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Application of Web-Based Sources and Services for Sustainable Development in University Libraries

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Abstract

This study aims to explore the provision of web-based sources and services through the websites of university libraries in India. The present study adopted a content analysis method for examining various web-based library services and web-based sources provided through the university library websites with a checklist. A total of 50 top-ranked Indian universities were listed from the National Institutional Ranking Framework (NIRF) ranking list for the year 2020 in the category university. From these universities to be included as a sample for the present study; each university must have an independent library website. Secondly, the university library should be offering web-based library services and resources through the library website. Based on these criteria, 42 library websites were shortlisted as a sample for this study. The study found that majority of the libraries were offering traditional library services such as referral service, and library catalogue in a web-based environment more extensively compared to innovative and modern present-day services like library application (App), Instant Messaging (IM), and virtual library tours. Moreover, libraries are yet to explore the full potential of social media services and web 2.0 tools. A majority of the library websites were lagging in the provision of these services. It is suggested that libraries should make efforts to provide social media services extensively as the current generation are the predominant users of social media; hence it is evident on the libraries' part to make efforts to reach out to a wide population of their library users. This research is the first study of its kind highlighting the significance of university library websites in the provision of web-based services and sources for sustainability, and exploring the role of academic libraries in the promotion of sustainable development by processes like collection development on sustainable development themes, developing information literacy skills, spreading awareness, and organizing events on sustainable development and related areas.

Keywords: Web-based Services, Web-based Sources, Web 2.0, Library Websites, University Library, Academic Library, Sustainable Development, Library Sustainability

1. Introduction

Deteriorating ecological conditions, environmental degradation, climate change, and depletion of natural resources has substantiated the need to establish equilibrium between nature and humans. This has given prominence to the concept of sustainable development. The Brundtland Commission (1987) has defined sustainable development as "development which meets the needs of the present without compromising the ability of future generations to meet their own needs". Sustainability involves the use of renewable sources of energy, the process of recycling, conservation, waste disposal, water management, and eco-friendly development (Emanuel & Adams, 2011). The reason behind the rising importance of the area of ecological sustainability has appeared as a solution to looming environmental and social issues (Chen, Boudreau & Watson, 2008). With the intensified need for a sustainable society, various institutes of importance worldwide have found ways for incorporating and addressing sustainability through their missions and practices (Stephens & Graham, 2010). Library as an institution of importance academically and socially can contribute significantly to sustainable development. Barnes (2012) opined that libraries in their role as valuable community institutions can prove to be an ideal place for spreading the message of sustainability and the demonstration of green technology and practices among the community members.

2. Role of libraries as promoters of sustainable development

Library as an important social institution possesses both opportunity and responsibility to address the issue of sustainable development through their practices and services. University libraries being the hub of research and scholarly activities and the key disseminator of sources and services can lead by example and act as a role model for other organizations and institutions as the promoters for sustainable development by offering such services and following those practices that will encourage sustainable development thus also encouraging others for promoting and implementing sustainability through their institutional practices and endeavours. There has been a huge change in the methods in which library services are provided in the libraries in the 21st century. The need to revamp library services in an innovative way owing to the technological advances is quite apparent and so is the need to shift from physical presence to virtual presence and from paper to electronic delivery (Madhusudhan & Nagabhushanam, 2012). Library services have now moved out of the four walls of the library to a virtual environment and electronic resources accessible ubiquitously round the clock (Boachie, 2018). The web has changed the concept of a physical visit to the library for scholarly purpose with virtual access to library resources and services (Qutab & Mahmood, 2009). International Federation of Library Associations and Institutions (IFLA, 2015) has deemed the promotion of universal literacy including digital literacy and access to Information and communication technology (ICT) as crucial factors in libraries' contribution to sustainable development. Libraries as the hub of research and scholarly activities in universities provide a well-maintained Information and communications technology (ICT) infrastructure. The ICT can powerfully be utilized to deliver such ICT based services that will require no added cost, energy, or space thus promoting sustainability by using more virtual and energy-efficient services (Hilty & Ruddy, 2000).

University libraries can promote environmental sustainability in several ways such as collection development on sustainability theme, green library buildings and practices, promotion of information literacy, organizing events such as conferences, and workshops regarding sustainability issues and provision of virtual user services. An ideal and feasible way of promoting and maintaining environmental sustainability is the use of web-based sources and services or the use of a digital environment for the provision of information

sources and services. Chowdhury (2010) highlighted the significance of the digital environment for ecological sustainability in a study stated: "there will be less paper, less ink, less production and transportation of physical knowledge products, and all these will eventually result in a reduction of carbon footprint". Environment-friendly sustainable library services are need of the hour, calling for prompt attention, planning and action on the part of the library community (Kang, 2020).

3. Significance of the study

The significance of university library websites in providing web-based sources and services is indisputable. They provide an effective central site for accessing libraries' information and resources. Several studies have highlighted the importance of libraries in the delivery of web-based services for users irrespective of time and location. Libraries are playing a vital role in the dissemination of information services through their websites (Haridasan and Uwesh, 2014). They serve as indispensable tools for content delivery and outreach activities of libraries (Wilson, 2015). Library websites are instrumental in the provision of digital information by providing a portal for accessing a plethora of e-resources and services virtually to the user (Al-Qallaf and Ridha, 2019). Fourie (2012) considered library website as a green way of dissemination of information and suggested that the library community can contribute to sustainable development through green practices and make a significant difference by promoting green means of information dissemination through electronic publishing and thus making less use of paper.

In this context, the study's need is highly imperative as the analysis of the content of the university library websites will help in analysing the strength and weakness of the library websites. The present study's results and recommendations will help the university libraries redesign their websites in a better way. Besides presenting users with better-designed websites and other required improvements, it will enable the provision of web-based sources and services through the websites that were lacking earlier. Moreover, the recommendations regarding library websites' contributions in the promotion of the concept of sustainable development will help libraries explore previously unexplored areas of sustainable development and take measures to integrate them into university library websites.

4. Research questions

R1. Which web-based library services and resources are provided by the university libraries to their users?
R2. What are the various ways of providing virtual reference services by the libraries through their websites?
R3. What web-based tools and services are offered by the libraries for supporting the research activities of their clientele?
R4. What is the presence of the libraries' social networking accounts across various social media platforms?
R5. How can academic library websites make a significant contribution to the promotion of sustainable development?

5. Research Design

The scope of the present study includes the content analysis of university library websites to examine the provision of web-based services and sources through the websites. The National Institutional Ranking Framework (NIRF) is a body approved by the Ministry of Human

Resource Development, Government of India for ranking institutions across the country. The ranking list for the year 2020 in the category university, namely 'India Rankings 2020: University', was used for selecting the sample of universities for the study. A total of the top 50 universities were listed. From these universities to be included as a sample for the present study; each university must have an independent library website. Secondly, the university library should be offering web-based library services and resources through the library website. Based on these criteria, 42 library websites with active hyperlinks were shortlisted as a sample for this study. The present study has utilized the standards used by a similar study by Wilson (2015) for determining the independence of library websites, which included the presence of OPAC (Online Public Access Catalogue) and other general library-related content and information.

However, the major delimitations of the study are listed below:

- The study analysed the library websites that were accessible from the selected universities' websites through hyperlinks.
- The study was limited to the main/ central library websites as some of the universities had a system of library websites. In such cases, only the main library website was included in the study.
- Analysis of the social media accounts/ web 2.0 services of the selected libraries was limited to the links provided through the library websites for accessing the official account of the libraries.

6. Data Collection

The present study adopted a content analysis method for carrying out the study. A checklist was prepared after reviewing the related literature from previous studies (Balaji *et al.*, 2019; Al-Qallaf and Ridha, 2019a; Wilson, 2015). The checklist was used to collect the data from the websites of the libraries under the study. The contents of the selected library websites were surveyed from August 2020 to September 2020. The checklist prepared for the data collection included the following components:

Web-Based Library Services: Provision of library services in a web-based environment including Online Public Access Catalogue (OPAC), Institutional Repository (IR), New Arrivals, Referral Service, Library App, News & Events, Online Document Delivery Service (DDS), Library virtual tour, Online renewal /reservation of books.

Virtual Reference Services: Provision of virtual reference services such as Email, Call/ Phone, Web forms, FAQ, Ask Services, Instant Message/Chat, Bulletin Board, SMS/ Text message, Video-Conferencing.

Online Research Tools/ Services: Provision of web-based research tools and services facilitating research activities such as Remote Login, Discovery tools/ Federated search tool, Plagiarism Check, Grammar Check, Tutorials and Guides, citation and referencing.

Social Media Account/ Web 2.0 Services: Including Facebook, Twitter, YouTube, Instagram, LinkedIn Blog, Social Bookmarking.

Web-Based Resources: Access to web-based resources such as E-Journals, E-Books, Online Database, ETD, E- Reports, E-Newspapers, E-reference sources, E-Multimedia resources etc.

7. Literature review

Libraries can be the facilitator of sustainable development in varied capacity. Several studies have highlighted the role of libraries in the promotion of sustainable development through the process like collection development on sustainable development themes, use of electronic resources as sustainable means of publications, developing information literacy skills, spreading awareness, and organizing events on sustainable development and related areas, also collaborating with environmental agencies and other special interest groups in display and distribution of environmental-themed educational resources. (Alpi, 2000; Beutelspacher and Meschede, 2020; Jankowska and Marcum, 2010; Purnik and Vasileva, 2018)

Library websites serve as an excellent medium of representing the libraries to the world virtually and can be instrumental in exhibition and promotion of libraries' sustainability initiatives also, interacting with users and creating awareness among them about environmental issues. Shu (2008) proposed developing academic library websites as virtual spaces providing flexible, and user-oriented interfaces, engaging users and facilitating enriched user experiences also, supporting content sharing by developing online communities through the use of online publishing and sharing tools such as blogs, wiki etc. Several studies have revealed that libraries make use of services like email, text messaging, web form, Instant Messaging (IM), online chat, VoIP, video conferencing, for providing virtual reference services to their patrons. However, among these Instant Messaging (IM), online chat, and video conferencing are not widely used (Linh, 2008; Mainka *et al.*, 2013; McConnaughy and Wilson, 2018; Rahman and Batcha, 2020). Bharati and Madhusudhan (2019) suggested that the library websites need to integrate user-friendly features like QR codes, instant messaging, tagging, sharing, Virtual tour etc. for bridging the gap between library and users.

Web accessibility involves facilitating users' interaction with websites and removing the barriers which may prevent such interactions. Devi and Verma (2018) found that on a majority (74%) of the Indian Institutes of Technology (IIT) websites library link was hidden under other broad headings such as facilities, quick links, etc. The study observed that it becomes confusing for the users if the library link is hidden under other broad headings rather than being provided directly on the parent institution's home page. Khademizadeh and Mohammadian (2019) suggested that library websites should provide users with easy navigation experience by clean, clear, and easy to access navigation bar to facilitate users' interaction with the websites and provision of good user experience. Wilson (2015) revealed that the majority of academic libraries in Alabama displayed more prominent information sources on their home pages while general library information was provided through links from the home page as placing important information on the library website's homepage makes it promptly accessible. Blummer (2007) reported that poor design of the websites caused hindrance to users in navigating the required material. The study suggested that academic libraries need to ponder over design and content in planning the library websites.

Use of social media has enhanced the provision of library services, along with offering the ease of access and dissemination; they have opened the door for provision of extension and outreach services. Mahmood and Richardson, (2011) surveyed academic library websites of USA to explore the acceptance of Web 2.0 technologies. The study presented a positive picture of the academic libraries under the study regarding the adoption of Web 2.0 technologies. All of the studied library websites adopted some form of web 2.0 tool. Libraries generally used these tools for sharing news, provision of information literacy instruction, promotion of library events, sharing pictures, and marketing of library services. Balaji *et al.*, (2019) explored the usage trend of web 2.0 applications in top-ranked Asian academic libraries through their websites. The study found that the websites used a wide variety of Web

2.0 applications such as blogs, Social Networking Sites (SNS), photo, and video sharing media, social bookmarking, and Rich Site Summary (RSS). Facebook was the most used web 2.0 application, followed by Rich Site Summary (RSS), Twitter, YouTube, Blog, and Instagram while, LinkedIn, Pinterest, Flickr, Tumblr and Podcasting were used less. On the contrary, in an earlier study, Qutab and Mahmood (2009) reported a lack of interest or consciousness about the importance of web-based services in Pakistan. It was observed that the libraries were highly lagging in the provision of web 2.0 services as none of the libraries provided any form of web 2.0 services or social media services apart from the provision of RSS feeds. Han and Liu (2010) found that the adoption of web 2.0 tools on Chinese university libraries' web sites is in its development stage as the number of web 2.0 services offered by the library websites is limited. Al-Qallaf and Ridha (2019) evaluated the presence of instructional features such as web-based tutorials, information literacy programs, research guides, plagiarism and citation guides on the library websites and reported that a good number of library websites offered some or the other form of library instruction for facilitating patrons' user experience. Majority of the library websites provided Research guides (50.05%) followed by OPAC search tips (45.5%) and Information literacy program (39.1%). In a content analysis study, Haridasan and Uwesh (2014) found that majority of the university library websites provided information about Online Public Access Catalogue (OPAC) followed by library loan, reprographic and document delivery services. A large number of library websites give information about electronic resources such as e-journals, online databases, and e-books. However, only a few of them provided links to resources like consortia, institutional repository, and subject gateway etc.

Studies have suggested various means for improving user experience through better-designed websites. Kumar and Yadav (2020) highlighted the need for formulating a policy for university library portals, regarding the minimum contents that should be mandatorily made available through the library portals to the users. Qutab and Mahmood (2009) suggested conducting studies analysing the library websites for improving their usability and quality for meeting international standards. Vasishta (2013) opined that libraries should strive to develop an interactive web portal providing active hyperlinks. Guides and tutorials should be made available to facilitate users' journal search and access experience.

8. Findings and discussion

On analysis of the data collected through the checklist after surveying the contents of sample library websites the following findings are derived which are discussed under the following headings:

8.1 Web-Based Library Services

The shift from traditional libraries to virtual spaces has provided libraries with excellent opportunities to serve their users in unprecedented ways considering the information environment offered by the web and Information and Communication Technology (ICT). The opportunity presented by the use of ICT and the web-based environment has provided libraries with the prospect of redesigning library services and make them ecologically sustainable through the delivery of library services in a web-based environment. The major advantage offered by web-based services that is conducive to sustainability is the privilege of delivery of library services at the users' doorstep without even needing to travel to the library for the provision of library services. The significance of providing library services over the web lies in the fact that it reduces the need to travel to the library, reducing environmental pollution, and saving resources and energy.

Table I: Web-Based Library Services

Web-Based Library Services	Number of Libraries	Percentage
OPAC	41	97.62
IR	24	57.14
New Arrivals	20	47.62
Referral Service	39	92.86
Library App	4	9.52
News & Events	30	71.43
Online DDS	12	28.57
Virtual library tour	2	4.76
Online renewal /reservation of books	8	19.05

Table I reveals that the provision of Online Public Access Catalogue (OPAC) is the most popular online library service provided by the libraries as a majority (97.62%) of the university library websites studied provided OPAC search on their websites. Referral service is a service provided by libraries for catering to the information needs of the users by directing them to useful sources other than those provided by the libraries. It can be seen from the data above that a high percentage of the libraries provided online referral service (92.86 %) to the patrons in the form of links to other useful resources and websites. 71.43 per cent of libraries provided online news and events service. A few libraries provided Information Repository (IR) (57.14%) facility and notification about the new arrivals (47.62 %) or addition of information sources to the library collection. For fulfilling the information needs of the library users, some of the libraries offered the provision of needed documents through e-mails in form of online document delivery service (DDS) (28.57%). Online renewal /reservation of books/ documents service was provided by 19.05 per cent of libraries. A small percentage of the libraries provided online mobile library application (App) (9.52 %) and library virtual tour (4.76 %) facility to their users. A similar study by Verma and Devi (2016) revealed that a meagre percentage of management institutes' (IIM) library websites provide virtual library tour on their websites.

8.2 Virtual Reference Services

Reference service has always been an important aspect of library services traditionally. Though, with the changing times and advent of Internet and Information and communications technology (ICT) methods of provision of reference service to library clientele has evolved and changed greatly. Virtual reference service (VRS) is the provision of reference service electronically with the help of ICT. It is a fast and efficient way of providing reference help to users irrespective of time and location. Virtual reference service can be easily provided by using a variety of services such as email, instant message/ live chat, SMS/ text message, phone. VRS also encompasses Web forms, Bulletin Board System (BBS), and FAQ (Fang, 2013).

Table II: Virtual Reference Services

Virtual Reference Services	Number of Libraries	Percentage
Email	38	90.48
Call/ Phone	35	83.33
Web forms	18	42.86
FAQ	10	23.81
Ask Services	12	28.57
Instant Message/Chat	7	16.67
Bulletin Board	3	7.14
SMS/ Text message	0	0
Video-Conferencing	1	2.38

Table II analyses the provision of virtual reference services by university libraries through their websites. It is visible from the data that most popular service provided by libraries for contacting library staff is Email, as a majority (90.48 %) of libraries provided the email address of library staff for responding to users' query, which was followed by the provision of phone numbers as contact information. Web forms are simply online forms that can be filled and sent through the web without using paper and hence avoiding unnecessary wastage of paper thus supporting sustainable development. 42.86 per cent libraries have web form facility on their sites, whereas 23.81% of libraries provide Frequently Asked Questions (FAQ) service. Moreover, Ask Services such as Ask Us, or Ask a Librarian are provided by 28.57 per cent libraries. While, instant message (IM) / live chat (16.67 %), bulletin board (7.14 %) services are provided by a small percentage of libraries. A negligible percentage (2.38 %) of libraries offered Video-Conferencing service to its users. Interestingly, none of the libraries provided SMS or text messaging facility to their users. In a similar study Balaji, Vinay, Shalini, and Raju (2019) reported that academic libraries provide digital reference service through emails, instant messaging (IM) tools, video calls and chats. However, it was noted that the IMs and video chat were not highly used method of offering digital reference service.

8.3 Online Research Tools and Services

The web has bestowed the scholarly community with valuable tools for greatly enhancing their research activity and productivity. Academic libraries, being the hub of research and scholarly activities have the obligation of providing professional support and generating awareness among the researchers about the advancements in prevalent research tools and services. Libraries can play a critical role in supporting researchers' scholarly and research endeavours by developing skills and practices that will enhance their efficiency and productivity (Ince, Hoadley & Kirschner, 2019). Research needs of the researchers ought to be evaluated regularly for the proper provision of scholarly guidance and services (White & King, 2020). The need to identify and provide current and pertinent research tools and services is quite apparent so that the research needs of the researchers are addressed and research productivity is enhanced. Table III identifies various online research tools and services that the university libraries are offering through their websites for facilitating the research endeavours of their clientele.

Table III: Online Research Tools/ Services

Online Research Tools/ Services	Number of Libraries	Percentage
Remote Login	25	59.52
Discovery service/ Federated search tool	16	38.09
Plagiarism Check	25	59.52
Grammar Check	12	28.57
Tutorials and Guides	13	30.95
Link to citation managers	12	28.57

Remote Login facility allows users to access to e-resources remotely from any location. Remote access facility not only ensures optimum usage of library resources off the university campus and beyond the library hours but also allows researchers with easy access to quality resources round the clock. It can be a potential facilitator of sustainable development by reducing the need to travel subsequently less pollution, less consumption of resources and energy. It can be seen from Table III that 59.52 per cent of the university libraries provided remote access facility to its users. Web-scale discovery service or Federated search tools provide a powerful and efficient method of searching a wide variety of information resources scanning a large body of data on a single search point. It allows library patrons to search holdings of the library's catalogue, other locally developed library contents such as digitized collections along with all the information resources subscribed by the library from a single search interface (Comeaux, 2017). Thus it can greatly improve search results minimizing the efforts of users of searching through each information source separately and can be of great help to researchers. 38.09 per cent of libraries offered discovery service or Federated searching facility to their users. While 59.52 per cent libraries provided information about plagiarism check on their websites. Software for checking grammar was provided by 28.57 per cent libraries. Tutorials and Guides can be an important way of getting familiarized or gaining knowledge about a topic. 30.95 per cent of libraries provided tutorials and guides and it was observed that the libraries under study provided them for better searching of information resources, also guides for plagiarism checking, information literacy tutorials etc. were provided by the libraries. Links to citation managers such as Endnote/ Mendeley were provided by 28.57% libraries.

8.4 Social Media and Web 2.0 Services

Implementation of social media and web 2.0 services/ tools by libraries has revamped the provision of library services in current web-based information environment diversifying the range of web-based library services that can be offered to patrons by libraries. Application of web 2.0 services has converted libraries into places that can be visited virtually from remote locations beyond the premises of the library. Web 2.0 services have provided libraries with the opportunity of reaching a wider audience and improving the interaction between users and libraries where users can act as both the consumer and the contributor to libraries (Tripathi & Kumar, 2010). Social media with its tremendous capability of reaching the masses can be instrumental in promoting and disseminating sustainability research, practices,

and program. In a study, Twitter and Facebook were identified as two popular social media platform for disseminating sustainability research. Blogs were also used by the university websites to disseminate their sustainability initiatives to some extent (Filippo, Benayas, Peña, & Sánchez, 2020).

Table IV: Social Media Account/ Web 2.0 Services

Social Media Account/ Web 2.0	Number of Libraries	Percentage
Facebook	6	14.28
Twitter	2	4.76
YouTube	5	11.90
Instagram	0	0
LinkedIn	0	0
Blog	5	11.90
Social Bookmarking	0	0

Table IV shows the presence of the libraries' social networking accounts across various social media platforms. The present study checked the social media account of university libraries under the study. Library websites were searched for the links leading to the libraries' social media account. Only those library websites that provided working links to libraries' official social media account were considered for the study as some of the library websites provided the links to their parent institution social media account while some other provided links that were not working. Such websites were not included in the study. As seen from the data not many libraries are involved in offering Web 2.0 services only 14.2 per cent libraries had their official Facebook page which was followed by YouTube (11.90%) and blogging (11.90%) service. Surprisingly, none of the libraries provided Instagram, LinkedIn, or Social Bookmarking services. The study found that university libraries generally used their social media accounts for promoting and publicising library events, for current awareness about the latest addition to library collections also, for informing users about various events such as workshops and conferences. In a study by Ahenkorah-Marfo and Akussah (2017) the majority of librarians agreed that social media can be used to deliver better user services than the traditional methods.

8.5 Web-Based Resources

The World Wide Web along with the Information and communications technology (ICT) has provided libraries with a tremendous opportunity of providing a plethora of web-based resources. The most important benefit of using these web-based resources is less usage of paper, less cutting of trees, and hence the reduction of carbon footprint and consequently, promotion of sustainable development.

Table V: Web-Based Resources

Web-Based Resources	Number of Libraries	Percentage
Links to E-Journals	40	95.24
Links to E-Books	37	88.09
Links to Online Database	41	97.62
Links to ETD	35	83.33
E- Reports	10	23.81
Links to E-Newspapers	14	33.33
Links to E-reference sources	20	47.62
Links to Multimedia resources	21	50
Other E-sources	12	28.57

Web-based resources have made the process of knowledge sharing and scholarly communication exceedingly easy and productive serving as an important medium for various scholarly and academic endeavours (Firdaus & Haridasan, 2015). Libraries can make a significant contribution to sustainability by using e-resources. Electronic sources of information such as e-journals, blogs, institutional repositories and multimedia publications as sustainable means of publications can be promoters for sustainable development (Jankowska & Marcum, 2010). It can be seen from Table V that high percentages of the libraries provided links to online databases (97.62%) several studies corroborate this finding that majority of academic library websites provide information about online databases through library websites (Aharony, 2012; Michalec, 2006; Verma & Devi, 2016). Provision of links to online databases was followed by links to E-journals (95.24%) and E-books (88.09%). ETD or E-Theses and Dissertations serve as important sources of information for researchers. 83.33 per cent of libraries provided access to ETDs some of the libraries provided links to E-theses and dissertations, while some others provided them on their websites through institutional repositories (IR). Half of the libraries offered links to multimedia resources (50%). A moderate percentage of the libraries also provided the links to reference sources (47.62%) such as encyclopaedia and dictionaries etc. 33.33 per cent of the libraries provided links to E-Newspapers. E-reports in the form of project research reports and annual reports were provided by 23.81 percentages of the libraries. While a small percentage of the libraries provided some other E-resources such as electronic question papers of examinations, digitized manuscripts and books.

9. Conclusion and recommendations

This study examined the provisions of web-based library services and sources through the library websites with the help of a checklist. The checklist was designed to evaluate various elements of web-based services such as the traditional library services provided in a web-based environment involving, new arrivals, referral service, library catalogue, and document delivery service along with some innovative library services resulting as the product of technological advancements like mobile library application (App), Instant Messaging (IM), chat service, virtual library tour services etc. Additionally, the application of web 2.0 and the provision of interactive user-oriented social networking services through the library websites was checked. Moreover, online tools and services such as web level discovery tools, citation

and referencing tools, plagiarism checking service providing support and enhancing the efficiency of researchers and facilitating research and availability of various web-based resources. It was observed that the majority of university libraries were offering traditional library services in a web-based environment more comprehensively in comparison to more innovative and modern present-day services. Libraries were providing traditional library services such as library catalogue, referral service, new arrivals, or addition to library collection by modernizing them as demanded by technological advancements to be delivered in a web-based environment i.e. the shift from the traditional catalogue to Web-OPAC, referral service in form of hyperlinks to useful resources and online notification about the new arrivals in the library rather than the extensive provision of contemporary and current services such as mobile library application (App) and virtual library tour. Investing efforts and resources in the development of mobile library application (App) is highly recommended for catering to the needs of the current tech-savvy generation of users who are engrossed into mobile devices like smartphones and tablets. Mobile library application (App) allows libraries to remain connected to their users 24x7 and providing the patrons with an interactive and personalized user experience right into the palm of their hands. It was quite heartening to note that libraries do consider reference service an important facet of library services as libraries were offering several services to virtually address the reference queries of the users. A majority of the university library websites provided e-mail addresses for contacting library authorities. Though, Instant Messaging (IM), and video-conferencing services were underutilized. However, these services if utilized properly offer an exciting possibility for catering to reference queries of the users in real-time; thus, using these services for providing virtual reference services is recommendable. The study identifies that there is room for improvement in the provision of online research tools and services for researchers as information about citation and referencing tools, citation guides, web search guides and tutorials, and information literacy tutorials were lacking on a majority of the library websites. Also, the remote login facility was not provided by a great number of libraries and only a small number of library websites offered web-scale discovery service.

It is suggested that libraries should increase the provision of remote login facility to their users to enhance the optimum usage of resources subscribed by the libraries and also decrease the need to travel, consequently less consumption of resources and energy. Similarly, increasing the utilization of other web-based services like online renewal and reservation of books, online document delivery service (DDS) etc. may be conducive in promoting sustainability.

This study found that libraries are yet to explore the full potential of social media services and web 2.0 tools. A majority of the library websites were lagging in the provision of these services. It is suggested that libraries should make efforts to provide social media services extensively as the millennial generation are the predominant users of social media; hence, it is evident on the libraries' part to make efforts to reach out to a wide population of their library users. Social media services and web 2.0 tools present libraries with the immense opportunity of providing dynamic, interactive, and user-oriented web-based services, along with improving the user services web 2.0 tools also allow libraries to make a profound shift in the manner of provision of traditional library services in a web-based environment. The prospect of using them for the provision of library services in a web-based environment is quite promising. The findings on the provision of web-based resources are quite positive as the majority of the library websites provided users with a variety of web-based resources to the users. Library websites can play a highly significant role in the promotion of the concept of sustainable development. Certain steps can be taken by the libraries to make library websites an important tool for sustainable development such as serving as a portal for facilitating access to content and resources related to sustainable development and allied

areas. Creating awareness among the users through the use of library websites along with the profound use of social media for promoting the concept of sustainable development also, organizing online webinars, lectures, and events on sustainable development can be conducted. It is highly recommended that libraries ensure induction of a special corner on library websites dedicated entirely to the latest news, information, trends, and research about sustainable development and related areas such as climate change, environmental degradation eco-friendly products and services helping users to keep track of sustainability initiatives, current practices and trends around the world. Additionally, it is reported by the study that libraries are effectively providing referral service to the users and it is likewise suggested to use it for the benefit of promoting sustainability by providing hyperlinks to resources related to sustainable development to the users and facilitating their access to pertinent sustainability resources. Although quite a few library websites were providing web forms facility on their websites it was however found by the study that some of the libraries provided various forms in PDF format for downloading and printing rather than the web forms. It is strongly recommended that libraries opt for web forms which will eliminate the need for printing and unnecessary wastage of paper. Also, social networking services can be effectively used by the libraries to create awareness about sustainable development, green practices, and services. Apart from this, blogging, social bookmarking, photo, and video sharing services can be used for similar purposes. Another suggestion is to use the library websites for generating awareness about the best practices of sustainable development i.e. the use of three R's – reduce, reuse and recycle for the conservation of natural resources, reduction of pollution and waste. This can be an important step as it can make individuals mindful about the use of the principle of three R's in their everyday schedule so that every individual can make a small yet significant contribution to sustainable development.

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