

Knowledge Access using DL Platform: A TERI Research Library Case Study

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ABSTRACT

It is a constant endeavour of The Energy and Resources Institute (TERI)—Library and Information Centre (LIC) to cater best information services to the users community, which comprises of research professionals working in the field of energy, environment and sustainable development. Understanding the consumer of data, information and knowledge to accomplish the projects, is becoming increasingly important in relation to the appropriate designing and development of information products and services 'tailoring' to the needs of these users. To cater the services to the research professional's different service platforms are used such as, web-enabled information services etc. These services are assessed in terms of quality, timeliness, reliability and usability. The paper describes about the TERI digital library initiative and various digital services provided by TERI Library and the method of analysis opted by TERI Library professional to assess these services such as google analytic and user survey techniques. The paper also highlights the result of user satisfaction survey undertaken in the year 2011. The methodology, survey software, data analysis, result and the action taken in response to the user feedback are highlighted in this paper.

Keywords: TERI, information services, digital libraries, customisation, information products, need assessment, information retrieval, user studies, service quality, user survey

1. INTRODUCTION

The Energy and Resources Institute (TERI) is a dynamic and flexible organisation with a global vision and a local focus. It was established in 1974 with the purpose of tackling and dealing with the immense and acute problems that mankind is likely to face within in the years ahead. The TERI has created an environment that is enabling, dynamic and inspiring for the development of solutions to global problems in the fields of energy, environment and current patterns of development, which are largely unsustainable. The Institute has grown substantially over the years, particularly, since it launched its own research activities and established a base in New Delhi, its registered headquarters.

With staff strength of over 900, drawn from multidisciplinary and highly specialised fields, offices and regional centers equipped with state-of-the-art facilities, and a diverse range of activities, TERI is the largest developing country institution working to move human society towards sustainable development. TERI makes effective use of the latest development in information technology in both its in-house and outreach activities¹.

1.1 Library and Information Centre of TERI

Library and Information Centre of TERI was also

established in 1974 as documentation and information centre. TERI-LIC has emerged as a pioneering research library and information centre in South Asia on energy, environment, plant biotechnology, forestry, natural resources, and sustainable development. The Centre is one of the largest in the region and most modern in terms of service, infrastructure, and information technology applications. The TERI-LIC serves primarily to meet all information needs of researchers; the Centre also serves energy and environment professionals worldwide by providing value-added information services. The LIC has been organising several conferences, seminars, workshops in both national and international levels to promote the digital library developments in India and abroad.

1.2 Collection

TERI library consists of a good number of online and offline resources in the field of energy, environment, biotechnology and sustainable development. Currently, it houses an updated collection with 30,000 books, reports, reference resources, conference proceedings, government documents and standards, 475 current scientific and technical journals, 1050 online journals, 25,000 back volumes, more than 1200 CD-ROMs and an archive of miscellaneous literature including pamphlets, reprints, press-clippings and annual reports

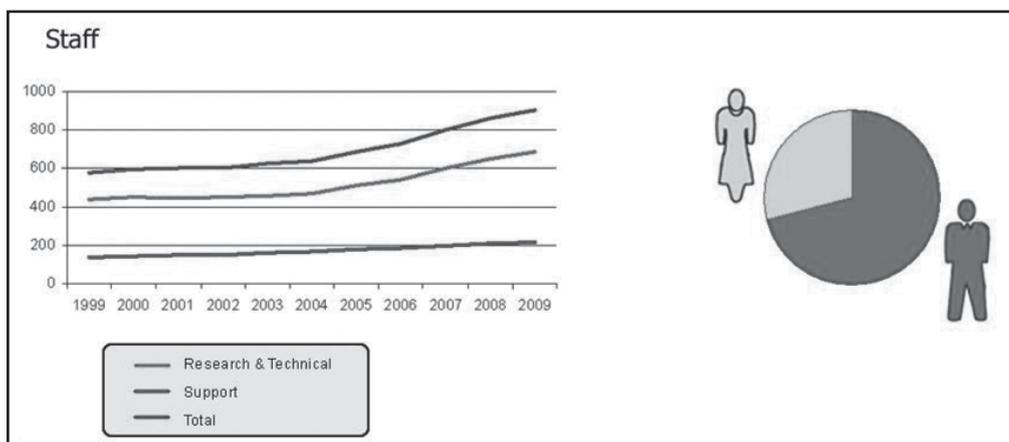


Figure 1. Staff strength of TERI

of government, corporate, research, voluntary and multilateral organisations. Library is also maintaining separate sections for specialised library on climate change and Mycorrhiza Information Centre. Besides these resources, the library professionals are involved busy in creating new and innovative services keeping in mind their research requirements.

1.3 Services

TERI-LIC services are categorised in three parts basic, digital, and project-based (Table 1).

1.4 TERI Electronic/Virtual/Digital library

With the advent of internet technologies, TERI started its first hop in the year 1999 towards developing the virtual electronic collection in the areas of energy, policy economy, environment, plant biosciences, biodiversity, regulatory issues, urban transport, etc. Later on, library had undertaken digital library initiatives and developed a comprehensive digital library platform that provides rich and structured content through online, remote, and continuous access to resources through TERI intranet which is popularly known as TERInet.

1.4.1 About TERInet (Enterprise Information Portal)

The TERInet is a compendium of in-house knowledge and enables TERI staff access information on office procedures and systems, online databases and other sharable in-house information from all locations of TERI or from any remote place through Internet. The intranet provides a single window interface to various applications like KM system, Oracle-based ERP forms and reports, projects, CDS/ISIS databases, and MS-Office and Acrobat documents. TERInet connects more than 700 nodes distributed across seven floors of the main building and library block. The main building and library block are connected through a fiber link and there are 35 nodes in the library block. There are close to 10 servers, providing services such as mail, web, FTP, file, print, DNS, RDBMS, CD-cum-NAS and customised applications. The Digital library collection is housed on CD-cum-NAS server. The main network operating system is provides the login facility to TERInet. Windows NT and Windows 2000 server are mainly used as application servers. The

Table 1. Services provided by TERI-LIC

Basic library services	Digital library services	Project-based services
<ul style="list-style-type: none"> • Circulation • Abstracting services • Reference and referral services • Document delivery • Reprography • Literature search • Inter-library loan • Book exhibition • Children's reading section • Seminars, workshops and conferences 	<ul style="list-style-type: none"> • News headlines • Online journals content s • e-Books/documents • What's new in other institutes • Forthcoming events • Recent additions • 'New Article' alerts • Online journals • Databases and portals • CD-ROM access • DELNET database • Theses and dissertations • Open Access Library Catalogue • Institute repository in GSDL 	<ul style="list-style-type: none"> • Business opportunities • Events • Projects/publication updates of other institutes • News updates for TERI websites • GRIHA • Sustainable habitat • COSMILE • AEI • TERI-NA • TERI-Europe

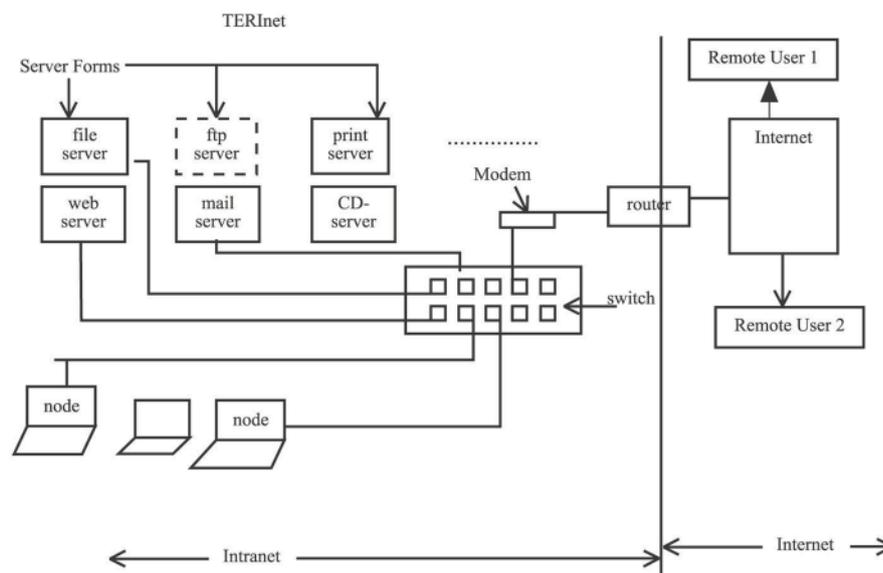


Figure 2. Network pattern and information flow showing TERInet²

access to TERInet-based resources is through an intranet and TERInet services program launcher. Inhouse users mostly use these resources. To provide access for outside offices and mobile users, Citrix metaframe software MPLS-VPN link has been deployed. MPLS VPN is a family of methods for harnessing the power of multiprotocol label switching (MPLS) to create virtual private networks (VPNs). The Citrix works on the thin client principle and delivers the content through a web browser and creating virtual extranet. The TERI regional offices (Bangalore, Guwahati, Goa) in India and offices abroad (TERINA, Washington; TERI-Germany; TERI-Moscow; TERI-Middle-East at Sarjah; TERI-Japan at Tokyo) are able to access main office intranet resources using this extranet technology.

1.4.2 Hardware and Software Used

Hardware and software used for the electronic library at TERI¹ include a TCP/IP protocol-based switched network; MS Internet Information Server version 6.0 also called as web server; network attached storage (NAS) acting as a file server; and the Windows 2003 server operating system. In TERI two basic ideas were taken into account when considering setting up an electronic library: To have as much full-length resources in its server as possible. This meant downloading all relevant online books and journals and providing access through electronic library, and (b) other resources could be accessed through the internet. Later on GreenStone Digital Library (GSDL) Software was also used to build the TERI in-house digital repository and linked with the existing digital library.

While designing the initial structure of the electronic library, resources were segregated according to the following concepts:

- (1) Physical Electronic Library: Here resources are available at the TERI server. This helped in-house researchers accessing the collection through the intranet. Apart from downloaded internet resources, other electronic collections were also included which were in the TERI collection and would continue to remain with TERI Electronic Library.
- (2) Virtual Electronic Library: Here links to the resources accessible through the internet are provided. Access to the resources is only possible on internet computers. In this case access rights lie with the resource holder.
- (3) Digital Library: It includes all type of resources such as links to web resources, databases, and full-text downloaded documents in server.

2. DIGITAL LIBRARY DEVELOPMENT AT TERI

The need for digital library at TERI in New Delhi started with the concept of providing online access to electronic collections and services from researchers' desktop or from their home computers and also to provide access to TERI regional centres and the centres abroad. Other needs were to aggregate all scattered resources at one location and provide the continuous easy multiple remote accesses needed to accelerate the research process and save the time of the researcher.

Apart from that it would reduce the handling, processing and circulation times, and in addition, because library space is extremely costly at TERI, there is tremendous need to save the library storage space and other resources. TERI Digital Library was set-up in 1999 to provide better access to a number of online and virtual resources available and subscribed by TERI Library like journals, books,

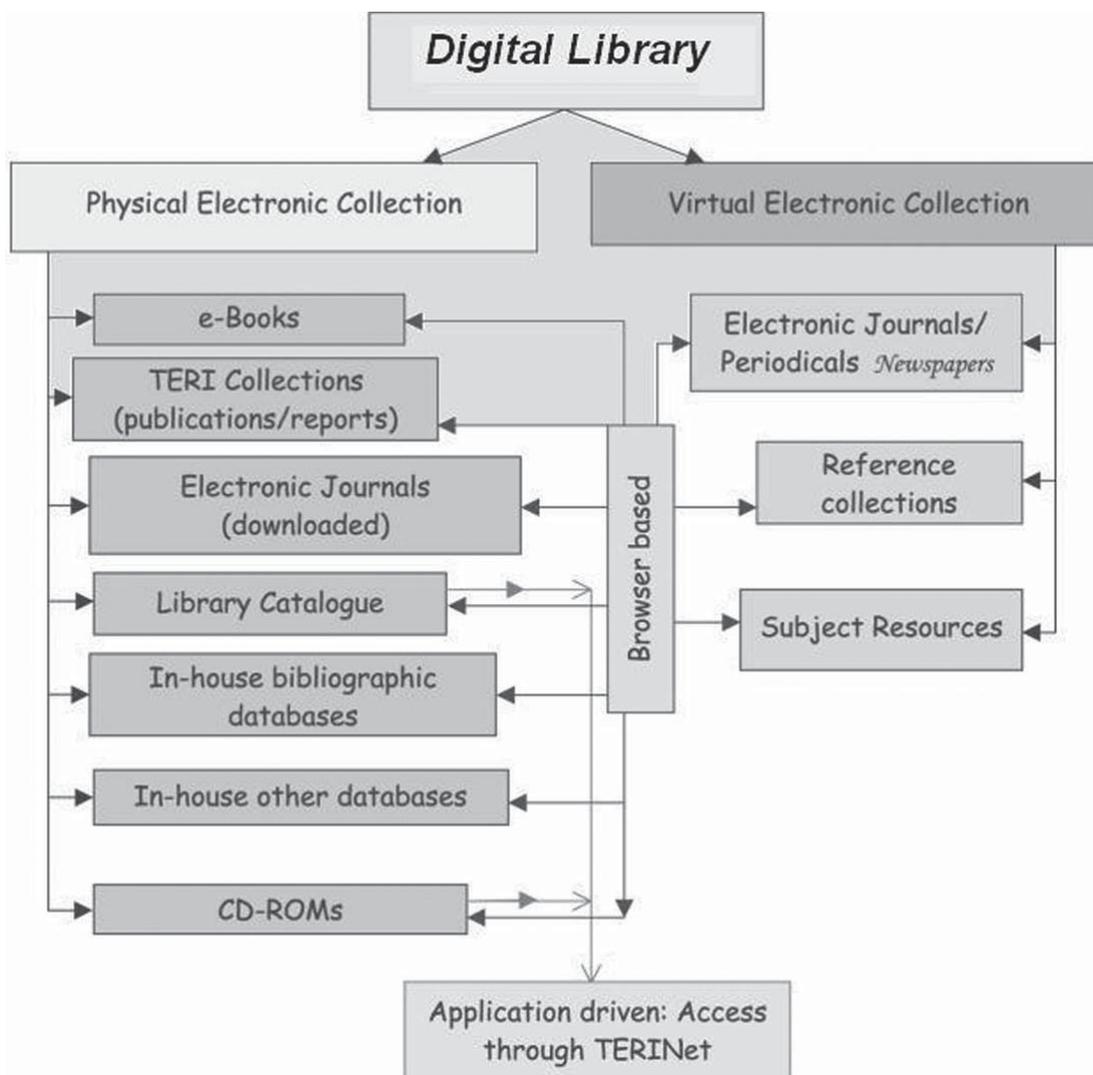


Figure 3. Structure of TERI digital library in 1999²

databases and CD-ROMs. The TERI Digital Library has been opened for the researchers since 2000.

2.1 Three Dimensional Digital Library Service System

The three axes are TERI-LIC (organisation perspective), information resources and service/methods which are complementary in supporting, interacting, and enhancing each other and steadily provide the library and information service with a net force, developing cyberspace in all aspects of teaching and scientific research. Within the three dimensional structure, each function will influence the other two and one weakness may lead to a complete failure.

2.2 Services at TERI Library

TERI Library is providing a good number of online, digital and personal services to its in-house researcher and regularly marketing these services through e-mails. Here are list of online/digital services provided by TERI Library to its researchers:

2.2.1 New Headlines

Library professionals scan 14 national and 5 International newspapers daily for the news on energy, environment, sustainable development and other articles related to TERI research interest. After scanning, all the marked news items are entered in customised LibSys database with its weblink and if weblink is not there, the newspaper clippings are scanned and save the same in the server.

Once all the entries are done, html file is generated, and linked in digital library. The headlines are circulated through e-mail across TERI Globe. Archive of news item is also available both in searchable and calendar form.

2.2.2 Journals Content Alert

The website of core journals are scanned for the latest journal TOC and the same is linked in digital-library homepage, division-wise and researchers are informed through e-mail.



Figure 4. Current TERInet and digital library model.

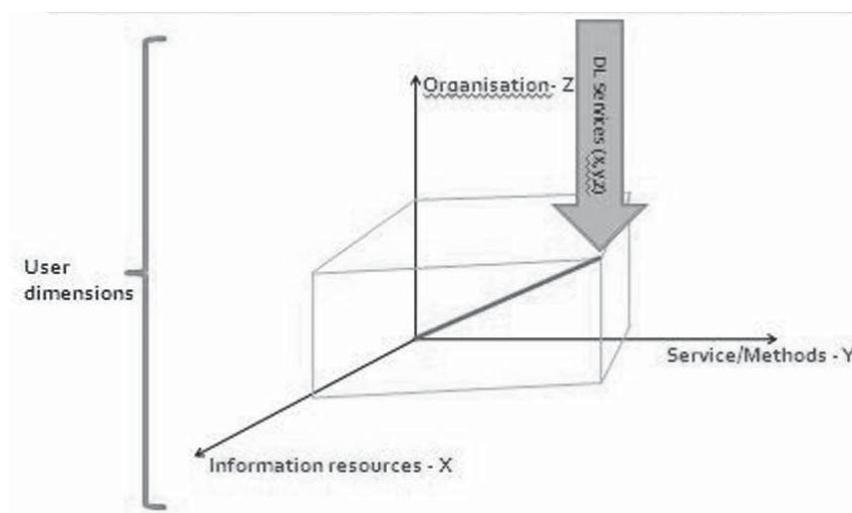


Figure 5. TERI three dimensional digital library system.

2.2.3 What's New in Other Institutes

The library professionals scan important Institutional repository in GSDL like WRI, World Bank, IISD, CICERONE, etc. in consultation to the researcher for their ongoing projects, latest publication and current emerging topics in the field of TERI research interest. Information collected through websites are compiled at one place and access is provided through e-library on monthly basis.

2.2.4 Recent Addition

A list of newly arrived online and printed books are generated from LibSys and updated on monthly-basis both on intranet (digital library) and internet (library site) and users are informed through e-mails.

2.2.5 Forthcoming Events

Information from conference websites, journals and also from subscribed events alerts is taken

regularly, forthcoming events information on various fields of TERI research.

Information about the latest events collected and feeded in LibSys database and the subject-wise list is generated with full detail about the event, which later on updated in digital library and circulated among researchers.

2.2.6 Articles Alert

On monthly basis researcher are collecting full-text latest articles from various online journals of TERI interest and sending across to relevant researcher though e-mail.

2.2.7 Online Journals

TERI Library is subscribing more than 575 current scientific and technical printed/online journals. It also subscribes online journals through JSTOR, Science Direct, and Springer. Online journals are

accessible through IP address and also through username and password.

2.2.8 e-Books

TERI has subscription to Springer e-book collection on earth and environmental science, Cambridge online books on climate change and apart from this, a number of e-books have been downloaded and purchased on researcher's request. Researcher can further consult or access these books through digital library.

2.2.9 CD-ROM Collection

Library has more than 2000 CDs on various subjects. All are available in TERI Server and researcher can access these CDs through digital library home page.

2.2.10 Databases and Portal

Library has subscription to online databases and portals like CMIE Prowess, India trade, Indiatat.com, Infraline.com, Petrowatch, etc.

2.2.11 Library Catalogue

Library is using LibSys database for library management purpose and the TERI researcher across the globe can access the library collection catalogue through web OPAC (Online Public Access Catalogue).

2.2.12 Theses and Dissertations

Library also uploaded full-text of theses and dissertations submitted by the PhD students to TERI university on yearly basis.

2.2.13 Institute Repository in GSDL

Institute is also maintaining its in-house digital collection which include annual reports, MoUs, photographs, e-books, newsletter and journals published by TERI in GSDL Software.

3. MEASURING KNOWLEDGE ACCESS

With growing researchers hopes, blasts in know-hows and content and rising costs, assessment activities have become a routine part of library management. Besides conventional services, the library staff is putting enormous efforts to provide the best and innovative services to its researchers to support their research work.

Library has also adopted the mechanism of periodically examine researcher satisfaction with the library's collection, services, and information preferences to assure that researchers' changing needs are continually being met. Library staff at TERI conducted a comprehensive customer satisfaction survey in 2011 to meet with the current and future researchers needs.

3.1 Method of Analysis

- Direct Interaction with research professionals
- Questionnaires based user survey
- Data collected directly from publisher
- Result and Discussion of User Survey

3.1.1 What is Google Analytics (<http://support.google.com/>)

Google Analytics shows how people found a site, how they explored it, and how one can enhance their visitors experience. With this information, one can improve his website's return on investment, increase conversions, and make more money on the web.

3.1.2 How does Google Analytics work?

Google Analytics uses a first-party cookie and JavaScript code to collect information about visitors and to track one's website data. Google Analytics anonymously tracks how visitors interact with a website, including where they came from, what they did on a site, and whether they completed any of the site's conversion goals.

3.1.3 Usage Statistics through Google Analytics

TERI Library has installed the Google Analytics code in its digital library collection page and every month getting the information through e-mail as shown in Figs 6 & 7. The report shows the popularity of digital library page among users and status of top contents as listed in the list. Pages in the site were viewed by users a total of 4,384 times and most used pages are home page of TERI DL (/el.html), followed by News headline service (terilicnews.htm), Online Journals (ej.htm), Online databases (e-database1.htm), and electronic books collection (e-col.htm)

3.2 Questionnaires/User Survey Form

Library has designed an in-house user survey questionnaire using Microsoft technology (ASP.NET, Framework 2, Backened SQL Server 2005). Existing survey application captures various pieces of information from the end-user. The existing survey consists of questions and feedback or answers to those questions. The administrator should be able to see the survey statistics for every objective type (single choice or multi choice) question. There were eight questions (figure 8) under various categories. Name column was optional to hide the user identification, so that he can give his/her feedback freely.

The eight questions addressed were in the following areas:

- Access mode
- Library resources
- Library services
- Library rating in meeting user satisfaction

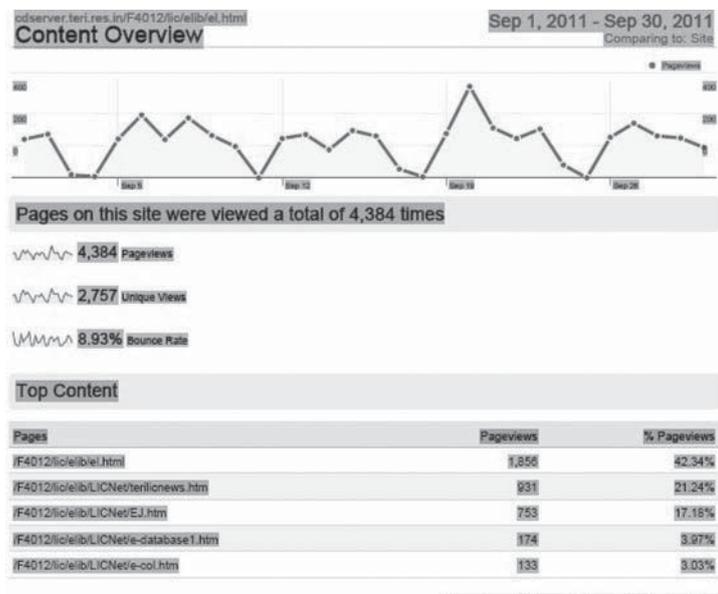


Figure 6. Google analytic content overview.

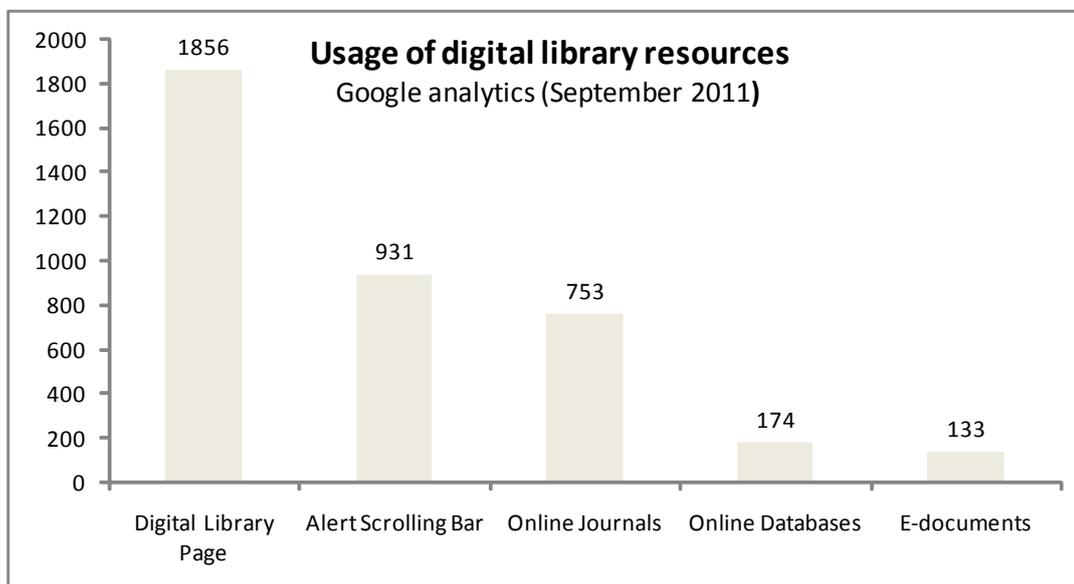


Figure 7. Top used contents of digital library.

4. RESULTS AND DISCUSSIONS

The LIC user survey was conducted to explore and assess the frequency of use of the library in the month of September 2011. The survey was carried out with an aim to improve and strengthen of library resources and services in disseminating authentic and value-added information. The LIC is primarily concerned with providing information that will keep the users up-to-date in their fields of basic interest as well as in their related subjects. The services are provided both on demand and in anticipation.

The LIC could manage to get 161 responses from TERI professionals. Results were based on the data extracted from the structured part of the web questionnaire and from the free field

comments that permitted participants to write down their comments. Results yielded positive feedback as well as opportunities for further improvements.

Among a number of digital services provided by TERI Library, 'News headline' is most popular and frequently used service among researchers (80) followed by 'Article of your interest' (48) and 'Journal content alert' service. A large number of researchers are accessing 'Digital services' occasionally and often. There are very few users to which the services provided are not applicable. (Fig. 9).

In case of resources, the graph shows that 'Cambridge online books collection' and e-documents/reports are frequently used by TERI LIC users followed by online theses/Dissertation, and 'Springer

Library User Survey

Can you spend your valuable five minutes to fill up this feedback form so as to strengthen the collection base and improve library services? We solicit your quick response

Name (optional)

1) Please indicate your frequency of use of library services or collections -

Visiting the library Daily Weekly Monthly Less often occasionally N/A

Online access Daily Weekly Monthly Less often occasionally N/A

2) How often do you use following basic services (please tick as applicable)

Issue/Return of books Frequently Often Occasionally Never N/A

On-demand book purchase Frequently Often Occasionally Never N/A

Inter-library loan, DELNET, etc Frequently Often Occasionally Never N/A

Literature search Frequently Often Occasionally Never N/A

Reference and referral services Frequently Often Occasionally Never N/A

3) How often do you use following E-services

Forthcoming event alerts Daily Weekly Monthly Less often occasionally N/A

Figure 8. User survey questionnaire.

e-books collection'. There are 87 users who are often using the CD-ROM collection followed by theses and e-book collection. There are some researchers which are not aware of the services provided by the library staff due to their busy travel schedule. (Fig. 10)

Users' response on LIC rating for overall quality of services was quite satisfactory. The survey reveals majority of users have rated the library in category 'Very Good' (73), followed by 45 responses in category 'Good' and 30 responses in category 'Excellent' and 13 as 'Satisfactory'. Therefore, the overall quality of library services was regarded to be high for majority of users. Further, it was noted that no users rated the library in low category in terms of its resources and services. The findings thus support users' satisfaction to overall library activities.

As expected, customers frequently used Google and other search engines to seek information needed for their work. Following subscribed library online journals and other databases. Their mode of preference to send the information queries to library is through e-mail followed by telephonic calls and info desk.

Majority of TERI researchers are satisfied with the digital services provided by the library staff. Forty nine per cent stated they were too busy to obtain the information. It was discovered that many of the researchers were not aware about the some of the services/resources of their research interest and there are very few users to whom these services are not relevant at all.

5.1 Library's Action Points

Based on the results and TERI researchers' remarks, the library incorporated the results of the survey into immediate operational improvements and future action plan items for 2012 Strategic Plan and Collection Development Policy.

Some of the ideas generated from the user feedback form for further improvement of existing digital services and start the new one of user research interests are:

- All recommendations online resources were extracted, priced, and put in area meeting for discussion and further action.
- The library incorporated into its 2012 strategic plan the aim to increase electronic resources, particularly e-journals in TERI research priority areas.
- The services which are less-used or never-used by most of the researchers will be dropped out and in place of those something new will be planned such as subject guide etc.
- The 2012 strategic plan also expands and steps up proper marketing of the library services among users, emphasising customised services, outreach, and collaboration with other libraries of similar research interest to position the library as a research partner with it scientists.
- Marketing the library services through website (www.teriin.org) and e-mails.

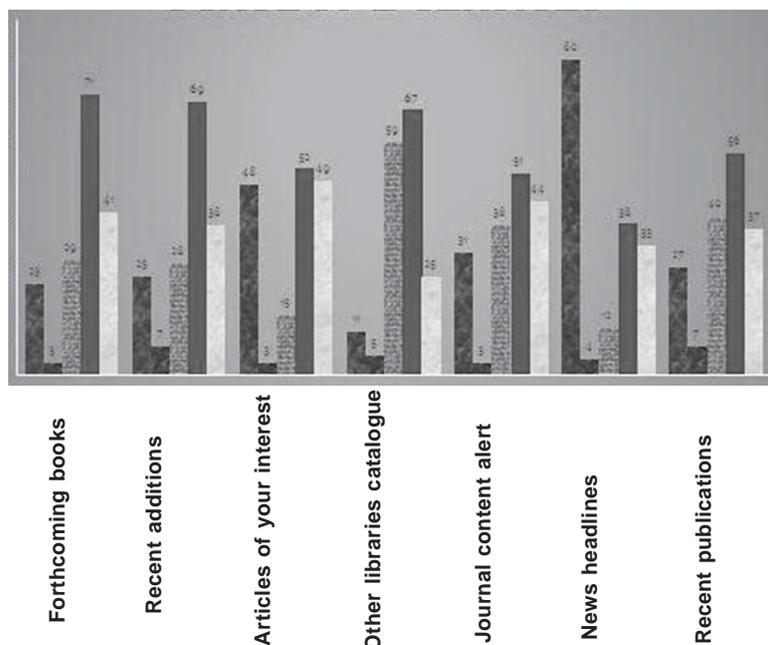


Figure 9. Usage of electronic services.

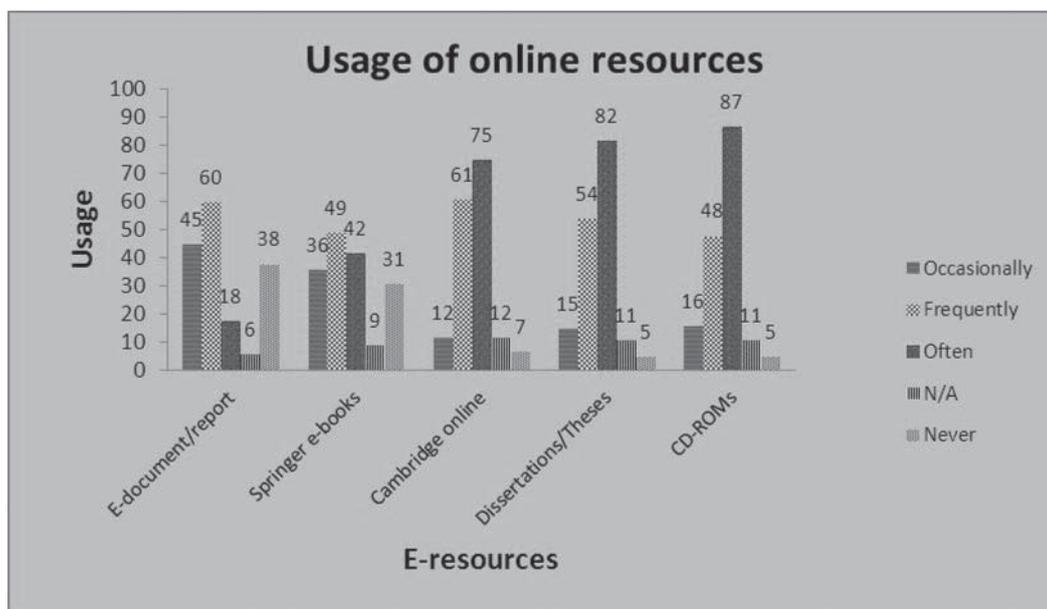


Figure 10. Usage of electronic resources.

- Library professional will organise more orientation programmes not for new joiners but also for the old researchers to familiarise them with various services provided by library.
- Web 2.0 application will be used to popularise the services and resources provided by the library to explore using these technologies in the future for new researcher in TERI.
- Library kiosk will be installed at the entrance of library in which tutorial about library services and resources run.

- Library professionals will increase face to face interaction among users to understand their need and make them aware about existing services and resources.
- Resources sharing and networking with other libraries for the maximum utilisation of resources.

6. CONCLUSIONS

TERI Library is one of the innovative library which is always busy in generating a number of digital services for their researcher and also busy

in regularly taking the feedback from the users on these services through different means. The google Analytic and survey result in overwhelmingly supported the presence of the library and the library staff, among users. It provided valuable evidence-based data to share with researchers and stakeholders. The survey took approximately a year to accomplish from planning through final report and significant staff time to execute the role and responsibilities with the help of internal resource advisor. As a tool for future planning, and to understand the library's user need-base and requirement, the survey and other feedback mechanism are absolutely invaluable and worth.

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