIB i.e. 69% and 75% of users, respectively, followed by users who thinks that training might be useful were from IITR and CDRI i.e. 41% and 39% of users, respectively.

5.2.15 Availability of Training Programme

With the growth of online electronic resources and services the information seeking in electronic environment has become more complex. It is imperative for users to train themselves in browsing and searching web-based resources and services along with printed resources effectively and efficiently.

	TRAINING	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH	TOTAL
1	**YES**	31 (37%)	63 (70%)	25 (40%)	36 (55%)	37 (44%)	54 (64%)	17 (19%)	263 (43%)
2	**NO**	53 (63%)	27 (30%)	38 (60%)	29 (45%)	47 (56%)	30 (36%)	73 (81%)	**297 (57%)**

Table 5.1.15 Availability of Training

The table 5.1.15 shows the availability of training program in the CSIR KRCs. It was found that overall only 43% users responded that training was provided by the KRC whereas 57% users responded that training was is not provided.

5.2.16 Problems in using Web-based Library Services

User might face difficulty in accessing web-based services that may result in under utilization of resources. To ensure maximum utilization of web services, it is important to ascertain the problems faced by them. The data related to this aspect is presented below.

	PROBLEMS	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH	TOTAL
1	**Lack of Awareness**	22	13	13	25	18	20	12	123 (22%)
2	**Late Response**	12	10	6	2	8	12	9	59 (10%)
3	**No Response**	5	1	2	1	3	7	4	23 (4%)
4	**Lack of Promotion**	11	12	5	8	10	9	16	71 (13%)
5	**Slow Internet**	13	23	12	10	20	16	11	105

	Connectivity								(19%)
6	**Lack of Up-to-datedness**	3	9	7	6	2	4	13	44 (8%)
7	**Navigation/Interface**	2	2	4	1	1	1	5	16 (3%)
8	**Lack of training/orientation program**	16	20	14	12	22	15	20	119 (21%)

Table 5.2.16 Problems in Accessing WBLS

The table 5.2.16 indicates the problems faced by selected CSIR users in accessing web-based library services. The findings shows that maximum number of users who responded the lack of awareness as the major hindrance were 123 i.e. 22% of users, followed by the users who responded that lack of training/ orientation program as the major hindrance were 119 i.e. 21% of users, followed by the users who responded the slow internet connectivity as a main problem were 105 i.e. 19% of users, followed by the users who responded that lack of promotion prevents them from best utilization of WBLS were 71 i.e. 13% of users, whereas late response as a problem was responded by 52 i.e. 10% of users. However, lack of up- to- datedness, no response and navigation/interface problems were faced by 44 i.e. 8%, 23 i.e. 4% and 16 i.e. 3% of users, respectively.

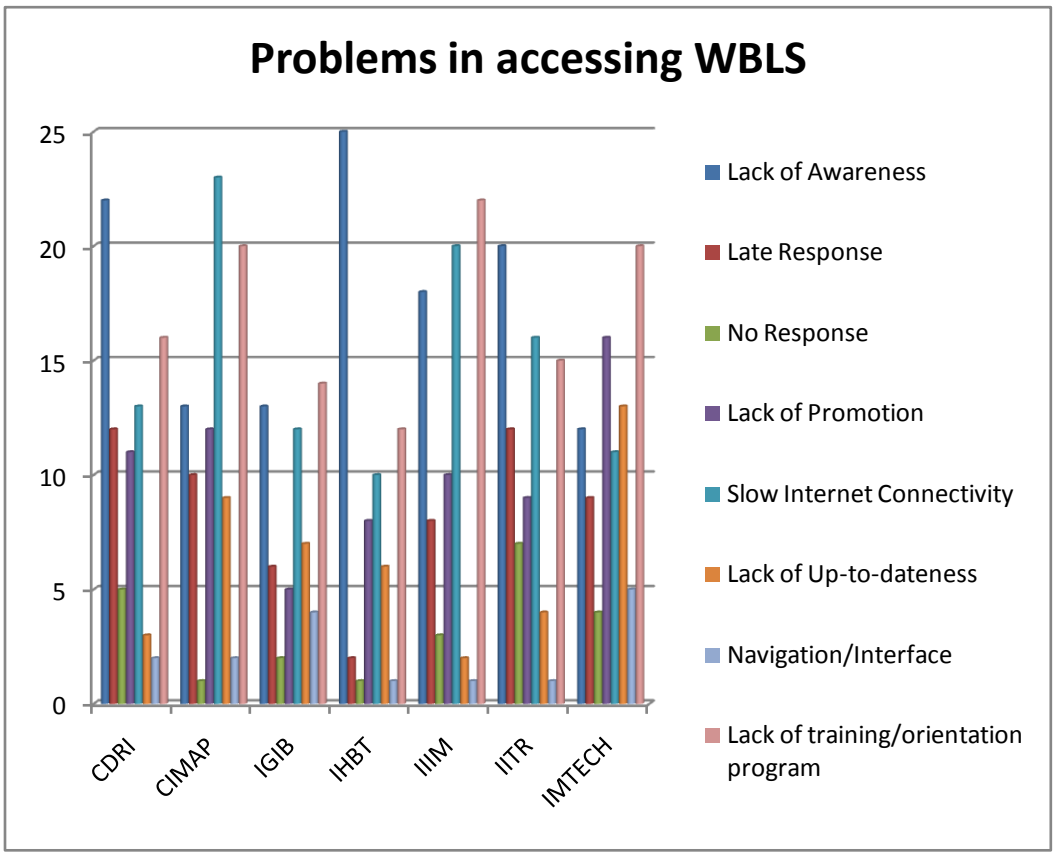

Fig. 5.2.16 Problems in Accessing WBLS

The fig. 5.2.16 clearly shows the institute wise opinion of users in facing problem in accessing web-based library services. it was found that in CDRI, IHBT and IITR lack of awareness was recorded as major problem in accessing WBLS, whereas in IGIB, IIIM and IMTECH lack of training/orientation program was the major hindrance and in CIMAP slow internet connectivity was the major hindrance in accessing web-based library services.

5.2.17 Opinion

To improve the existing web-based services rendered by libraries and enhance the services in future, there is a need to take opinion from users. So, the data pertaining to this aspect are presented below.

	OPINION	CDRI	CIMAP	IGIB	IHBT	IIIM	IITR	IMTECH	TOTAL
1	**Excellent**	21	31	10	10	14	11	12	109 (20%)
2	**Very Good**	44	33	12	36	25	14	23	187 (33%)
3	**Satisfactory**	11	20	34	14	43	27	42	**191 (34%)**
4	**Unsatisfactory**	8	6	7	5	2	32	13	73 (13%)

Table 5.2.16 Opinion

The table 5.2.16 indicates the opinion of users in terms of their satisfaction level of the selected CSIR institutes with the web-based library services. It was found that maximum number of users i.e. 191 (34%) users found WBLS as satisfactory, while 187 (33%) users found WBLS as very good, whereas 109 (20%) users found WBLS as excellent. However, only 73 (13%) users think WBLS as completely unsatisfactory.

CHAPTER -6

FINDINGS, CONCLUSIONS & SUGGESTIONS

This chapter presents findings and conclusion based on the data analysis and subsequent inferences derived out of the analysis are as follows:

Findings based on the librarians' questionnaire.

1. The hardware tools like computer systems, scanner for digitization, power backup and multifunction printers were available in all CSIR libraries.

2. The operating system software and library management software were present in all the CSIR libraries. All sections in all the CSIR KRC's are connected through integrated library management software. All the KRC's have also made their library services available on the network, which can be accessed from campus/hostel/classes.

3. The main service provider in the maximum number of CSIR institutes is NKN.

4. It was found that all the CSIR libraries are offering web-based library services 365*24 hrs.

5. It was found that the library websites of CDRI, CIMAP, IGIB, IHBT, and IITR were used to be updated in real-time.

6. It was found that all the information scientists of the selected KRCs accept that easy and faster services is the major factor that encouraged them to offer web-based services.

7. It was found that all the selected KRCs focus basically on providing access to open access journals databases and e-journals through web-based library services.

8. It was found that all the selected CSIR KRC's are offering majority of web-based library services to its users. In which web-based reference service, acquisition service, and cataloguing service were the most preferred services.

9. It was found that the web application tools are not much preferred by the selected CSIR KRCs. Only 4 selected KRCs offers them. Facebook, RSS feed, instant messaging

and blog were mostly offered for getting users' feedback, sharing library events/news/announcements. information literacy tutorials and for promoting library image among users.

10. Searching techniques like controlled vocabulary, keyword searching, and Boolean operators were mostly offered to users by the KRCs.

11. It was found that process of initiating any new web-based library service was mainly done through general discussion with staff and by the library advisory committee.

12. It was found that selected KRCs do not pay special attention in providing necessary training to staff pertaining to use of new web-based technologies. Only 2 selected KRC organize training programs as and when needed.

13. It was found that evaluation of web-based library services in 5 selected KRCs was done through user survey technique whereas in 2 selected KRCs through usage statistics.

14. It was found that process of taking user feedback in selected KRCs was preferred mainly on a yearly basis.

15. It was found that the orientation program for fresher's for creating awareness was organised by all the selected 7 KRCs.

16. It was also found that basically selected KRCs do not face many problems in providing web-based library services to its users, except IITR KRC which faced hindrances like lack of appropriate technological expertise, insufficient time and training, and management support.

Findings based on the basis of users' questionnaire

1. It was found that the maximum users of all the selected 7 CSIR KRCs were aware and used to access web-based library services on a daily basis.

2. It was found that the maximum number of users i.e. 84% users from the selected CSIR KRCs preferred interactive level web-based library over traditional library services. Out

of which maximum number of users i.e. 22% of users access WBLS to search book databases.

3. It was found that the majority of users i.e. 28% preferred WBLS because of 24*7 availability of services.

4. The study revealed that maximum number of users i.e. 47% users access WBLS on a daily basis.

5. It was found that the maximum number of users were aware of the National Knowledge Resource Consortium. In which Taylor and Francis Journal was preferred most

6. It was found that maximum number of users from the selected CSIR institutes experiences slow access speed, overloading of information on the internet, issues in downloading pages as a major hindrance in accessing web resources as a major problem.

7. It was found that overall in all the selected CSIR KRCs web-based acquisition service was preferred by 64.98% users, followed by cataloguing services by 61.9% users, which was followed by periodical services by 61.4% users, followed by administrative services by 56.43% users, followed by reference services by 56.27%users, followed by web-form facilities by 55.17% users. However, web-based circulation service was the least preferred service by 46.01% users.

8. The study also revealed that web application tools were not so preferred by selected CSIR KRCs. However, CSIR, CIMAP, IHBT an IITR allows only limited access to web application tools.

9. The study revealed that overall only 43% of users from the selected CSIR KRCs accepted that training was provided by the KRC, however, they also agreed that training is essential and must be provided for best utilization of web-based library services.

10. It was found that the overall majority of users i.e. 34% from the selected CSIR KRCs found WBLS as satisfactory.

Major findings on the basis of objectives of the study

Objective 1. To describe the range of library services offered via the web.

1**.** It was found that the web-based CAS and DDS services were the most preferred services as they were offered by all libraries. It was also found that the maximum number of KRC's offers web-based reference service to only campus-wide internet users.. (table 5.2.11.1(a)) and (table 5.2.11.1(b))

2. It was found that the alert service for the new addition, list of new arrivals service, status of documents and requests for documents were the most popular acquisition service. It was also found that maximum number of KRC's offers web-based acquisition service to only campus-wide internet users. (table 5.2.11.2(a)) and (table 5.2.11.2(b))

3. It was found that web-based circulation service was not so popular service in selected CSIR KRC's. Only 4 out of 7 selected institutes were offering web-based circulation service. However, checking the availability of particular document was the most preferred service. It was found that majority of the selected institutes allow only on-campus internet users to access their web-based circulation services. (table 5.2.11.3(a)) and (table 5.2.11.3(b))

4. It was found that all the selected 7 CSIR KRCs provide access to subscribed e-journals and access to e-journals through the consortium. However, apart from these services access to online databases, access to Web-OPAC and access to institutional repository were also preferred web-based cataloguing service. It was found that maximum number of selected KRC allows only on-campus internet users to access web-based cataloguing services. (table 5.2.11.4(a)) and (table 5.2.11.4(b))

5. It was found that except IITR, rest of 6 selected KRC's offers web-based periodical services. Electronic article delivery service, Pro-active web-based 'Table of Contents' and article alert service was the most preferred services. It was found that maximum number of selected KRC allows only on-campus internet users to access web-based periodical services. (table 5.2.11.5(a)) and (table 5.2.11.5(b))

6. It was found that web-based general/ administrative services were not so popular in the selected CSIR KRCs. Only 3 KRCs were providing number of web-based services to its users which includes e-mail based Services, feedback form, contact /addresses, library holidays list, FAQ, helpdesk services/ask-a-librarian and web-based user education/ library tutorials. It was found that maximum number of selected CSIR KRCs allows only on-campus internet users to access web-based general/ administration services. (table 5.2.11.6(a)) and (table 5.2.11.6(b))

7. It was found that request for documents of ILL/DDS service was the most popular web form facility offered by the selected 6 KRCs. It was found that 4 selected KRCs allows only on-campus internet users to access web form facilities whereas selected KRCs allows only affiliated users of the campus. (table 5.2.11.7(a)) and (table 5.2.11.7(b))

8. It was found that IGIB, IIIM, IMTech KRCs did not allow access from web application tools in their KRC's. Facebook, Instant Messaging, RSS feed, and blogs were the most popular web application tools. The findings shows that 2 of the selected KRCs allow all users regardless of their institutional affiliations to access web application tools. (table 5.2.11.8(a)) and (table 5.2.11.8(b))

9. It was revealed that only CDRI and IIIM KRCs offers all types of searching techniques to its users like controlled vocabulary, keyword searching, Boolean operators, truncation, field-specific, and proximity locators. (table 5.2.11.10)

Objective 2. To identify the awareness of web-based library services.

It was found that overall 47% of users were aware and use regularly the web-based services and the awareness level was highest in CDRI with 79% of users who use them regularly whereas the awareness level was low in IGIB and IITR with 37% and 27% respectively. (table 5.2.1.)

Objective 3. To identify the purpose of use of library web-based library services.

Findings of the study revealed that the maximum number of users' from the selected CSIR KRCs uses the web-based library to search book databases, to know the availability

of particulars, to access current awareness bulletins, to know more about services and to reserve books. (table 5.2.2.)

Objective 4. To rank the institutes on the basis of the level of sophistication of web-based services offered via institute.

From table table 5.1.12.1 (c), 5.1.12.2(c), 5.1.12.3(c), 5.1.12.4(c), 5.1.12.5(d), 5.1.12.6(c), 5.1.12.7(c) and 5.1.12.8(c), it was clear that CDRI and IHBT stood 1st in the list as they offer maximum number of advance level of sophisticated web-based library services to its users, followed by IGIB on 2nd position, IIIM on 3rd and IMTECH on 4th, CIMAP on 5th and IITR on 6th position.

Objective 5. To estimate the level of satisfaction of users by web-based library services.

The findings with regards to the opinion of the users in terms of satisfaction revealed that most of the users found WBLS as satisfactory, followed by 33% users considered them as good. Whereas 20% users rated them as excellent. However a small portion of users (i.e.13%) found the services as unsatisfactory.

Objective 6. To measure the performance of web-based library services.

1. Environment Quality of Web-based services

It was found that overall 66.5% of users and 43.8% of users from the selected CSIR KRCs were satisfied with the access & collection and equipment facilities offered in the web-based library services environment, respectively. (table 5.2.11.1(a)) & (table 5.2.11.2(b))

2. Web services delivery quality

It was found that overall 58.9% of users, 52.4% of users and 47.2% of users from the selected CSIR KRCs were satisfied with the patron support, personal support and patron relationship delivered by web-based services, respectively. (table 5.2.12.1(b)), (table 5.2.12.2(b)) & (table 5.2.12.3(b))

3. Web Services Outcome Quality

It was found that overall 61.8% of users, 57.2% of users and 49% of users from the selected CSIR KRCs were satisfied with functional, emotional and reliability outcomes of the web-based library services, respectively. (table 5.2.13.1(b)), (table 5.2.13.2(b)) & (table 5.2.13.3(b))

Objective 7. To identify the problems faced by users in using web-based library services.

The study revealed that the majority of users found the lack of awareness, lack of training/orientation program and lack of promotion as the major hindrances in accessing web-based library services. (fig. 5.2.16)

Objective 8. To suggest improvement measures based on the inferences drawn from the study.

The improvement measures are suggested in section 6.3 suggestions.

HYPOTHESES TESTING

Ho1. Users are aware and use regularly the web-based library services.

Level of significance .05(from (Table 5.2.1))

$\chi^{2=}$ 1.196 df= 6 p= 1.00

H0= Users are aware of WBLS

H1= Users are not aware of WBLS

Since p>.05, therefore p-value of chi-square indicates that the difference is no statistically significant. Therefore, null hypothesis (Ho) is accepted and alternate hypothesis (H1) is rejected.

Thus, the above hypothesis is accepted as most of the users of CSIR are well aware and use web-based library services regularly.

Ho2. Users are satisfied with their delivery quality of web-based library services

The above hypothesis is proved and accepted as the maximum number of users of the selected CSIR institutes were satisfied with the delivery quality of web-based library services. (5.2.12.1(b), 5.2.12.2(b) and 5.2.12.3(b))

Ho3. Web-based library services are very interactive as compared to traditional services.

Level of significance .05 (from table 5.2.3)

$\chi^{2=}$ 21.35 df= 6 p= .0016

Ho= there is no difference in the interactive level of WBLS and tradition services

H1= WBLS is more interactive as compared to traditional services

Since p<.05, therefore p-value of chi-square indicates that the difference is statistically significant. Therefore, null hypothesis (Ho) is rejected and the alternate hypothesis (H1) is accepted.

Therefore, the above hypothesis is accepted and proved as users prefer web-based library service more due to its interactive nature as compared to traditional services.

Ho4. Web-based cataloguing services is the highly used web-based library service.

The above hypothesis is failed to accept as in selected CSIR institutes the web-based acquisition service was highly used web-based library services. (Table 5.2.10.1(b), 5.2.10.2(b), 5.2.10.3(b), 5.2.10.4(b), 5.2.10.5(b), 5.2.10.6(b) and 5.2.10.7(b))

6.2 CONCLUSION

Traditional methods of offering library services have been changed with the development of the internet and web technology. The World Wide Web provides libraries with tremendous opportunities to provide online resources and services to their users, which in print media is impossible. They are also at the forefront of adopting technology and leveraging the capabilities of new technology to provide advanced and seamless services. The web-based library services have made professional life simpler and have become a basic necessity of academic life.

It can be concluded from the study shows that libraries are not well utilizing the full potential of web technologies, though they are having proper infrastructure facilities to provide web-based library services. The libraries are also not much interested in utilizing web application tools so they must rethink on how they can utilize the web application tools like Blog, RSS feeds, Instant Messaging, wiki for enhancing and upgrading their library web-based services.

It can be concluded that the traditional library services are not so much in demand because, library users, especially those who search literature and information in the library, are decreasing. Most library users prefer locating information using a search engine, rather than the traditional library catalogue or commercial academic e-resources provided by the library. Library users expect more services from the library, such as managing references, mobile message notices of latest resource information and digitization service.

Through the results of the study, the librarians and users will have a clear picture of the current state of web-based library services and will help for redesigning of web-based library services for users. The outcome of the study documents the current state of library web-based services and, ideally, the results can also serve as idea-generators for libraries of established CSIR institutes.

6.3 SUGGESTIONS

Based on the findings of the study, the following suggestions are made for improving and effectively utilizing the web-based library services in the libraries of the Council of Scientific & Industrial Research.

1. Creation of personal workspace where user can store information which is useful to them.
2. Automatic filtering of resources and information on the basis of user categories and tasks, etc.
3. Appropriate online support for query formulation and modification should be encouraged by the proficient staff.

4. User training or information literacy programs should be conducted regularly and sophisticated online tutorials using digital video technology should be developed to assist the user.
5. Induction program not only to increase awareness but also related to advance search techniques so that the user can easily find his required information.
6. The study found low usages of the web-forms facility. Libraries should encourage their users to use the web-forms. These web-forms are effective tool for interaction and communication among library and users.
7. Libraries should set up regular and continuous user-oriented evaluation policies to assess and evaluate websites and resources and services (both online and offline) for observing the proper use. This will enable the academic librarians to be familiar with user requirements and accordingly they will improve and design new resources and services. Libraries can analyze the usages of websites with online tools such as Google analytics, simple counter, etc.
8. Library websites should be updated frequently. The rich and frequently updated contents are impressive that has the power to attract users to visit and use the library website for resources and services.
9. Libraries should encourage and promote the usage of social networking sites for the promotion and marketing of libraries resources and services.
10. Library users expect more services from the library, such as managing references, mobile message notices of the latest resource information and digitisation service.

6.4 FURTHER AREA OF RESEARCH

The future area of the research can be as follows:

1. Web-based library services of CSIR institutes of Northern India: A Study
2. Web-based library services of CSIR Institutes of India Dealing with Biological Sciences: A User Study.
3. User's perception towards traditional library services and web-based library services in the Council of Scientific and Industrial Research: a comparative study.
4. Evaluation of web-based library services in the Council of Scientific and Industrial Research in India.
5. Designing and developing new web-based library services for the Council of Scientific and Industrial Research in India.

BIBLIOGRAPHY

Arora, J. (2001). Web-based Digital Resources and Services: Trends and Innovations. *CALIBER*. Retrieved June, 17, from http://ir.inflibnet.ac.in/handle/1944/105

Aharony, N. (2012). An analysis of American academic libraries' websites: 2000-2010. *The Electronic Library*, 30(6), 764-776. doi: https://doi.org/10.1108/02640471211282091

Al-Kharous i, R., Jabur, N.H., Bouazza, A. and Al-Harrasi, N. (2016). Factors affecting the implementation of Web 2.0 applications in Omani academic libraries. The Electronic Library, 34(2), 332-351. doi: https://doi.org/10.1108/EL-06-2014-0101

Anunobi, C. V. and Ogbonna, A.U. (2014).Web 2.0 use by Librarians in a State in Nigeria. *Developing Country Studies.* 2(4). 57-66.

Arif, M., Ameen, K., & Rafiq, M. (2017). Assessing distance education students satisfaction with web-based services: A Pakistani's perspective. *Online Information Review*, *41*(2), 202–218. doi: https://doi.org/10.1108/OIR-07-2016-0172

Arif, M. & Mahmood, K. (2012). The changing role of librarians in the digital world: Adoption of Web 2.0 technologies by Pakistani librarians. *The Electronic Library.* 30 (4). 469-479. doi: https://doi.org/10.1108/02640471211252184

Asouva, Bredan E., Cyprian I. and Ugwuanyi, Ugwu Fredunand C. (2015). Evaluation of electronic services infrastructures and quality of e-resources in Nigerian. *The Electronic Library*. 33(6).1133-1149.

Balaji, B. P. & Kumar, V. (2014).Use of Web technology in Providing Information Services by South Indian Technological Universities as Displayed on Library Websites. *Library Hi Tech.* 29(3). 470-495.

Boateng, F. & Liu, Y. Q. (2014). Web 2.0 applications' usage and trends in top US academic libraries. *Library Hi Tech*. 32. doi: https://doi.org/10.1108/LHT-07-2013-0093.

Bharadwaj, R.K. & Walia, P.K. (2012). Web Based Information Sources and Services: A Case Study of Stephen's College, University of Delhi. *Library Philosophy and Practice (e-journal).* Retrieved October 18, 2016, from http://digitalcommons.unl.edu/libphilprac/768/

Bwalya, T. (2014). Internet and Web based library Services Provision among Academic Libraries in Zambia: A Comparative study of the University Zambia and Copperbelt University Libraries. *International Research: Journal of Library and Information Science, 4(4,)* 475-493.

Cervone, F. (2008). ITIL: a framework for managing digital library services. *OCLC Systems & Services: International digital library perspectives*, 24(2), 87 - 90. doi: https://doi.org/10.1108/10650750810875430

Choi, Y. (2006). Reference services in digital collections and projects. *Reference Services Review*, 34(1), 129-147. doi: https://doi.org/10.1108/00907320610648815

Chen, D.Y.T., Chu, S.K.W & Xu, S.Q. (2013). How do libraries use social networking sites to interact with users. *Wiley Online Library.* 49 (1).1-10. doi: https://doi.org/10.1002/meet.14504901085

Chowdhary, G.G. (2002). Digital Library and Reference Services: present and future. Journal of Documentation, 58(3), 258-283. doi: https://doi.org/10.1108/00220410210425809

Chua, A.Y.K. & Goh, D.H. (2010). A study of Web 2.0 applications in library websites. *Library & Information Science Research*, 32(3), 203-211. doi: https://doi.org/10.1016/j.lisr.2010.01.002

Devi, K. K. & Verma, M. (2017). Content Evaluation And The Design Trends Of National Institutes Of Technology (Nits) Library Websites Of India: An Evaluative Study. *Journal Of Indian Library Association*. 53. 135-174.

Halub, L.P.(1999). The Value of Web-based library services at Cedars- Sinai Health System. *Bulletin of Medical Library Association,* 87(3), 256-60.

Hariharan, A., Hariharan, C.M. & Mymoon, M. (2007). Customised Web-based Services at SERC Library with Special Reference to Alert Services. *DESIDOC Bulletin of Information Technology,* 27(3), 31-38. doi: https://doi.org/10.14429/djlit.27.3.134

Haruna, B., Kiran, K. Tahira, M. (2017). Modelling web-based library service quality and user loyalty in the context of a developing country. *The Electronic Library*, 5(3), 507-519. doi: https://doi.org/10.1108/EL-10-2015-0211

Islam, M. A., & Hossain, M. J. (2014). Marketing Information Resources and Services on the Web. The *Electronic Library*, 32(5),742- 759.

Kahinde, A.A., & Tella, A. (2012). Assessment of Nigerian University Library Websites/Webpages. *New Review of Information Networking,* 17(2) 69-92. doi: https://doi.org/10.1080/13614576.2012.724282

Kalita, D. & Hazarika, T. (2016). Web based Interactive Services in the University Libraries in Assam and perception of library managers and users: a case study. *ACLA Bulletin*, 8.

Kanamadi, S. & Kumbar, B.D. (2006). Web-Based Services Expected from Libraries: A Case Study of Management Institutes in Mumbai City. *Webology*. Retrieved from http://www.webology.org/2006/v3n2/a26.html

Katariya, S. & Anbu k, J.P. (2009). Applications of Web 2.0 in the Enhancement of Services and Resource in Academic Libraries: An Experiment @ JIIT University Noida, India. Retrieved from http://crl.du.ac.in/ical09/papers/index_files/ical-98_130_287_1_RV.pdf

Khalid, M. & Richardson, J. V. (2013). Impact of Web 2.0 Technologies on Academic Libraries: a Survey of ARL Libraries. *Electronic Library,* 31(4), 508-520.

Khan, I. (2013). Library, Librarian nd Library Services in Web 2.0 Environment. Retrieved from http://www.ijodls.in/uploads/3/6/0/3/3603729/imran_khan_14-36.pdf

Kim, Y. & Abbas, J. (2010). Adoption of Library 2.0 Functionalities by Academic Libraries and Users: A Knowledge Management Perspective. *The Journal of Academic Librarianship,* 36(3), 211-218. doi: https://doi.org/10.1016/j.acalib.2010.03.003

Kiran, K., & Diljit, S. (2012). Modeling Web-Based library service quality. *Library and Information Science Research,* 34(3), 184-196. doi: https://doi.org/10.1016/j.lisr.2012.02.005

Krishnamurthy, M. (2005). Digital Library Services at the Indian Statistical Institute. The Electronic Library, 33(2),200-203. doi: https://doi.org/10.1108/02640470510592898

Li, L. (2006). Leveraging quality web-based library user service in the digital age. *Library Management,* 26 (6/7), 390-400. doi: https://doi.org/1.1108/01435120610702387.

Lwoga, E. T. (2014). Integrating Web 2.0 into an Academic Library in Tanzania. *The Electronic Library,* 32(2), 183-202. doi: 10.1108/EL-06-2012-0058

Madhusudhan, M. and Nagabhushanam. (2012). Web-Based library services in university libraries in India: an analysis 'perspective'. *The Electronic.* 30(5). 569-588

Malik, A.& Mahmood, K. (2013). Infrastructure needed for digital reference service (DRS) in university libraries: An exploratory survey in the Punjab, Pakistan. *Library Review*. 62 (6/7), 420-428.

McGillis, L. & Toms, E.G. (2001). Usability of Academic Library Website: Implications for Design. *College & Research Libraries,* 62(4), 355. doi: https://doi.org/10.5860/crl.62.4.355

McMenemy, D. (2012). Emergent digital library services in public libraries: a domain study. *New Library World,* 113(11/12), 507-527. doi: https://doi.org/10.1108/03074801211282902

Mierzecka, A. & Suminas, A. (2018). Academic library website functions in the context of users' information needs. *Journal of Librarianship and Information Science*. 50. 157-167. doi: https://doi.org/10.1177/0961000616664401.

Okon, E.E., Inyang, I.J. & Etim, I.A. (2015). Marketing of Web-Based Library Resources in Nigerian Universities. *Library Philosophy & Practice (e-journal),* paper 1263. Retrieved from http://digitalcommons.unl.edu/libphilprac/1263

Pathak, S.K., Mishra, A. & Sahoo, G. (2008). Future of Web Based Library And Information Servicess: An Indian Scenario. *Planner 2008*. Retrieved from http://ir.inflibnet.ac.in:8080/ir/bitstream/1944/1156/1/36.pdf

Pirshahid, S.E., Naghshineh, N. & Fahimnia, F. (2016). Knowledge and use of Web 2.0 by librarians in university libraries of East Azerbaijan, Iran. *The Electronic Library*, 34(6),1013-1030. doi: https://doi.org/10.1108/ EL -10-2014- 0192

Punchihewa, C.N.D.. (2018). How do Sri Lankan University Libraries Employ Web 2.0 Tools in Providing Web-Based Library Services? : A Comparative Study. *Journal of the University Librarians Association of Sri Lanka.* 21. 18-39. doi: https://doi.org/10.4038/jula.v21i1.7909.

Rahman, A. & Shafique, F. (2011). Use of Web 2.0 and Its Implications for Libraries: Perceptions of Information Professionals in Pakistan. *Library Philosophy and Practice (e-journal)*. 623. Retrieved from http://digitalcommons.unl.edu/libphilprac/623/

Rowlands, J. (1999). BMA Library Online: Library Development of Web-based Services and Resources. *VINE,* 29(1), 25-34. doi: https://doi.org/10.1108/eb040708

Sarasvathy, P., Prasada, G. & Jagdeesha. (2016). Digital Library Environment in Changing Scenario: User's Survey of Mysore University, Mysore. *International Journal of Library and Information Studies.* Retrieved from http://ijlis.org/img/2016_Vol_6_Issue_2/90-96.pdf

Sarkar, T. D. (2013). Prevalence of widget applications on library websites: an analytical study. *New Library World*. 114 (3/4). 110-131. doi: https://doi.org/10.1108/03074801311304032

Si, L., Wanigasooriya, P. & Ranaweera, A. (2017). Evaluation and Assessment of E-Service Quality of University Libraries in Sri Lanka. *European Academic Research*. 4. 10646-10671.

Sinh, N.H. & Nhung, H. T. H. (2012). Users' Searching Behaviour in Using Online Databases at Vietnam National University - Ho Chi Minh City. *Proceedings of the IATUL Conferences*. Paper 27. Retrieved from: http://docs.lib.purdue.edu/iatul/2012/papers/27

Singh, N. K. (2012). Digital Reference Service in University Libraries: A Case Study of the Northern India. *International Journal of the Library and Information Studies*, 2(4), 1-17.

Shafique, F. & Riedling, A. (2013). Survival avenues for Pakistani libraries in the era of emerging technologies: Adoption of Library 2.0 and Library 3-D. *The Electronic Library*, 31 (4), 412-432. doi: https://doi.org/10.1108/EL-02-2011-0025

Shiri, A. (2003). Digital library research: current developments and trend. *Library Review*, 52(5), 198-202. doi: https://doi.org/10.1108/00242530310476689

Siddike, M.A.K., Munshi, M.N. & Mahamud, R. (2013). Marketing of web-based academic library services in Bangladesh. *International Journal of Library and Information Science*, 5(10), 378-385. Retrieved from http://www.academicjournals.org/IJLIS

Thangam, M & Padma, P. (2016). Usage of Web Resources by the Research Scholars of Madras University in Chennai: A Study. *International Journal*

of Library and Information Studies. Retrieved from http://ijlis.org/img/2016_Vol_6_Issue_2/104-112.pdf

Thomas, C. & McDonald, R.H. (2005). Millennial Net Value(s): Disconnect Between Libraries and the Information Age Mindset. Retrieved from https://www.researchgate.net/profile/Robert_Mcdonald4/publication/228452528_Millennial_net_value_s_Disconnects_between_libraries_and_the_information_age_mindset/links/00b7d5230d35bc0d7f000000.pdf

Wasik, J.M. (1999). Building and Maintaining Digital Reference Service. *Eric Digest.* Retrieved from *https://www.ericdigests.org/1999-4/digital.htm*

Wilson, D. E. (2015). Web content and design trends of Alabama academic libraries. *The Electronic Library*, 33, 88-102. doi: https://doi.org/10.1108/EL-05-2013-0100.

Xu, C., Ouyang, F. & Chu, H. (2009). The Academic Library Meets Web 2.0: Applications and Implications. *The Journal of Academic Librarianship,* 35(4),324-331. doi: https://doi.org/10.1016/j.acalib.2009.04.003

Zarei, H. & Abazari, Z. (2011). A study of web based services offered by Asian national libraries. *The Electronic Library*, 29(6), 841-850. doi: https://doi.org/10.1108/02640471111188051.

Zhixian, Y. (2014). Australian Academic Librarians' Perceptions of Effective Web 2.0 Tools Used to Market Services and Resources. *The Journal of Academic Librarianship*, 40(3/4), 220-227. doi: https://doi.org/10.1016/j.acalib.2014.02.009

LEVERAGING WEB-BASED LIBRARY SERVICES IN THE DIGITAL ENVIRONMENT: A USER STUDY OF BIOLOGICAL SCIENCE INSTITUTES OF CSIR OF NORTHERN INDIA

QUESTIONNAIRE ***(for Librarian)***

Dear Sir/Madam I'm Shreya Gupta, a Ph.D. scholar, in Department of Library and Information Science, Babasaheb Bhimrao Ambedkar University (A Central University), Lucknow, doing a research work on the topic **"Leveraging Web-Based Library Services In The Digital Environment: A User Study Of Biological Science Institutes of CSIR of Northern India".** In this context, I would like to request for your kind co-operation in filling this questionnaire for my study and giving some necessary suggestions. Spending some time, will help me to complete this research work. I assure you that the data provided by you will be used only for this research work and shall be kept confidential.

Thanking you

1. General Information:

a) Name of the Library----------
b) Year of establishment of the Library: ----------
c) Library timings----------
d) Normal working days----------
e) Sunday / Holidays----------
f) Name of the Librarian----------
g) Gender: Male [ ] Female [ ]
h) Contact No. / Telephone No.: (optional) ----------
i) E-mail address----------

2. No. of staff:

i) Professional [ ] ii) Semi-professional [ ]
iii) Non-professional [ ] iv) Any other_____

2.1 How many resource persons are there for managing web-based library services?
.....

If Yes, then please specify who amongst the following helps to manage the web based library services

Resource Persons	**Who**	**Number**
a. IT Specialist		
b. Information Scientist		
c. System Administrator		
d. Librarian		
e. Library Staff		
f. Any other, specify please		

3. Please Provide Total no. of registered Library users?

Types of users	Total no. of registered users
1. Scientist	
2. Research Associate	
3. Senior Research Fellow	
4. Junior Research Fellow	
5. Others (Please specify)	

4. Section: A- IT Infrastructure

Please fill up following sections regarding IT Infrastructure facilities available?

4.1: Hardware:

Please indicate whether library possess following hardware, and if yes then how many equipments?

S.No.	Hardware	Yes	No	Number
1.	Computer System			
2.	Scanners for Digitization			
3.	Web Camera			
4.	Power Backup			
5.	Multifunction Printers			
6.	Web Servers			
7.	Database Servers			
8.	Mirror Server			
9.	Backup Server			
10.	LCD Projector			
11.	FAX			
12.	Any other, please specify			

4.2 Does your library have separate Cyber Section?

a) YES ☐ b) NO ☐

4.3: Software:

Please indicate whether library possess following software? If yes, then name the respective software.

S.No.	Software	Yes	No	Software
1.	Operating Software			
2.	Library Management Software			
3.	CD-Net Management			
4.	Multilanguage Support			
5.	Web Designing Software			
6.	Any Other, Please Specify			

4.4: LAN facility:

4.4.1: Are all sections connected through Integrated Library Management Software within the library?

a. Yes b. No

4.4.2: Is library services available on network accessed in campus/ hostel/classes?

a. Yes b. No

4.5: Internet facility:

Please specify following?

a. Type of Connection: _____ b. Service Provider: _____

c. Bandwidth: _____

4.6: How you rate overall infrastructure facility of library for providing web-based library services?

Excellent	**Good**	**Average**	**Fair**	**Poor**

5. Section B: Web- based Library Services and web application tools

Does your library provide web-based services? If yes, please answer following questions

5.1: Library website URL: _____

5.2: From how many years web-based services have been offered by your library?

_____

5.2: Do you make web-based library service available round the clock?

a. Yes 365x 24 ☐ b. No on regular working hours ☐

c. Any other, please specify_____

5.3: What is the mode of accessibility of web-based library services?

a. Campus wide through IP authentication ☐ **b.** User ID/ Password ☐

c. Proxy Server ☐ **d.** Any other Mode (Please specify):_____

5.4: What is the frequency of updating of information on websites?

a. Real time ☐ b. Next day ☐ c. Weekly ☐

d. Any other, please specify:_____

5.5: What were the factors that encouraged your library to offer web-based library services through websites?

a. Easy Access and Faster Service	b. To Increase the Visibility of the Library
c. To Make Services Available 24x7	d. Enhance and Effective Use of Library

	Services
e. Due to Technological Changes	f. Easy-to-use Web resources Permitting Self Service
g. Staff Efficiency Improved Technologically	h. Marketing of Library Services
i. Save Users Time by Providing Personalized Services	j. Due to Change in the Perception of the users regarding access to Services/ Information
k. Any other, please specify_____	

5.6: What are different web-resources offered by the library? (Multiple answers permitted)

a. E-books	b. E-theses/dissertations
c. Open Access Journals Databases	d. CD-ROM
e. Institutional Repository Gateway	f. Online Subject
g. E- Journals	h. E-Databases
i. Video Library	j. E-newspaper Clipping
k. Patents/Standards	i. Any other, please specify_____

5.7: What are different web-based services offered by the library through various sections (Reference, acquisition, circulation, cataloguing, periodical and general/ administrative)? (Multiple answers permitted)

	Indicate the web-based services provided by you library	**Indicate who can access to these services**	**Based on your opinion, rate the level of sophistication of the web based library services**
1. Reference service	a. Selective Dissemination of Information b. Current Awareness Service c. Document Delivery Service d. Web-based Reference Tools e. Virtual Reference Desk/Ask- a-Librarian f. Online Current Awareness Bulletin g. Virtual Reference Service h. Inter-Library Loan based Services i. Any other:	a. All internet users, regardless of institutional affiliation b. On campus internet users c. Off campus internet users d. In house library patron e. Restricted to affiliated users	___ 0 None ___ 1 Basic ___ 2 Average ___ 3 Advanced
2. Web-	a. List of New Arrivals	a. All internet users,	___ 0 None

based Acquisition Services	b. Alert services for New Additions c. Status of Items (on order, processing, etc) d. Request for Document e. Acquisition Policies f. Status of Suggested Document Forthcoming Items g. Any other:	regardless of institutional affiliation b. On campus internet users c. Off campus internet users d. In house library patron e. Restricted to affiliated users	___ 1 Basic ___ 2 Average ___ 3 Advanced
3. Web-based Circulation Services	a. Patron Accounts (view information only) b. Status of User Account c. Circulation (issue/return) d. Reservation of document e. Status of Reserved Documents f. Cancelation of Reserved Document g. Availability of a Particular Document h. Renewal of Loaned Document i. Interaction with user for query j. Payment of Overdue Charges k. Any other	a. All internet users, regardless of institutional affiliation b. On campus internet users c. Off campus internet users d. In house library patron e. Restricted to affiliated users	___ 0 None ___ 1 Basic ___ 2 Average ___ 3 Advanced
4. Web-based Cataloguing Services	a. Access to Web-OPAC b. Access to Subscribed E-Journals c. Access to E-journals through Consortium d. Access to Institutional Repository e. Access to Online databases f. Access to Union Catalogue g. Access of Electronic Indexes h. Any other	a. All internet users, regardless of institutional affiliation b. On campus internet users c. Off campus internet users d. In house library patron e. Restricted to affiliated users	___ 0 None ___ 1 Basic ___ 2 Average ___ 3 Advanced
5. Web-based Periodical Services	a. Pro-active Web-based 'Table of Contents' b. Article alert service c. Electronic Article Delivery d. Recommendation for Subscribing a New journal e. Status of Recommended Journal f. Journal Citation	a. All internet users, regardless of institutional affiliation b. On campus internet users c. Off campus internet users d. In house library	___ 0 None ___ 1 Basic ___ 2 Average ___ 3 Advanced

	Report(JCR) g. Most Cited paper in Various field Online h. Any other	patron e. Restricted to affiliated users	
6. Web-based General /Administrative Services	a. Change Password Online b. Library News c. Map of the Library/Site Map d. E-mail based Services e. Feedback Form f. Contact /Addresses g. Library Holidays List h. FAQ i. Helpdesk Services/Ask-a-Librarian j. Web based User Education/ library tutorials k. Suggestions Box l. Library Forums (e-mail based) m. Library Link n. Photo Gallery o. In-house Library Bulletin p. Information about Special Exhibition/ Seminars q. Any other	a. All internet users, regardless of institutional affiliation b. On campus internet users c. Off campus internet users d. In house library patron e. Restricted to affiliated users	___ 0 None ___ 1 Basic ___ 2 Average ___ 3 Advanced
7. Web-forms facility	a. Reference Queries b. Request for Document on ILL/DDS c. Status of Circulation Account d. Reserve/Cancel/Renewal Status of Documents e. Request for Article f. Interaction with Reference Staff/ Librarian g. Interaction with Acquisition Staff/ Librarian h. Feedback/Suggestion for Service i. For Recommending New Book/ Journal	a. All internet users, regardless of institutional affiliation b. On campus internet users c. Off campus internet users d. In house library patron e. Restricted to affiliated users	___ 0 None ___ 1 Basic ___ 2 Average ___ 3 Advanced

8. Web application tools/Social Networking Sites	a. Facebook b. RSS feeds c. Instant Messaging d. Blog e. Wiki f. Twitter g. Tagging h. Podcast i. Vodcast j. Any other	a. All internet users, regardless of institutional affiliation b. On campus internet users c. Off campus internet users d. In house library patron e. Restricted to affiliated users	___ 0 None ___ 1 Basic ___ 2 Average ___ 3 Advanced

5.8: Which of the following search techniques are provided by your library in the system to access resources?

a. Controlled Vocabulary or Subject	b. Keywords
c. Boolean Operators	d. Truncation and Wild Cards
e. Field Specific	f. Proximity Locators
g. Relevance	

5.9: For what purpose your library uses above mentioned web application tools?

a. Library Advocacy	b. Virtual Reference Service
c. Improve the Provision of User Oriented Services (SDI,CAS)	d. Designing New Web-based Services
e. User's Feedback/Suggestions	f. Sharing Library Events/News/Announcements
g. Marketing/Advertising of Library Service	h. Information Literacy Tutorials
i. To Create Research Guides/Courseware	j. Promoting Library Image among Users
k. Any other, please specify_____	

5.10: What are the problems being faced by your library for implementing web application tools?

a. Lack of Awareness	b. Lack of Staff Time
c. Problem in Archiving	d. Threats to Data Security
e. Provide Unauthentic Content	f. Breach Copyright Law
g. High cost of Hardware/Software	h. Overdependence on IT centre
i. Information Overload	j. Affected by Firewalls or Filtering Software

6. Section D: Miscellaneous

6.1 Please specify the total strength of your library collection.

Collection	Print	Non-Print	Both
1. Books			
2. Reference Books			
3. National journal			
4. International journal			
5. Back volumes			
6. Rare and Special collection			
7. Reference sources			
8. Magazines			
9. Online databases			
10. Project / Theses reports			
11. News papers			
12. Any other, please specify			

6.2 Please specify total budget for the library, library services and website development/management in your library?

Years	Library	Library Services	Website development/management
2011-12			
2012-13			
2013-14			
2014-15			
2015-16			

6.3 Have you hired any personnel through outsourcing to provide web based services in your library?

a. YES b. NO

If yes, then please specify the number of staff hired through outsourcing for web based library services.

_____

_____

6.4 What is the process for initiating new web-based library services?

a. General Discussion with Staff
b. Library Advisory Committee
c. Feedback Obtained from Web Administration Tool
d. Library Website Committee
e. With External Expert Feedback
f. Any other, please specify:_____

6.5. Do you agree training/workshop is required in order to provide effective communication, web tools handling and website management for staff?

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree

6.6. Do training/workshop is provided to library staff for effective communication, web tools handling and website management? If yes, please specify the periodicity?

a. Every Week ☐ b. Every Month ☐ c. Quarterly ☐
d. Twice a year ☐ e. Yearly ☐
f. Any other, please specify_____

6.7. How will you evaluate your web-based services being utilized? Please provide data uses pattern of web–based services? If possible, provide soft copy?

a. Usage Statistics ☐ b. User Survey ☐

_____

6.8. How often you take feedback from users regarding web-based services?
a. Daily ☐ b. Weekly ☐ c. Monthly ☐
d. Quarterly ☐ e. Yearly ☐
f. Any other, please specify_____

6.9. What is the rate of satisfaction of web-based services of your library as per user feedback?

a. Very High ☐ b. High ☐ c. Average ☐
d. Below average ☐ e. Low ☐

6.10. What steps have been taken by library for creating awareness among users regarding utilization of web-based library services?

a. Orientation Programs for the Fresher's	b. Online- Virtual Tours
c. Workshop/Training/Conferences	d. Credit based Course
e. Non-Credit based Course	f. Any other, please specify _____

6.11. Please indicate the problem faced by you in providing the web-based services in your library?

a. Insufficient Terminals for Access	b. Slow Internet Connectivity
c. Lack of Appropriate Technological Expertise	d. Maintenance
e. Collaboration with Users	f. Insufficient Time and Training
g. Lack of Awareness among Users	h. Management Support
i. Any other, please specify: _____	

6.12. Please provide some suggestions for further strengthening of web-based library services in your library in the future?

_____

_____

_____

Signature

Seal

LEVERAGING WEB-BASED LIBRARY SERVICES IN THE DIGITAL ENVIRONMENT: A USER STUDY OF BIOLOGICAL SCIENCE INSTITUTES OF CSIR OF NORTHERN INDIA

QUESTIONNAIRE

(for Users)

Dear Sir/Madam I'm Shreya Gupta, a Ph.D. scholar, in Department of Library and Information Science, Babasaheb Bhimrao Ambedkar University (A Central University), Lucknow, doing a research work on the topic **"Leveraging Web-Based Library Services In The Digital Environment: A User Study Of Biological Science Institutes of CSIR of Northern India".** In this context, I would like to request for your kind co-operation in filling this questionnaire for my study and giving some necessary suggestions. Spending some time, will help me to complete this research work. I assure you that the data provided by you will be used only for this research work and shall be kept confidential.

Thanking you

1. Personal Information

Name		Designation	
Age (Optional)		Male/Female (optional)	Male ☐ Female ☐
Highest qualification		Department	
Course Pursuing			

2. Are you aware that the resources and services of your library being provided via website?

a. Yes, use them Regularly [ ] **b.** Yes, Use them Sometime [ ]

c. Yes, Use Online Journals only [ ] **d.** Yes, but Never Used [ ]

e. Never Heard [ ]

3. Do you think web-based library services are more interactive over traditional library services.

a) YES [ ] **b)** NO [ ]

If yes, then please select the reasons behind the interactive nature of web- based library services. (Multiple answers are permitted))

a. 24X7 Availability of Services [ ]

b. Save Time and Travelling Cost [ ]

c. Easy Access and Faster Service [ ]

d. Allow Self Service [ ]

e. Interaction with Library Staff [ ]

f. Any other, please specify_____

4. What is your purpose of using web based library services? Please tick the following.

S.No.	Purpose	TICK
1.	To search the books database	
2.	To know the availability of a particular	
3.	To search books using all approaches	

4.	To reserve a book	
5.	To access Current Awareness Bulletins	
6.	To pay library dues	
7.	To pay for fee based library services, if any	
8.	To know more about services rendered by library	

5. How often you use the web based library services? Please tick the following.

S. No.	Frequency	Web based library services
1.	Daily	
2.	Weekly	
3.	Forthnightly	
4.	Monthly	
5.	Occasionally	

6. How much time you spent on the web based library services? Please tick the following.

a) Less than 1 hr a week [ ] b) 2-3 hrs a week [ ] c) 5-6 hrs a week [ ]

d) 7-9 hrs a week [ ] e) 10-20 hrs a week [ ] f) Over 20 hrs a week [ ]

SECTION I

WEB BASED RESOURCES

7. Are you aware of the National Knowledge Resource Consortium?

a. **YES** [ ] b**. NO** [ ]

If Yes, then please specify that how much time you spent in accessing the resources from NKRC

a) Less than 1 hr a week [ ] b) 2-3 hrs a week [ ] c) 5-6 hrs a week [ ]

d) 7-9 hrs a week [ ] e) 10-20 hrs a week [ ] f) Over 20 hrs a week [ ]

8. Which of the following full text e-resources you prefer in National Knowledge Resource Consortium

S.No.	Full text E- resources	YES	NO
1.	ACS (American Chemical Society)		
2.	ACM (Association for Computing Machinery)		
3.	AIP (American Institute of Physics)		
4.	Annual Reviews		
5.	ASCE (American Society of Civil Engineers)		
6.	ASME (American Society of Mechanical Engineer)		
7.	ASTM (American Society for Testing and Materials)		
8.	CUP (Cambridge University Press)		
9.	CSIRO		
10	Elsevier		
11	Emerald		
12	ICE (Institute of Civil Engineers)		
13	IEEE (Institute of Electrical & Electronic Engineers)		
14	Indian Journals		
15	IOP (Institute of Physics)		

16	Maney Publishing		
17	NPG (Nature Publishing Group)		
18	OSA (Optical Society of America)		
19	OUP (Oxford University press)		
20	NRC		
21	RSC (Roya; Society of Chemistry)		
22	SAGE		
23	Science		
24	Springer		
25	Taylor & Francis		
26	Wiley & Blackwell		
27	WorldScientific		

9. Problems Encountered while using the e-Resources:

a) Slow access speed [ ]
b) Difficulty in finding relevant information [ ]
c) Overload of information on the Internet [ ]
d) It takes too long to view/download pages [ ]
e) Privacy problem [ ]
f) Any other please specify [ ]

SECTION II

WEB SERVICES

10. Which web-based library services, you basically prefer for your works (Rank the following web-based library services as the code given below)

RANKS: **0 -** Don't **1 -** Rarely **2 -** Occasionally **3 -** Frequently **4 -** Highly

i) Web-based Reference and Information Services

Web-based Reference and Information Services	**Ranking**				
	0	**1**	**2**	**3**	**4**
j. Selective Dissemination of Information					
k. Current Awareness Service					
l. Document Delivery Service					
m. Web-based Reference Tools					
n. Virtual Reference Desk/Ask- a-Librarian					
o. Online Current Awareness Bulletin					
p. Virtual Reference Service					
q. Inter-Library Loan based Services					
r. Any other:					

ii) Web-based Acquisition Services.

Web-based Acquisition Services	**Ranking**				
	0	**1**	**2**	**3**	**4**
h. List of New Arrivals					
i. Alert services for New Additions					
j. Status of Items (on order, processing, etc)					
k. Request for Document					

l. Acquisition Policies					
m. Status of Suggested Document Forthcoming Items					
Any other:					

iii) Web-based Circulation Services.

Web-based Circulation Services	**Ranking**				
	0	**1**	**2**	**3**	**4**
l. Patron Accounts (view information only)					
m. Status of User Account					
n. Circulation (issue/return)					
o. Reservation of document					
p. Status of Reserved Documents					
q. Cancelation of Reserved Document					
r. Availability of a Particular Document					
s. Renewal of Loaned Document					
t. Interaction with user for query					
u. Payment of Overdue Charges					
Any other					

iv) Web-based Cataloguing Services.

Web-based Cataloguing Services.	**Ranking**				
	0	**1**	**2**	**3**	**4**
i. Access to Web-OPAC					
j. Access to Subscribed E-Journals					
k. Access to E-journals through Consortium					
l. Access to Institutional Repository					
m. Access to Online databases					
n. Access to Union Catalogue					
o. Access of Electronic Indexes					
Any other					

v) Search Techniques used for accessing web-based resources

Search Techniques used for accessing web-based resources	**Ranking**				
	0	**1**	**2**	**3**	**4**
a. Controlled Vocabulary or Subject					
b. Keywords					
c. Boolean Operators					
d. Truncation and wild cards					
e. Field specific					
f. Proximity locators					
g. Any Other (please specify)					

vi) Web-based Periodical Services.

Web-based Periodical Services	**Ranking**				
	0	**1**	**2**	**3**	**4**
i. Pro-active Web-based 'Table of Contents'					
j. Article alert service					
k. Electronic Article Delivery					
l. Recommendation for Subscribing a New journal					
m. Status of Recommended Journal					
n. Journal Citation Report(JCR)					
o. Most Cited paper in Various field Online					
Any other					

vii) Web-based General /Administrative Services.

Web-based General /Administrative Services	**Ranking**				
	0	**1**	**2**	**3**	**4**
r. Change Password Online					
s. Library News					
t. Map of the Library/Site Map					
u. E-mail based Services					
v. Feedback Form					
w. Contact /Addresses					
x. Library Holidays List					
y. FAQ					
z. Helpdesk Services/Ask-a-Librarian					
aa. Web based User Education/ library tutorials					
bb. Suggestions Box					
cc. Library Forums (e-mail based)					
dd. Library Link					
ee. Photo Gallery					
ff. In-house Library Bulletin					
gg. Information about Special Exhibition/ Seminars					
Any other					

viii) Awareness about web-forms facility in your library websites? If yes, please indicate purpose of using web-forms? (Multiple answers permitted).

Web form facility	**Ranking**				
	0	**1**	**2**	**3**	**4**
j. Reference Queries					
k. Request for Document on ILL/DDS					
l. Status of Circulation Account					
m. Reserve/Cancel/Renewal Status of Documents					
n. Request for Article					
o. Interaction with Reference Staff/ Librarian					
p. Interaction with Acquisition Staff/ Librarian					

q. Feedback/Suggestion for Service					
i. For Recommending New Book/ Journal					
Any Other					

SECTION III

11. WEB SERVICES ENVIRONMENT QUALITY

1. Access and collection

Access and collection	**Ranking**				
	Strongly Agree	**Agree**	**Uncertain**	**Disagree**	**Strongly Disagree**
a) The service provides trusted information compared to the Internet					
b) The service provides access to a wide range of electronic resources in my subject area					
c) Online information resources are clearly arranged by subject					
d) The Web site has links that are all working.					
e) The Web site is easy to use.					
f) The Web site is convenient to access					

2. Equipment

Equipment	**Ranking**				
	Strongly Agree	**Agree**	**Uncertain**	**Disagree**	**Strongly Disagree**
a) There are enough ports for laptop use to access Web-based services					
b) There are enough working computers to access Web-based services					

SECTION IV

12. WEB SERVICES DELIVERY QUALITY

1.

Patron support	**Ranking**				
	Strongly Agree	**Agree**	**Uncertain**	**Disagree**	**Strongly Disagree**
a. Online librarians interact with me in a courteous manner					
b. Online librarians are always willing to help me.					
c. Online librarians understand my specific information needs					

Personalisation	**Ranking**				
	Strongly Agree	**Agree**	**Uncertain**	**Disagree**	**Strongly Disagree**
a) The library system stores all my preferences to offer me extra information.					
b) I am able to set up an alert for new materials in my discipline.					
c) I am able to save my searches and display my search history.					

2.

Patron Relationship	**Ranking**				
	Strongly Agree	**Agree**	**Uncertain**	**Disagree**	**Strongly Disagree**
a) The instructions on remote access are easy to follow.					
b) There are clear, precise instructions at the point of use.					
c) The site allows me the convenience of sending a query/comment online					

SECTION V

13. WEB SERVICES OUTCOME QUALITY

1.

Functional Benefits	**Ranking**				
	Strongly Agree	**Agree**	**Uncertain**	**Disagree**	**Strongly Disagree**
a) Using Web-based services, I can easily get what I am looking for most of the time.					
b) Using Web-based services, I can get the exact information I'm looking for.					
c) Using Web-based services, I can get the information I am looking for in minimal time and effort					

Emotional Benefits	Ranking				
	Strongly Agree	**Agree**	**Uncertain**	**Disagree**	**Strongly Disagree**
a) I feel very happy when I get what I want from the Web-based services.					
b) The Web-based services have innovative features that are interesting to use.					
c) Using Web-based services makes me feel the library is truly dedicated to fulfilling my needs.					

2.

Reliability	Ranking				
	Strongly Agree	**Agree**	**Uncertain**	**Disagree**	**Strongly Disagree**
a) Online document delivery requests are dealt with in promised time.					
b) Online interlibrary loan requests are dealt with in promised time					

SECTION VI
MICELLANEOUS

14. Are you aware with presence of social networking site, instant messaging, wiki, blog, etc. in the library website?

a) Yes b) No

If yes, please indicate which different web application tools are being used by you, provided by library?

a. Facebook	
b. RSS feeds	
c. Instant Messaging	
d. Blog	
e. Wiki	
f. Twitter	
g. Tagging	
h. Podcast	
i. Any other, specify	

15. For what purpose these above mentioned tools are being utilized? (Multiple answers permitted)

a.	To Know the Updates of Library and its Services	
b.	Virtual Reference Service	
c.	For Wiki on Subject /to Link Blog	
d.	For Feedback and Suggestions	
e.	Library Instruction Tutorials	
f.	Any other services, please specify?	

16. Do you think training is required for optimum utilization of web-based library services?

a. Not Required at All [ ]
b. No, One Can Learn from Experience [ ]
c. Yes Training Might be Useful[ ]
d. Yes, Training is Essential for Best Utilization [ ]

17. Does library provide training/orientation programme for utilizing web-based library services?

a. Yes [ ] b. No [ ]

18. Please indicate the problems being faced by you in using the web-based services in your library? (Multiple answers permitted)

a. Lack of Awareness [ ]
b. Late Response [ ]
c. No Response [ ]
d. Lack of Promotion [ ]
e. Slow Internet Connectivity [ ]
f. Lack of Up-to-dateness [ ]
g. Navigation/Interface [ ]
h. Lack of Training/Orientation Programme [ ]
i. Any other, please specify_____

19. What is your opinion and rate on overall web-based services provided by your library?

a. Excellent [ ]
b. Very Good [ ]
c. Satisfactory [ ]
d. Un-satisfactory [ ]

20. Do you have any suggestions to strengthen web-based library services in your library (please specify)

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.....
.....

THANK YOU

Signature