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To cite this article: Abid Hussain & Muhammad Ismail (28 Feb 2025): Factors Influencing the Adoption of Mobile Services Among Academic Librarians: Perceived Advantages and Barriers in Islamabad, Journal of Library & Information Services in Distance Learning, DOI: [10.1080/1533290X.2025.2470173](https://doi.org/10.1080/1533290X.2025.2470173)

To link to this article: <https://doi.org/10.1080/1533290X.2025.2470173>

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 Published online: 28 Feb 2025.

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# Factors Influencing the Adoption of Mobile Services Among Academic Librarians: Perceived Advantages and Barriers in Islamabad

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## ABSTRACT

This study examines the factors influencing the adoption of mobile services, their advantages, and the barriers academic librarians face in Islamabad, Pakistan. The study used survey method of research using quantitative approach. After an extensive literature review, a structured questionnaire was developed to collect data from academic librarians of Islamabad, Pakistan. The findings show that most librarians perceived mobile services as a good omen for academic libraries and showed great interest. However, factors like data security measures, individual attitudes, librarians' resistance, the bombardment of extensive information, and the level of digital literacy and technical skills are a few factors influencing mobile services in academic libraries. The research emphasizes the potential advantages of mobile integrations. It suggests that adopting smartphones will foster library services, enhance accessibility and tailor strategies to promote seamless integration among academic libraries. The study reports significant findings with implications for Library and Information Science (LIS) education, policymaking, and scholarly research as well as ongoing professional development initiatives for academic librarians nationwide.


## KEYWORDS

Mobile services; mobile applications; smartphones; academic libraries; academic librarians; Islamabad

## Introduction

Academic libraries worldwide are integrating mobile services in order to enhance user engagement with library resources to support their research faculty and students (Moorthy et al., 2019; Ocran et al., 2020). Mobile services foster innovation, enhance library services, and provide 24/7 accessibility to online materials (Masrek & Hussein, 2021). Digital literacy and technical skills are crucial for adoption (Rafiq & Hussain, 2023). Librarians with higher digital literacy tend to use mobile technologies in

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 Supplemental data for this article can be accessed online at <https://doi.org/10.1080/1533290X.2025.2470173>.

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their library services. Those organizations that offer training programs and continuous skill development for their librarians are more innovative in adopting digital technologies, contrary to those that need more skills that are technical. Librarians across the globe consider that digital technologies have security and privacy concerns and express apprehensions about the safety of sensitive data. They emphasize that there should be transparent security measures to protect mobile services for widespread adoption. Arguably, librarians with technological skills may exhibit more positive attitudes and a greater willingness to embrace mobile services (Rafique et al., 2018). Conversely, those librarians where conservatism prevails have less tilt toward mobile services. Librarians with less developed technological skills should study the benefits of mobile services and identify external factors like support from technology vendors and government regulations. The government should adopt policies encouraging academic libraries to integrate mobile services with the educational environment to expedite their use.

Globally, mobile use is widespread, with 189 million mobile cellular subscribers in Pakistan (Pakistan Telecommunication Authority, 2023). However, the adoption of mobile services in Pakistani academic libraries remains unclear. Most studies on mobile services in academic environments were conducted in advanced countries, with few focusing on Pakistan (Hussain, 2022a,b, 2023). The increasing prevalence of mobile technologies and their potential benefits that can be used to transform library services has become crucial (Moorthy et al., 2019).

The major purpose of this study is to examine the factors influencing the adoption of mobile services among academic librarians in Islamabad, Pakistan, exploring the perceived advantages and barriers to mobile service integration. Specifically, the research seeks to identify the factors that facilitate or impede the adoption of mobile services among academic librarians, examine the benefits and challenges connected with mobile service integration in academic libraries, and inform decision-makers, educators, and Library and Information Science practitioners on strategies to foster a conducive environment for effective mobile service utilization.

## Literature review

Globally, libraries leverage mobile technologies to enhance academic services. Yet, librarians in developing countries are still deliberating on adopting mobile applications, whereas their counterparts in developed nations have already integrated mobile devices and services to advance library offerings. Despite global trends, librarians in Pakistan are hesitant to embrace mobile technologies, citing uncertainty about their effectiveness

in enhancing local library services (Khurram & Khan, 2023). The adoption of mobile services among academic librarians in Islamabad has become a subject of a diverse array of influential factors that underscore the unique contextual dynamics of the region. Mobile adoption in academic libraries depends on technical infrastructure, library policies, organizational support, resource allocation, and integration with existing systems. Moreover, academic librarians' digital literacy and technical skills significantly impact mobile technology utilization. Hanif et al. (2021) asserts that user interface and effective information management strategies are key factors that influence mobile adoption in the academic environment. According to Hussain (2020a,b), individual attitudes and openness to embracing new technology significantly impact mobile adoption among academic librarians. Furthermore, his study revealed that librarians' resistance to change constitutes a substantial barrier to adoption.

Adopting mobile services has potential advantages and positive impacts on academic libraries in Islamabad, Pakistan. According to Hossain et al. (2019), mobile services in academic libraries enhance accessibility to academic resources. Hamid and Chavoshi (2018) are of the view that mobile services facilitate a collaborative learning environment and are efficient for research support activities. Alalwan et al. (2018) ascertained that mobile services give access to information 24/7 round the clock and positively impact patrons. Kumaraswamy et al. (2018) explored how mobile adoption improved communication between library staff and patrons and concluded that it is a good source of information sharing and communication. Similarly, Al-Hunaiyyan et al. (2018) examined that mobile services are a revolutionary step in educational sectors in the age of technological innovations. Hussain (2023) discovered that Mobile services enable users to access library resources anytime, anywhere. Rafiq et al. (2021) articulated that mobile services allow users to access library catalogs and databases and help in the search and discovery of library resources. Similar to Hossain et al. (2019) disclosed that the integration of mobile technology with a learning management system (LMS) allows users to access library resources directly. Hamidi and Chavoshi (2018), Afthanorhan et al. (2019), and Khan et al. (2019) investigated how mobile services reduce the physical paperwork within the library ecosystem and stated that mobile services can send notifications regarding library events, newly arrivals, due dates, and can be cost-effective for libraries in the long run. In Pakistan, incorporating mobile services with academic libraries is a progressive step with multifaceted potential and advantages. Although there are certain challenges, such as lack of digital literacy and inadequate technological infrastructure, the perceived benefits underscore the transformative potential of mobile services in Pakistan's academic setup.

Librarians around the globe encounter a range of challenges and barriers in the adoption of mobile services. Past studies of advanced countries indicate that most librarians need more technology infrastructure, such as issues with network connectivity and hardware limitations. In their research, Zhang et al. (2019) and Afthanorhan et al. (2019) ascertained that limited access to smartphones and reliable high-speed internet in certain regions is an overarching challenge. Studies conducted by Hossain et al. (2019) and Moorthy et al. (2019) concluded that lack of training opportunities for students, faculty, staff, and librarians may also hinder the adoption of mobile services in the academic setup. Bernacki et al. (2020), Khan and Ayesha (2022), and Sánchez-Prieto et al. (2019) have explored that security concerns regarding data protection and privacy are a few formidable obstacles that can impede mobile services in academic libraries. In their study, Boruff and Storie (2014) studied that lack of institutional support and clear policies regarding adopting mobile services may hinder library professionals' digital skills. Hussain (2023) found that academic librarians in developing countries contend with multifaceted challenges like support from organizations, individual interests, and systematic barriers in the evolving terrain of adopting mobile services in their professional domains. Hamidi and Chavoshi (2018) indicated that disparities in digital literacy and access to mobile devices among library users can create a digital divide. Rafique et al. (2018) ascertained that limited awareness and acceptance among library patrons regarding the availability and benefits of mobile services may result in low demand. In the context of Pakistan, academic librarians face distinct challenges like the digital divide, lack of high-speed internet, institutional constraints, and the need for organizational support. In their study, Al-Hunaiyyan et al. (2018) opined that necessary infrastructure and implementation of comprehensive training programs impede the adoption of mobile services. Similarly, Kaliisa and Picard (2017) stated that security concerns, often exacerbated by inadequate cyber security measures, become profound barriers. Khan and Qutub (2016) have reported that resistance to change within academic librarians and supportive framework are key factors for Pakistani librarians to adopt mobile services in the academic environment. In essence, librarians in Pakistan, amid challenges, are striving to overcome these barriers to fully harness the transformative potential of online services *via* mobile technology to advance library practices and support the educational goals of our institutions.

## Research questions

1. What are the factors that influence the adoption of mobile services among librarians in academic libraries in Islamabad, Pakistan?

2. What are the perceived benefits and advantages of integrating mobile services with academic libraries in Islamabad, Pakistan?
3. What are the challenges/hindrances that academic librarians face while adopting mobile services in academic libraries in Islamabad, Pakistan?

### **Theoretical support**

The theoretical framework for the present study is drawn from the research conducted by Hamad et al. (2018). Their model effectively examines librarians' acceptance and use of mobile services in academic libraries. Since this study focuses on the perceptions of academic librarians in Jordan, a developing country, it holds relevance for Pakistan as well, which also faces low adoption rates of mobile services in its academic libraries. While many scholars have applied various theories, such as Unified Theory of Acceptance and Use of Technology (UTAUT), Technology Acceptance Model (TAM), and Digital Object Identifier (DOI), these studies are predominantly based in developed countries like the USA, UK, and Germany. The model used in this study is straightforward and suitable for librarians in developing countries like Pakistan, providing a solid rationale for implementing mobile services in the future. Therefore, it is essential for this model to incorporate modern technologies to enhance service delivery and client satisfaction.

### **Methods and procedures**

The present study is based on the survey research method, commonly used to study large groups' preferences, practices, concerns, settings, attitudes, and behavior. Several researchers employed this research design to assess the attitude of librarians toward Information Communication Technologies (ICTs) in libraries (Ramzan et al., 2021; Ramzan and Singh, 2010). After an extensive literature review, a structured questionnaire was developed to collect data from academic librarians. The first section of the questionnaire was about demographic variables of the participants, including gender, age, designation, qualification, and experience. The second section comprised three questions regarding the factors influencing the adoption of mobile services among academic librarians, perceived benefits and advantages, and the challenges they usually faced while adopting them. The questionnaire was sent to experts in the Library and Information (LIS) field to check items' relevancy and accuracy. In light of the experts' feedback, necessary revisions and changes were made regarding the instruments' clarity, length, and language.

All librarians working in the university libraries across Islamabad, Pakistan, were the population of the study. The population of university

librarians was selected for the following reasons. First, due to the absence of any comprehensive list of academic librarians in the country, it took a lot of work for the researchers to identify and approach the librarians working in schools and colleges. However, in the case of university libraries, the task was comparatively easy through websites, as most universities have active web pages with the staff directory and other library details. Second, university libraries in Pakistan are considered more developed and advanced than school and college libraries due to funding and infrastructural resources. The questionnaire was developed using “Google Forms” and an online tool for data collection. The link to the questionnaire was shared using multiple methods, including social media platforms such as Facebook, personal email addresses of librarians acquired from their respective university webpages, professional email, and WhatsApp groups. The survey remained open from November 2, 2023, to December 10, 2023. After repeated follow-up calls, a total of  $N=317$  (88.06%) dully filled questionnaires were received. Data were analyzed using Statistical Package for Social Sciences (SPSS) using descriptive data, including frequency, percentage, mean score, and standard deviation, and presented in the following tables.

### Data analysis

Table 1 provides a demographic snapshot of respondents’ gender, age, job designation, experience, and highest educational degree. The ratio of male respondents was  $n=133$  (61.3%) while female respondents were  $n=84$  (38.7%). This distribution indicates a gender imbalance, with a higher representation of males than females in the sampled population of librarians. Understanding and addressing gender disparities in the workplace is crucial for promoting diversity and inclusion within the profession. The age distributions suggest that the highest gender ratio was up to 30 years: 29.5%, 31 to 40 years: 21.7%, 41 to 50 years: 28.1%, and above 50 years: 20.7%. The age distribution suggests a relatively balanced representation across different age groups. This diversity in age can contribute to a dynamic work environment, with the potential for knowledge transfer between experienced professionals and younger, more recent entrants to the field. The job designations of the respondents reveal that most were Librarians (47.5%), followed by Library Assistants (19.4%) and Assistant Librarians (15.7%). A smaller proportion of respondents included individuals in the “Others” category (12.0%), and the smallest group comprised Chief Librarians (5.5%). Regarding their years of experience, the largest group of respondents had 11–15 years of experience (31.8%), followed by those with 0–5 years (22.6%). Those with 16–20 years of experience made up 18.9%, while 6–10 years accounted for 14.3%. The smallest group had over 20 years of experience



**Table 1.** Demographic information of respondents.

		Frequency	Valid percent
<b>Gender</b>	Male	133	61.3
	Female	84	38.7
<b>Age</b>	Up to 30 years	64	29.5
	31–40 years	47	21.7
	41–50 years	61	28.1
	Above 50 years	45	20.7
<b>Job designation</b>	Chief librarian	12	5.5
	Librarian	103	47.5
	Assistant librarian	34	15.7
	Library assistant	42	19.4
	Others	26	12.0
<b>Experience in years</b>	0–5 years	49	22.6
	6–10 years	31	14.3
	11–15	69	31.8
	16–20 years	41	18.9
	Above 20 years	27	12.4
<b>Highest degree</b>	BS/Master	167	77.0
	MS/MPhil	43	19.8
	PhD	7	3.2
	<b>Total</b>	<b>217</b>	<b>100.0</b>

(12.4%). Most librarians have attained a Bachelor's or Master's degree, highlighting the educational qualifications prevalent in the field. The presence of individuals with higher degrees, including Ph.D., indicates a potential for research and academic contributions within the profession; among them, the highest ratio was BS/Master: 77.0%, followed by MS/M.Phil: 19.8% and Ph.D.: 3.2%. This demographic overview provides valuable insights into the composition of the librarian workforce in terms of gender, age, job roles, experience, and education. These insights can inform strategic initiatives to promote diversity, tailor professional development opportunities, and foster collaboration within librarianship.

The survey asked respondents how often they use mobile services. As given in [Table 2](#), majority of them ( $n=209$ ) indicated that they use mobile services frequently whereas year-wise distribution showed that librarians who used mobile services for less than a year were 46, and librarians who used mobile services between 1 and 3 years were 54; among them, 44 were those who used mobile between 3 and 6 years; however, librarians who used mobile services more than 6 years were 65. Only eight respondents answered no as indicated in the given table. Thus 203 respondents in out of 217 used mobile devices while only eight respondents did not. Mobile phones have become an essential part of our daily lives, and most librarians have Smartphones for their personal use.

To understand what factors influence the adoption of mobile services among academic librarians in Islamabad, Pakistan, we asked participants to rank the statements as given in [Table 3](#) on a 5-point Likert scale from strongly disagree to strongly agree. As shown in [Table 3](#), ten statements were presented to the librarians to gauge their perception of various factors that influence the adoption of mobile services in academic libraries. The



**Table 2.** Respondents' frequency of mobile usage.

		If yes, for how long you used mobile services				
		Up to 30 years	31–40 years	41–50 years	Above 50 years	Total
<b>Yes</b>	Less than a year	17	5	18	6	46
	Between 1 and 3 years	20	12	0	22	54
	Between 3 and 6 years	13	25	6	0	44
	more than 6 years	12	4	34	15	65
	<b>Total</b>	62	46	58	43	209
<b>No</b>	Less than a year	1	0	0	1	2
	Between 1 and 3 years	0	1	0	1	2
	Between 3 and 6 years	0	0	1	0	1
	more than 6 years	1	0	2	0	3
	<b>Total</b>	2	1	3	2	8
<b>Total</b>	Less than a year	18	5	18	7	48
	Between 1 and 3 years	20	13	0	23	56
	Between 3 and 6 years	13	25	7	0	45
	more than 6 years	13	4	36	15	68
	<b>Total</b>	64	47	61	45	217

**Table 3.** Factors influencing the adoption of mobile services among academic librarians of Islamabad, Pakistan?

	Descriptive statistics		
	N	Mean	Std. deviation
The accessibility and affordability of Smartphone	217	4.09	1.021
Reliable and high-speed internet access	216	4.06	.922
Library policies and resources	215	4.00	.959
The compatibility of mobile services with existing library systems and technologies	214	3.92	1.154
The level of digital literacy and technical skills among academic librarians can	215	3.88	.890
Data security measures	216	3.78	.923
Individual attitudes and openness to embracing new technologies	216	3.74	.844
The level of support from mobile service providers or technology vendors	216	3.52	.849
Librarian's resistance to change	214	3.45	1.133
Bombardment of extensive information	213	3.33	1.163
Valid N (listwise)	212		

accessibility and affordability of Smartphones got the highest (Mean = 4.09, SD = 1.021), followed by “Reliable and high-speed internet access (Mean = 4.06, SD = .922). The next highest means score was “Library Policies and Resources” (Mean = 4.00, SD = .959) “Library Policies and Resources” got the highest mean score (mean 4.00, SD.959), followed by

“The Compatibility of Mobile Services with Existing Library Systems and Technologies” (Mean = 3.92, SD = 1.154). The fourth statement “the level of digital literacy and technical skills among academic librarians” got (Mean = 3.88 SD = .890) followed by the statement “Data Security Measures” (Mean = 3.78, SD = .923). The crucial factor in these statements is “Individual attitudes and openness to embracing new technologies” (Mean = 3.74, SD = .844). The next statement described “the level of support from mobile service providers or technology vendors” (Mean = 3.52, SD = .849) while “Librarian’s resistance to change” had (Mean = 3.45, SD = 1.133). Another statement, “Bombardment of Extensive Information” got a (Mean = 3.33, SD = 1.163). These statement shows that various factors influence the adoption of mobile services in the academic setup of Pakistan.

Table 4 shows the perceived advantages and potential impacts of integrating mobile services in academic libraries in Islamabad, Pakistan. A total of 16 constructs were placed before librarians to gauge the benefits of mobile services. The constructs were rated on a five-point Likert scale from strongly disagree to strongly agree. The highest construct among them was found to be “Mobile services enhanced accessibility to academic resources” (Mean = 4.09, SD = 1.202), followed by Mobile Services Facilitate Collaborative Learning (Mean = 4.06, SD = 1.262). Similarly, the statement “Librarians also Perceived that Mobile Services Efficiently Support Research” had (Mean = 4.00, SD = 1.400). Moreover, the statement “It Improved Communication and Engagement” got (Mean = 4.00, SD = .921) followed by “Mobile Services Empower Digital Literacy” (Mean = 3.92, SD = .815). The statement “Mobile Services are Technological Innovation in Education” got (Mean = 3.88, SD = .92). On the other hand, the statement “Mobile Services Enable Users to Access Library Resources anytime, anywhere” got (Mean = 3.85, SD = 1.021). The statement “mobile services allow users to access library catalogs and databases” had (Mean = 3.80, SD = .922). Some librarians believed that “mobile services help in the search and discovery of library resources (Mean = 3.78, SD = .959). The statement “mobile services facilitate real-time communication with patrons got (Mean = 3.74 SD = 1.154). The other statement, “mobile services enable library staff to offer remote services, got (Mean = 3.52, SD = .890). Few librarians were of the view that “Integration of mobile technology with Learning Management System (LMS) allows users to access library resources directly (Mean = 3.45, SD = .923), while other believed that mobile services reduce the physical paperwork within the library ecosystem (Mean = 3.33, SD = .844).

The statement “mobile services can be used to send notifications regarding library events, fresh arrivals, and due dates” got a (Mean = 3.33, SD = .849). While the statement “Mobile Services can Create Virtual Communities or Discussion Groups, Fostering Knowledge Sharing”

**Table 4.** Advantages of mobile services.

	Descriptive statistics		
	N	Mean	Std. deviation
Mobile services enhanced accessibility to academic resources	215	4.09	1.202
Mobile services facilitate collaborative learning	216	4.06	1.262
Mobile services are efficient for research support	216	4.00	1.400
It Improved communication and engagement	213	4.00	.921
Mobile services empower digital literacy	212	3.92	.815
Mobile services are technological innovation in education	215	3.88	.927
Mobile services enable users to access library resources anytime, anywhere.	217	3.85	1.021
Mobile services allow users to access library catalogs and databases	216	3.80	.922
Mobile services help in the search and discovery of library resources	215	3.78	.959
Mobile services facilitate real-time communication with patrons	214	3.74	1.154
Mobile services enable library staff to offer remote services	215	3.52	.890
Integration of mobile technology with LMS allows users to access library resources directly	216	3.45	.923
Mobile services reduce the physical paperwork within the library ecosystem	216	3.33	.844
Mobile services can be used to send notifications regarding library events, fresh arrivals, and due dates	216	3.33	.849
Mobile services can create virtual communities or discussion groups, fostering knowledge sharing.	214	3.24	1.133
Mobile services are cost-effective for libraries in the long run	213	3.23	1.163
Valid N (listwise)	212		

(Mean = 3.24, SD = 1.133). The last statement denoting “Mobile Services are Cost-effective for Libraries in the Long Run” got a mean score mean 3.23 and a standard deviation 1.163. Overall statements show that librarians perceived mobile services as beneficial for patrons in this era of innovations.

Table 5 shows the challenges and barriers academic librarians face in Pakistan while adopting mobile services in their academic libraries. A total of eight constructs were designed to gauge the associated challenges/ barriers while integrating mobile services with academic libraries. These constructs were also gauged using a five-point Likert scale from strongly disagree to strongly agree. The majority of librarians were of the view that “Inadequate technology infrastructure, including issues with network

**Table 5.** Challenges and barriers to adoption of mobile services in academic libraries.

	Descriptive statistics		
	N	Mean	Std. deviation
Inadequate technology infrastructure, including issues with network connectivity and hardware limitation	215	3.92	1.456
Library professionals may face challenges in adopting mobile services due to a lack of training opportunities and skills gaps	215	3.86	1.057
Limited financial resources may impede the acquisition of mobile devices	216	3.68	1.041
Resistance to change among library professionals can be a barrier, as some may be hesitant or unwilling to embrace new technologies	216	3.56	1.095
Concerns related to the security and privacy of user data may act as a barrier to the adoption of mobile services	211	3.50	1.127
Lack of institutional support and clear policies regarding the adoption of mobile services may hinder library professionals	216	3.49	1.341
Disparities in digital literacy and access to mobile devices among library users can create a digital divide	214	2.96	.849
Limited awareness and acceptance among library patrons regarding the availability and benefits of mobile services may result in low demand	216	2.49	.868
Valid N (listwise)	210		

connectivity and hardware limitation” (Mean = 3.92, SD = 1.456) were the major barriers hindering the use of this technology in libraries while few of them were of the view that “library professionals may face challenges in adopting mobile services due to a lack of training opportunities and skills gaps” (Mean = 3.86, SD = 1.057), followed by the statement “limited financial resources may impede the acquisition of mobile devices” (Mean = 3.68, SD = 1.041). However, few of the respondents agreed to the statement “resistance to change among library professionals can be a barrier, as some may be hesitant or unwilling to embrace new technologies” (Mean = 3.56, SD = 1.095).

Most librarians agreed with “concerns related to the security and privacy of user data may act as a barrier to the adoption of mobile services” (Mean = 3.50, SD = 1.127) while some agreed to the statement “lack of institutional support and clear policies regarding the adoption of mobile services may hinder library professionals” (Mean = 3.49, SD = 1.341). The statement “disparities in digital literacy and access to mobile devices among library users can create a digital divide only” received (Mean = 2.96, SD = .849) followed by “limited awareness and acceptance among library patrons regarding the availability and benefits of mobile services may result in low demand” (Mean = 2.49, SD = .868). Overall, the statements

showed that librarians in Pakistan strive to overcome these challenges while adopting mobile services in academic libraries. The complete details are shown in [Table 5](#) given below.

## Discussion

This study examined the factors influencing to adoption of mobile services in academic libraries in Islamabad identifying potential advantages and barriers. Achieving all its three objectives, the findings of the study revealed that academic libraries under investigation had not fully integrated mobile technology into their daily operations. This limited adoption can be attributed to various factors, primarily the insufficient skills of library professionals in effectively utilizing mobile technology. To ensure effective utilization, training library staff in mobile technology is crucial. The absence of training leads to a lack of expertise, resulting in under-implementation of mobile devices in academic libraries. This finding aligns with previous research conducted by Liu et al. (2020), (2024), Nalluri and Gaddam (2016), and Akeriwa et al. (2015), which highlighted the significance of training in overcoming barriers to mobile technology adoption. In this study, different constructs were included in the objectives of the elements: the accessibility and affordability of smartphones and reliable and high-speed internet access. According to Burudi et al. (2021), library readers and professionals in developing countries face affordability issues with cell phones and high-speed internet, as well as limited library policies and resource constraints, hindering mobile adoption in academic environments.

The advantages of mobile services in academic libraries are well-documented. Studies by librarians in advanced countries, such as Nalluri and Gaddam (2016), have shown that mobile services enhance accessibility to academic resources. Additionally, research by Lo and Stark (2021) supports the notion that mobile services facilitate collaborative learning and efficient research. Mobile technologies also provide opportunities to advance digital literacy skills in academic settings. The widespread adoption of smartphones and tablets has transformed various industries, including academic libraries. Libraries have leveraged this trend to expand their services, making information and resources more accessible. Our study found that mobile services empower digital literacy and drive technological innovations in education, corroborating the findings of Al-Adwan et al. (2023). Mobile services help in the search and discovery of library resources. The adoption of mobile services facilitates real-time communication with patrons; the study addressed this statement by highlighting that mobile-enabled access eliminates barriers of time and location, as students and researchers have to retrieve information on the go, even beyond the

physical library's open hours (Masreka & Hussein, 2021). Moreover, it enables library staff to communicate with library patrons regarding various library resources and services. Our study found that integrating mobile technology with a learning management system (LMS) allows users to access library resources directly. The study of Sánchez-Prieto et al. (2019) also confirmed our findings to which stated that mobile applications together with the LMS helps users to have easy, direct access to library resources. This study investigated the potential of mobile services to streamline library operations, specifically examining how they can reduce physical paperwork within the library ecosystem, facilitate notifications regarding library events, new arrivals, and due dates. Consistent with previous research, libraries in developed countries have adopted mobile technologies to enhance and sustain library services over the long term. In developing countries like Pakistan, librarians are trying to utilize these services. However, many librarians in Pakistan perceive mobile services as a positive omen. Still, there are some challenges associated with mobile services, such as inadequate technology infrastructure, including issues with network connectivity and hardware limitations. Rafique et al. (2020) stated that the lack of training opportunities, skills gaps, and limited financial resources may impede the acquisition of mobile devices. Resistance to change among library professionals can be a barrier, as some may be hesitant or unwilling to embrace new technologies. Our study investigated concerns related to security and privacy of user data as a potential barrier to mobile service adoption. We also examined the impact of inadequate institutional support and unclear policies on library professionals' willingness to incorporate mobile services. Our findings closely align with Saxena and Yadav (2013), confirming these challenges as significant barriers to the effective adoption and implementation of mobile services in libraries.

Additionally, our research revealed that disparities in digital literacy and mobile device access among library users could exacerbate the digital divide, echoing the findings of Cummings et al. (2010). In developing countries, limited awareness and acceptance of mobile services among library patrons can lead to low demand. Despite these challenges, Pakistani librarians are embracing innovative technologies to tailor library services for long-term sustainability. Libraries have shifted their housekeeping operations and services to provide access to their collection in the era of information communications technology (ICT). The internet has empowered libraries to embrace trends and adapt to the digital age. The internet has enabled college, university, teachers, researchers, and students to find what they need virtually without going into the library. Our librarians are actively working to identify how these devices are impacting information access and ensuring that they are communicating with their

users and delivering web content in most efficient and effective ways. We must be prepared to tackle this challenge to expand the market and meet the growing demand for mobile access to personalized information anytime, anywhere. This study has led to the uncovering of the potential challenges that can obstruct the successful implementation of (mobile-based) library services in Pakistani, academic libraries. When the challenges identified in the findings are properly addressed, they may be used as the foundation for the successful implementation of mobile technology in academic libraries in Islamabad in particular and Pakistan in general. The research underscores the need for continued efforts to bridge the technological gap and promote the integration of mobile services in academic libraries, thereby contributing to advancing the information landscape in Pakistan. The knowledge presented in this paper could assist academic librarians in Islamabad, Pakistan, to assess their institutions' vulnerabilities, challenges, and strengths in using mobile technologies to provide library services.

## Conclusion

Academic libraries in the global landscape are witnessing a transformative phase with the integration of innovative services like the utilization of mobile services. Advanced countries like the USA, UK, and Germany have been at the forefront of embracing these technologies to elevate library services on a global scale. In contrast to developed nations, academic libraries in developing countries like Pakistan struggle to adopt innovative technologies, with mobile services presenting a notable challenge. The present study focused on academic libraries and sought to address the disparity by examining the factors influencing the adoption of mobile services, identifying perceived benefits, and uncovering challenges academic librarians face. The findings of this study underscore the positive reception of mobile services among librarians, emphasizing their potential to enhance library services, accessibility, and tailored strategies for seamless integration. However, barriers such as concerns about data security, individual attitudes, librarian resistance, information overload, and varying levels of digital literacy and technical skills were identified as influencing factors in the adoption of mobile services. As every research has limitations, this research specifically covers the geographical locations of Islamabad and may not be generalized to other provinces of Pakistan. Furthermore, the study focused solely on public and private sector universities in Islamabad, excluding colleges and research institutions. This study provides valuable insights that can inform the curriculum of Library and Information Science (LIS) schools, guide policymakers, and contribute to the professional development programs for academic librarians in the country.



## Recommendations

Based on the findings of the study, the following recommendations are made:

1. Academic libraries should invest in reliable, high-speed Internet infrastructure to ensure consistent and high-speed connectivity.
2. The Higher Education Commission of Pakistan and the Ministry of Information Technology should plan a library policy aligned with the integration of mobile services.
3. The Ministry of Education and Higher Education Commission (HEC) should organize training programs to improve academic librarians' digital literacy and technical skills.
4. Academic libraries in Pakistan should partner with mobile service providers and technology vendors to provide support and training programs.
5. Library associations like Pakistan Library Association (PLA), Pakistan Library Welfare Organization (PLWO), Punjab University Library and Information Science Association (PULISA), and others should facilitate workshops and training sessions on collaborative learning tools available through mobile services.
6. Academic librarians should encourage using mobile services for real-time communication with patrons.
7. Academic librarians should develop a mobile communication strategy for disseminating notifications on library events, fresh arrivals, and due dates.
8. To prepare library and information science graduates for the digital age, the schools of Library and Information Science in Pakistan should integrate mobile technology into their curriculum, ensuring that future librarians can seamlessly adopt and utilize mobile technology to enhance library resources and services.

## Conflict of interest

The authors have no conflicts of interest to report.

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## Appendix

### Questionnaire

**Factors influencing the adoption of mobile services among academic librarians, perceived advantages and barriers Academic librarians face in Islamabad**

Dear Participant

This survey is intended to write an article “Factors influencing the adoption of mobile services among academic librarians, perceived advantages and barriers Academic librarians face in Islamabad”. Please complete the following questionnaire at your convenience. There is no need to write your name when you complete this questionnaire, as this survey only requires anonymous responses. I would like to confirm the confidentiality of the research study, and that your response will only be used for academic purposes.

Yours sincerely,

Abid Hussain and Dr. Muhammad Ismail

**1. What is your gender? Please tick the relevant box.**

Male

Female

2. **Please tick your relevant designation:**  
 Chief Librarian ☐  
 Librarian ☐  
 Assistant Librarian ☐  
 Library Assistant ☐  
 Other ☐
3. **How much professional experience do you have? Please tick the relevant box.**  
 0–5 years ☐  
 11–15 years ☐  
 16–20 years ☐  
 More than 20 years ☐
4. **Please indicate your age by ticking on the relevant box**  
 30 years or less ☐  
 31–40 years ☐  
 41–50 years ☐  
 More than 50 years ☐
5. **Please tick on your highest qualification.**  
 BS/Masters ☐  
 MS/M. Phil ☐  
 Ph. D ☐
6. **How many years have you been using a cell/mobile phone? Please tick the one relevant to you.**  
 Less than a year ☐  
 1–3 years ☐  
 3–6 years ☐  
 More than 6 years ☐
7. **Please rate your preferred factors that influence your adoption of mobile services.**  
 (Key: SD = Strongly Disagree, DA = Disagree, UD = Undecided, A = Agree, SA = Strongly Agree)

Factors influencing the adoption of mobile services

Factors influencing the adoption of mobile services	SD	DA	UD	A	SA
The accessibility and affordability of Smartphone					
Reliable and high-speed internet access					
Library Policies and Resources					
The compatibility of mobile services with existing library systems and technologies					
The level of digital literacy and technical skills among academic librarians can					
Data Security Measures					
Individual attitudes and openness to embracing new technologies					
The level of support from mobile service providers or technology vendors					
Librarian's resistance to change					
Bombardment of extensive Information					

8. **In your opinion, what are the advantages and potential impacts of integrating mobile services in academic libraries? Please tick that is more relevant to you.**  
 (Key: SD = Strongly Disagree, DA = Disagree, UD = Undecided, A = Agree, SA = Strongly Agree)

Advantages of mobile services	SD	DA	UD	A	SA
Mobile services enhanced accessibility to academic resources					
Mobile services facilitate collaborative learning					
Mobile services are efficient for research support					
It Improved communication and engagement					
Mobile services empower digital literacy					
Mobile services are technological innovation in education					
Mobile services enable users to access library resources anytime, anywhere.					
Mobile services allow users to access library catalogs and databases					
Mobile services help in the search and discovery of library resources					
Mobile services facilitate real-time communication with patrons					
Mobile services enable library staff to offer remote services					
Integration of mobile technology with LMS allows users to access library resources directly					
Mobile services reduce the physical paperwork within the library ecosystem					
Mobile services can be used to send notifications regarding library events, fresh arrivals, and due dates					
Mobile services can create virtual communities or discussion groups, fostering knowledge sharing.					
Mobile services are cost-effective for libraries in the long run					

9. **What challenges and barriers do you face in the adoption of mobile services in your library? Please tick that is relevant to you.**

(Key: SD = Strongly Disagree, DA = Disagree, UD = Undecided, A = Agree, SA = Strongly Agree)

**Challenges and barriers in the adoption of mobile services in libraries**

Challenges and barriers	SD	DA	UD	A	SA
Inadequate technology infrastructure, including issues with network connectivity and hardware limitation.					
Library professionals may face challenges in adopting mobile services due to a lack of training opportunities and skills gaps.					
Limited financial resources may impede the acquisition of mobile devices.					
Resistance to change among library professionals can be a barrier, as some may be hesitant or unwilling to embrace new technologies					
Concerns related to the security and privacy of user data may act as a barrier to the adoption of mobile services					

Challenges and barriers	SD	DA	UD	A	SA
Lack of institutional support and clear policies regarding the adoption of mobile services may hinder library professionals					
Disparities in digital literacy and access to mobile devices among library users can create a digital divide.					
Limited awareness and acceptance among library patrons regarding the availability and benefits of mobile services may result in low demand.					

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**Thank you for your time and participation**