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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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. 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.

This new web environment has amazing effects on how user services are planned and executed. 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, e-books, e-databases, OPAC, web-forms, etc. to satisfy the users' demands. 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. 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.

The need for the Study

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 was 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.

Statement of the Problem

The present study was 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.

Scope of the Study

For this study, the CSIR institutes of Northern India dealing with Biological Sciences only were 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/

Limitations of the Study

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

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.

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 service is a highly used web-based library service.

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.

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.

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.

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.

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.

CHAPTERISATION

This thesis is organised into six chapters and chapterisation is as follows:

Chapter 1: Introduction: this chapters discussed the background of the study, definition of key term, objectives of the study, scope of the study, hypotheses, research methodology, statistical tools and techniques and significance of the study.

Chapter 2: Review of Literature: this chapter discussed all recent study on web-based library services of various websites, library websites, studies on web 2.0 application in libraries and studies on web-based library resources.

Chapter 3: Web-based library services in context to Special Libraries: this chapter described the conceptual aspects of Web-based library services and its various aspects. It also discussed the various performance indicators used in the study to evaluate the satisfaction level of the users with respect to the web environment quality, web delivery quality and web outcome quality.

Chapter 4: Profile of CSIR Institutes dealing with Biological Sciences: this chapter presented the brief introduction of the selected CSIR institutes of Northern India.

Chapter 5: Data Analysis and Interpretation: this chapter presented the tabulation, statistical analysis, interpretation and graphical representation of the collected data from libraries.

Chapter 6: Findings, Suggestions & Conclusion: this chapter presented the findings and suggestions of the study and concluded with suggestions in future to improve the quality of the web-based library services in the CSIR libraries. It offers a conclusion based on findings.

FINDINGS

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 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))

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.

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.

FURTHER AREA OF RESEARCH

The further 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.