THE PROGRESS: A Journal of Multidisciplinary Studies
Vol.6, No.1 (March, 2025), Pp.100-108
ISSN (Online): 2958-292X, ISSN (Print): 2958-2911
DOI: https://doi.org/10.71016/tp/9ghm6c34

Original Article **https://hnpublisher.com**

Developing Collaborative Digital Reference Services among University Libraries of Pakistan

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ABSTRACT

Aim of the Study: Information and Communication Technologies (ICT) have brought about tremendous changes in reference services, transforming how users access and use information. The study aims to assess and analyze the practicality of developing collaborative digital reference services (CDRS) among university libraries of Pakistan.

Methodology: This research study used a mix-methods research design that combines quantitative and qualitative methods. A questionnaire was used to gather the quantitative data for the study. The population for the quantitative research study was the chief librarians, head librarians, and the library in-charges of the central libraries of all universities in Pakistan (both in the public and private sectors), which are recognized by the Higher Education Commission of Pakistan (HEC). To obtain the qualitative data, semi-structured interviews were conducted from chief librarians, head librarians, and the library in-charges, who were selected using a purposive sampling technique. The qualitative data was analyzed thematically, while the quantitative data was analyzed using the Statistical Package for Social Science (SPSS) Version 22.

Findings: Finding shows that all university libraries of Pakistan have sufficient ICT infrastructure like computers, servers, image scanners, printers, internet connection, library website, Online Public Access Catalogue (OPAC). The non-availability of technology resources and digital reference services software prevents libraries from offering digital reference services.

Conclusion: Study concluded that university libraries use different strategies for marketing digital reference services such as through library staff, library website, information literacy, training and guidance and especially through social media (i.e., Facebook, Twitter, wikis etc.). University libraries across Pakistan need good ICT infrastructure to facilitate collaboration and digital reference services.

Keywords: Reference Services, Digital Reference Services, Collaborative Digital Reference Services, Virtual Reference Services, University Libraries, Pakistan, ICT Infrastructure.

Article History

Received:
January 08, 2025

Revised:
March 19, 2025

Accepted:
March 22, 2025

Online:
March 30, 2025

1. INTRODUCTION

Libraries need a robust Information and Communication Technology (ICT) infrastructure to support digital reference services and provide users with seamless access to information. ICT infrastructure should be scalable, adaptable to emerging technologies, and continuously monitored to meet evolving needs. It allows libraries to provide users with access to digital resources, streamline operations, offer various user services, facilitate collaboration, digitize and preserve valuable materials, and provide data analysis tools. It also enables libraries to engage with their communities beyond physical spaces through social media, websites, and online platforms. ICT advancements have drastically changed how information is handled, making it easier to create, acquire, store, organize, retrieve, search for, view, update, and send information electronically. According to (Rafiq, 2012), the ICT infrastructure has expanded, and usage of the Internet for research purposes has increased in Pakistan day by day. Pakistani libraries are utilizing ICTs for various purposes such as digital library collection, inter-library loans, electronic document delivery and digital reference services. The concept of a reference service has been revolutionized by the spread of information technology. A few years back, a reference librarian sat behind the reference desk and helped patrons with questions via face to face or telephone conversation but now ICT has a significant impact on digital reference services such as electronic mail, video conferencing and online chat (Lateef & Mairaj, 2023). With the help of ICT, developing countries provide collaborative digital reference services. The concept of collaboration has been used in libraries for a long time. Increasing user needs and information explosion are the root causes of collaboration. Resource sharing is the best and most basic example of collaboration. Many libraries have understood the importance of providing digital reference services through collaborative services. The Library of Congress offers collaborative digital reference service (CDRS), which is a free reference service project, and more than 100 libraries from different countries are connected. The primary objective of CDRS is to offer reference service to users anytime and anywhere through a worldwide digital network of libraries and information centres. Online Computer Library Centre (OCLC) also constructs and retains databases that contain member profiles, request managers, and a knowledge base (Chandwani, 2010). The Pakistani government has made various efforts to develop ICT to support and promote education and research culture in Pakistan but these efforts are still in initial stages. Pakistani libraries are far behind modern developed libraries in terms of their resources, services and ICT infrastructure. Pakistani libraries are transforming but due to many internal problems, the pace of this transformation is very slow. So this study is an attempt to examine the current state of ICT infrastructure available in university libraries of Pakistan for offering CDRS.

2. LITERATURE REVIEW

The three major revolutions in human society - agricultural, industrial, and technological - have significantly impacted our physical, social, financial, and political environment. The technological revolution, an expansion of the 18th and 19th-century industrial revolutions, is transforming the public through ICT usage (Kumar, 2007).

The twentieth century was marked by the technological revolution, particularly the invention of the computer in the mid-twentieth century. Engineers and scientists from Germany, the UK, and the US contributed autonomously to improve the computer. Initially, the PC was similar to an estimation machine, but Konrad Zuse in Germany planned a system- controlled computation machine in 1943. Bletchley Park in the UK and Howard H. Aiken in the US created the Automatic Sequence Controlled Calculator (ASCC) in 1944. The first PC, ENIAC, was built in 1945 in Philadelphia. (Allan). The PC innovation has rapidly grown, refined in size and quality, and decreased in cost, making it accessible to laymen worldwide. Lap Top's innovation has enhanced its conveyed ability and accommodation.

According to the (Authority, 2007) survey, Pakistan's internet penetration has been slow, with only 1500 users in 1995. However, by 1997, the number increased to 10,000, and by 2002, to one million. By 2007, the country had 3.5 million users and 17 million clients across 2,419 cities and towns. Around 80% of

internet users were in the three major cities. Personal computers (PCs) have become a domestic item in big cities, with 700,000 PCs in 2005 and increasing to 100,000 annually. Most specialists and students have a PC in their organizations, work offices, or homes (Mahmood et al., 2008).

Over the past 50 years, the PC and ICT have significantly impacted various aspects of human society, including libraries. These advancements have enabled libraries to computerize their functions, reduce costs, and provide quick data delivery, transforming not only library resources but also the dynamic nature of librarianship (Mairaj, 2010). According to (Ramzan, 2004), "The role and approaches of librarians in this changed development have been fundamental as the champions of presenting technology-based library resources, services, and systems.". Mahmood et al. (2008), communicated their perspective that Information technology has significantly transformed the role of librarianship, with the advent of PCs and communication technologies. This has led to the development of the Internet and World Wide Web, which have significantly impacted the world. Pakistan, a country behind the global curve in IT application, began demonstrating its presence in 1992 after investing in improving IT infrastructure. Saeed et al., (2000), mentioned that in 1993, 200 cities and towns joined Pakistan's national-wide system. LUMS being the first non-business organization which propelled its Web access with 64-bit data transmission and Digicom being the first business sector Internet market pioneer. Pakistan's telecom sector has seen a significant increase in foreign direct investment (2% of GDP) over the past three years, thanks to investor-friendly policies and the government's favourable environment (Ramzan, 2010).

The online computer Library Center survey reveals that the majority of people use the internet for information seeking, with 98% of university students using it for ease of information acquisition. Researchers increasingly use the internet for browsing and searching, making it their "first port of call." (de Argaez, 2011), Surveyed In March 2008, 17.5 million people in Asia used the Internet, with Pakistan ranking fifth in the South Asia Region. By 2007, around 3002 towns and cities were connected, with 816,807 people using the internet for home and office purposes.

2.1 Problem Statement

Libraries have significantly benefited from the integration of ICT into their daily operations. This study aimed to fill a gap in local literature by examining the current state of ICT infrastructure for collaborative digital reference services and attempted to fill the gap in the local literature because no study regarding collaborative digital reference services in university libraries of Pakistan had been previously conducted and also provide baseline information and guidelines to libraries and library professionals.

2.2 Research Questions

Following particular research questions were set for this study:

RQ1. What tools are being used for offering digital reference services in university libraries of Pakistan?

RQ2.What ICT infrastructure is available for offering digital reference services in university libraries of Pakistan?

RQ3.What are the challenges and prospects for developing collaborative digital reference services among university libraries of Pakistan?

3. RESEARCH DESIGN AND PROCEDURE

This research study used a mix-methods research design that combines quantitative and qualitative methods because quantitative research design is appropriate for generalizing the findings to a large population (Connaway & Powell, 2010; Creswell & Clark, 2011). A survey research approach was applied because it is systematic and it is the most effective and popular approach to gather data from a sizable population (Abbott & Bordens, 2011). Pickard (2013), mentioned that survey research approach

allows getting data faster, accurately and with less effort and it is effective for achieving the goals of quantitative research. A questionnaire was developed with the help of existing literature. A structured questionnaire was used because it is a cost-effective way of gathering data when the study population is enormous, distributed and different and a very high response rate is obtained (Marshall, 2005). After the assessment of the questionnaire by qualified professionals and subject experts, the web-based questionnaire, created in Google Forms, was sent to the target population. The population for the study consisted of all chief librarians, head librarians, and library in-charges of the central libraries of all HEC-recognized DAIs and universities in Pakistan (both public and private sectors). Out of the 218 DAIs and universities recognized by the HEC at the time of the conduction of the survey, responses were sought from 200 DAIs and universities due to the absence of contact information, refusal and libraries being in developing stage for the remaining 18 DAIs and universities. The researcher got 166 responses out of 200 respondents so that the percentage of collected responses was 83%. To obtain the qualitative data, semi-structured interviews were conducted from chief librarians, head librarians, and the library in-charges, who were selected using a purposive sampling technique. The qualitative data was analyzed thematically, while the quantitative data was analyzed using the Statistical Package for Social Science (SPSS) Version 22.

4. RESULTS AND DISCUSSION

4.1 Demographic Information

Demographics information is an important characteristic of a population. University name, category, sector, province/region, and Year of the establishment of the university libraries of Pakistan are the components of demographic information.

Table 1 indicates that majority university libraries belonged to general category and other belonged to engineering & technology, medical business, science & technology and agriculture category. *Table 2* shows that majority university libraries (107, 64.5%) belonged to public sector universities and fifty-nine (59, 35.5%) belonged to private sector universities.

Table 3 elicits fifty-nine (59, 35.5%) universities are located in Punjab province, forty-eight (48, 28.9%) in Sindh, twenty-five (25, 15.1%) in Khyber Pakhtunkhwa, twenty-one (21, 12.7%) in Islamabad Capital Territory region, six (06, 3.6%) in Baluchistan province, five (05, 03%) in AJK (Azad Jammu & Kashmir) and only two (02, 1.2%) universities are located in Gilgit Baltistan. *Table 4* reveals that a large number of universities established during (56, 33.7%) during 2011-2020 because the remarkable efforts of HEC.

Table 1: Category *of the university libraries (N=166)*

Disciplines	***f***	**%**
General	91	54.8
Engineering & Technology	30	18.1
Business Education	12	7.2
Science & Technology	7	4.2
Medical	20	12.0
Agriculture	6	3.6
Total	**166**	**100.0**

Table 2: *Sector wise university libraries (N=166)*

University Categories	***f***	**%**
Public	107	64.5
Private	59	35.5
Total	**166**	**100.0**

Table 3: *Province/Region of the university libraries (N=166)*

Universities region	***f***	**%**
Punjab	59	35.5
Sindh	48	28.9
Khyber Pakhtunkhwa	25	15.1
Baluchistan	6	3.6
Gilgit Baltistan	2	1.2
Islamabad Capital Territory	21	12.7
Azad Jammu and Kashmir	5	3.0
Total	**166**	**100.0**

Table 4: *Year of the establishment of the universities (N=166)*

Year of establishment of the universities	***f***	**%**
Before 1947	8	4.8
1947-1960	4	2.4
1961-1970	6	3.6
1971-1980	17	10.2
1981-1990	16	9.6
1991-2000	33	19.9
2001-2010	26	15.7
2011-2020	56	33.7
Total	**166**	**100.0**

4.2 Tools for Providing DRS

As shown in Table no 5, email was the most commonly used tool for providing DRS, which was used by 118 (92.9%) libraries. Web form, web 2.0 tools / social media (Facebook, twitter etc.), web chat/instant messaging and FAQ (frequently asked questions) were other commonly used tools for providing DRS. It was observed that no library was using CDRS.

Table 5: *Tools for providing DRS*

Tools for Providing DRS	***f***	**%**
E-mail	118	92.9
Web Form	55	43.3
Web Chat/Instant Messaging	40	31.5
ChatterBot *(*ChatterBot is a python library that makes is easy to generate an automated response to user's input)	08	6.3
FAQ (Frequently asked questions)	33	26
Web 2.0 tools / Social media (Facebook, twitter etc.)	45	35.4
Voice over Internet Protocol Video	16	12.6
Collaborative Digital Reference Service	0	0
WebCam Conferencing	17	13.4

4.3 Information and Communication Technology Infrastructure

The participating university libraries provide information about various items in ICT infrastructure which are most necessary for designing and implementing an effective collaborative digital reference services. Computers are essential tools in libraries, enabling information access, digital reference services, productivity, internet connectivity, digital creation, skills development, and community engagement.

Libraries with ICT infrastructure necessary for CDRS. Table 6 indicates that all the university libraries have computer facility which is very encouraging from the past studies. Saeed et al. (2000) finds that only 50% university libraries have computers. Malik and Mahmood (2013), also reported that majority of the university libraries have computer. Table 6 indicates that all the university libraries have computer. University libraries also have the server which provides organized and centralized storage. Servers are essential for data backup and recovery, supporting safeguarding valuable library content. Malik and Mahmood (2013), reported that only 28 university libraries have server. Table 6 indicates that 102 (61.4%) libraries have servers. Image scanners enable libraries to digitize and archive print materials, preserving fragile or rare items for long-term preservation and minimizing physical handling. (Malik and Mahmood (2013)), reported that only 29, 76% university libraries have image scanner. Table 6 shows that 126, 75.9% university libraries have image scanner. Printers are crucial in libraries, providing physical copies of requested documents and facilitating efficient delivery of materials through document delivery services or interlibrary loan (ILL) processes. They expand access to resources beyond the library's physical collection, enabling patrons to print from digital sources or library databases. Printing services enhance convenience and accessibility, allowing users to obtain hard copies of relevant information within the library premises, especially for reference. Malik and Mahmood (2013), finds that all the university libraries of the Punjab have printers. Current study also endorses the finding of (Malik & Mahmood, 2013). Table 6 shows that the use of fax machines (27, 16.3) in university library is rare because libraries use the technology but fax machines have been a common means of communication in libraries for many years, but their importance has diminished with the advent of digital technologies. However, they still hold some relevance in certain library settings. Some libraries still rely on fax machines for interlibrary loans. Saeed et al. (2000) reported that only 50 Present university libraries have the internet connection but the current research study finds that all the university libraries have internet connection which is crucial for libraries as it provides access to online resources, supports digital reference services, facilitates online collaboration and learning enables interlibrary loan and resource sharing, supports digital preservation, enhances community engagement and outreach, and fosters technology integration and innovation. Butt, Mahmood, and Shafique (2011), Conduct a research study on ‘Access and Use of the Internet in the Libraries of Lahore, Pakistan’ and reported that academic libraries use internet access among others. Libraries must ensure reliable and high-speed internet connectivity to meet the information needs of users in the digital era. Indicates that one hundred eleven (111, 66.9%) university libraries have internet connection provided by PERN (The Pakistan Education and Research Network Provided by HEC. COMSATS, PTCL, NAYATEL, WI- TRIBE, World Call, Watten Telecom and Link Dot Net are the leading internet provider in Pakistan.

Table 6 shows that one hundred-six (106, 63.9%) university libraries use fiber optic cable, seventy (70, 42.2%) use wireless, fifty (50, 30.1%) use DSL, eight (08, 4.5%) libraries use satellite, six (06, 3.6%) libraries use cellular and four (04, 2.4%) libraries use dial-up for internet connection. Table shows that twenty-nine (29, 17.5%) libraries have less than 10 MB internet bandwidth, thirty-nine (39, 23.5%) libraries have 11 MB – 20 MB internet bandwidth, thirty-two (32, 19.3) libraries have 21 MB – 30 MB and fifteen (15, 9.0) libraries have 31 MB – 40 MB, fifty-one (51, 30.7) have 41 MB – 50 MB. A library website serves as a gateway to the library's resources, services, and information. It offers convenient access to the library's catalogue, online resources, digital reference services, event listings, policies, and more, enabling users to engage with the library remotely and access resources at their convenience. Malik and Mahmood (2013) informed that the situation about library website and OPAC are not encouraging. Ramzan (2010) also reported the same situation about these two facilities but now situation are improving. Eighty-eight (88, 53.0%) University libraries have library website and one hundred-thirteen (113, 68.5%) libraries have OPAC (Online public access catalogue) which is a digital system used by libraries to provide users with access to the library's collection of materials. It serves as an online catalogue or database that users can search to find books, journals, audio visual materials, and other resources available in the library. OPACs allow users to search for library materials using various search criteria, including title, author, subject and keyword. This research study finds that only 19 university

libraries use Webchat instant messaging software, which is known as chat reference or virtual reference, is a communication method that has become increasingly popular in libraries. It involves using real-time chat software or platforms to provide reference and information services to library users. This research study finds that only 18 (11.4%) university libraries used Video/webcam software which plays an important role in libraries, particularly in supporting virtual communication and collaboration. Video/webcam software enables libraries to offer virtual reference services through live video interactions. Users can connect with librarians in real-time, ask questions, seek research assistance, and receive personalized guidance. Past studies and this research study finds that Koha 81 (54%) is the most popular and favourite library automation software among university libraries of Pakistan. Library automation refers to the use of technology and software systems to automate and streamline various library processes and operations. It involves the implementation of an integrated library management system (ILMS) or library automation system (LAS) that centralizes and automates tasks such as cataloguing, circulation, acquisitions, serials management, and more. The current research study finds that 93 (56.0%) university libraries have Institutional repositories. D-space 56 (60.2%) is the most well-known and popular software for institutional repositories in Pakistan. Institutional repositories is crucial for libraries as they provide centralized access to scholarly output, preserve institutional knowledge, promote open access and public engagement, facilitate compliance with funding mandates, support research data management, enhance institutional branding and visibility, provide valuable metrics and analytics, and foster collaboration and networking within and beyond institutions. They contribute to the advancement of research, scholarship, and knowledge dissemination.

Table 6: *Libraries with ICT infrastructure necessary for CDRS*

Item Name	***f***	**%**
Computer	166	100
Server	102	61.4
Image Scanner	126	75.9
Printer	164	98.8
Fax Machine	27	16.3
Internet Connection	166	100
Library Website	88	53.0
OPAC (Online Public Access Catalogue)	113	68.1
PERN (The Pakistan Education and Research Network)	111	66.9
Fibber Internet connection mode	106	66.9
41 MB – 50 MB Internet Bandwidth	51	30.7
Webchat instant messaging software	19	11.5
Video/webcam software	18	11.4
Koha (Library Automation Software)	81	54.0
D-space (Institutional repository)	56	60.2

4.4 Challenges and Prospects of Developing CDRS

Due to financial constraints, the rising cost of library material, and staffing problems, many libraries in developing countries have started setting up CDRS. With the help of CDRS, libraries extend service hours and share their information resources, workload, time, and expertise. It helps to reduce costs and save libraries financial resources. It would support the growth of cooperative efforts among library members and allows smaller libraries to access the resources of larger institutions. All interviewees appreciated the idea of developing CDRS and considered it a need of the hour. It will be an excellent initiative.

4.5 Delimitation of the Study

Inclusion Criteria: The higher education commission recognized degree-awarding institutions were included. The study only included the main campus/central libraries of the universities.

Exclusion Criteria: The current study did not include university libraries or degree-awarding public or private sector institutions that are not recognized by Pakistan higher education commission (HEC). It also excluded departmental and sub-campus libraries from the study.

5. CONCLUSION

The findings of this study indicate that there has been an improvement in the ICT infrastructure compared to previous conditions. However, it is important to note that the overall situation still needs attention in order to effectively build and implement collaborative digital reference services (CDRS). University libraries have good numbers of computers, servers, image scanners, printers, and internet connection. University libraries use Koha for library automation and D-Space is most famous software for institutional repository. The situation of Webchat Instant Messaging (IM) and Video / webcam software are the murky area that needs to be improved on urgent basis. Librarian market library resources through library website, information literacy sessions and through social media (i.e Facebook, Twitter, Wikis etc) because effective marketing strategies help libraries to promote their services and ensure that they are meeting the needs of their users but there are some major barrier like Financial constraints, non-availability of technological resources, non-availability of digital reference software and non-availability of skilled and trained staff which are the barrier for providing digital reference services to their users and need to overcome these barrier.

Acknowledgement

None.

Disclosure Statement

No potential conflict of interest was reported by the authors.

Funding Source

The authors received No funding to conduct this study.

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