

# **Investigating Technology Adoption Attitude among Public and Private Sector University**

## **Librarians: A Survey**

Khurram Shahzad

Government College University Lahore, Pakistan

E-mail: khurram@gcu.edu.pk

Dr. Muhammad Tariq

COMSATS University, Lahore Campus

E-mail: tariqnajmi@cuilahore.edu.pk

Muhammad Naeem

Government College University Lahore, Pakistan

E-mail: naemgcu@hotmail.com

### **Abstract**

Major objective of the study was to identify the technology adoption attitude of library professionals performing services in the public & private sector universities of Lahore, Pakistan. Quantitative method followed by survey research design was applied. Questionnaire was developed to gather data from the target population. All professional librarians of the public and private sector universities of Lahore having at least Masters qualification were the population of the study. The census sampling technique was used to collect data from the population in the quantitative phase. Due to the personal efforts of the researchers, the response rate was 76%. Collected data were analyzed through SPSS Software and descriptive statistics were applied. Results of the research show that most of the respondents want to implement the latest technological tools in their libraries. Factors of personal interest, competitive environment, creative mindset, availability of sufficient funds, and leadership play a vital role to implement emerging technologies in the university libraries. The study has practical implications for the authorities of the universities and policy-makers for taking practical measures to encourage and support library professionals to adopt the latest technological tools in the libraries to provide smart services.

**Keywords:** Technology adoption attitude, factors supporting technology implementation

## **Introduction and Background of the Study**

Technology has brought prominent changes in all fields of life. Information has become the life-blood for organizations. It is considered the currency of the 21<sup>st</sup> century. Gulati (2004) investigated the status of ICTs utilization in the libraries of India. The study concluded that most of the organizations were making effective utilization of information and communication technologies. These technologies had brought a great revolution in the routine functions of libraries. The study concluded that the job of library practitioners was very creative and challenging. It was recommended that library professionals should be ready to cope with the latest demands of technology to lead their organization in an efficient style. It also raised the need for the provision of generous financial grants from the Government of India.

Technology is a great tool to share resources quickly. It is highly fruitful in sending electronic documents from one place to another. It saves time and energy. It makes the process of information sharing faster. Murray and Tschernitz (2005) revealed that reference librarians did not receive traditional reference queries due to the arrival of the internet. Information Technology increased the efficiency of the libraries. The methods of information delivery are changed. Now, users are provided information in multiple ways. They are disseminated relevant documents around the clock. They are better served than the past users. Technology is changing rapidly. Many advances are happening. It is believed that the current technology will become obsolete with the passage of time. Frey (2006) described that in upcoming times, innovations would take place. The traditional methods of libraries would be replaced by electronic libraries. To cope with the changing needs, Wilson (2007) recommended that library professionals should make effective utilization of different search engines and databases to provide full-text documents to the users. The multiple benefits of IT have urged library practitioners to opt for emerging technology in their libraries. IT brings efficiency to the routine operations of the library. It provides required content without any constraints. It provides access to required documents quickly and efficiently. It has brought creativity in routine functions of libraries. The library practitioners don't waste their priceless time. They simply use technological tools and retrieve required information to disseminate the same to the concerned users. The growing demands of users are the major factors behind the application of IT in libraries. They require quick information to make completion of assigned tasks. They demand relevant and authentic information. They don't wait for the attainment

of the required document. They want the completion of their desire as early as possible. They have urged libraries to utilize the latest technological implements. (Melchionda, 2007).

Technology provides quick information. It is a great blessing for faculty members and library practitioners. It helps in facilitating the library's users. It proves helpful in the sharing of required documents. It saves precious time for library practitioners and users. Ranjan (2008) examined the effects of Information Technology in academic institutes for resource sharing. The findings of the study showed that IT was playing an effective role in changing the service moods of the institutes. Information was disseminated to the concerned users quickly using technology. No space problems happened due to the availability of technologies. Information and communication technologies had brought great ease for the library and information professionals. IT had proved productive and fruitful to a great deal.

Ramzan (2009) investigated the status of computers, library software, online resources, and services utilized in the libraries of Pakistan. His study revealed that the libraries were lacking in the application of Information Technology. The libraries were not provided proper funds to acquire the latest technological tools. The librarians did not have proper access to computers. He stressed a need to fully automate the libraries. His study shows a need to empower the libraries with ample funds. It is very essential to investigate the attitudes of the library practitioners of Pakistan. The benefits of IT are not attainable unless library professionals implement the latest tools of technologies with a welcoming attitude. Without investigating librarians' behavior towards technology, effective measures are not feasible to be taken for the prosperity of libraries and the empowerment of library practitioners.

### **Statement of Problem**

The study intends to identify technology adoption attitudes among university librarians. This research highlights the behavior of the library professionals working in the university libraries of Lahore, Pakistan. Adoption of IT tools in the libraries is of great value for the institutions and the users. In the present age, it is not easy to satisfy users' needs without IT adoption. The attitude of library professionals towards IT innovations matters a lot in the success of the provision of services to end-users. Technology adoption attitude of library professionals related to technological-tools-adoption is needed to be explored so that practical solutions might be applied and library professionals might be encouraged to implement technological tools in the university libraries to serve the users efficiently. This study will show librarians' attitudes towards technology

adoption and highlight factors that affect towards technology-implementation. Practical solutions would be offered in light of the results of the study so that the same might be implemented to refine university libraries' services.

### **Research Questions**

Research questions of the study are as following:

1. What is the attitude of university librarians towards technology adoption?
2. Which are useful factors for the adoption of technological tools?

### **Review of the Relevant Literature**

Implementation of technological tools is vital for the delivery of efficient services to the users. Frey (2006) described that in upcoming times, innovations would take place. The traditional methods of libraries would be replaced by electronic libraries. To cope with the changing needs, Wilson (2007) suggested using a dynamic approach. He recommended that library professionals should make effective utilization of different search engines and databases to provide full-text documents to the users. Kreitner and Kinicki (2007) mentioned that creativity provided fruitful results in every field of life including librarianship. The library is an ever-growing institution in terms of space, capital, resources, and services. Innovation in the library is highly important to serve the library's users efficiently. The latest technology needs to be adopted by the librarians. The positive attitude of library practitioners brings positive changes in the libraries. A strong motivation is required to avail the innovative opportunities for the libraries. Library practitioners need to bring a positive change in their attitudes if they want to make a creative usage of technology. Behaviors play a critical role in the working of libraries. Negative behaviors play a negative role and the working of the library is disturbed. Positive behaviors provide ample opportunities for library practitioners. To avail information technology, library practitioners need to bring a positive change in their behaviors. Rabina (2007) investigated the attitude of librarians towards IT. The study was carried out through an online questionnaire. The study concluded that a positive passion to accept new technology was a key to success in libraries. Libraries were utilizing information and communication technology to bring efficiency to their daily routines. The role of traditional libraries was being declined steadily with the advent of information technology. The study recommended that librarians needed to change traditional minds. They needed to become innovative for surviving in the fast-changing competitive world. In the present age, librarians have more facilities related to Information Technology. They have satisfactory

equipment of IT. The librarians of past age did not have such facilities. They did not have a formal education in IT. Hendrix (2007) investigated the attitudes of library practitioners. The study concluded that younger librarians were more skilled in using technology. The older librarians did not have proper IT skills. They had a traditional attitude. They felt shy of using technological tools. They only preferred to perform routine services. They did not like to bring efficiency to their works. The study raised an urgent need for continuous training programs for the older librarians for a fruitful usage of technology in libraries.

Now libraries provide quick information to users having utilized the internet. The users find required literature without wasting precious time. Now, users are not only provided print information but also electronic information. The application of computers and communication technology has brought great facilitation for libraries. It has changed the working style of library practitioners (Dunlap, 2008). Aharony (2009) conducted a study related to librarians' attitude towards web 2.0 technologies. He revealed that those library practitioners who were technology-minded had more possibilities of utilizing technological innovations. They could make better use of IT in their libraries. Their positive behaviors played a productive role in making libraries a friendly place of learning. The study recommended that the administration of the institutes should recruit such library practitioners who had a positive attitude towards IT. Borekci (2009) conducted a study on leader's ICT use. The study concluded that the positive attitude of a leader with an IT mindset up played a fruitful role for followers. The subordinates always followed in their leader's footsteps. They were greatly influenced by a liberal leader who himself utilized IT applications in the library. The followers felt a great deal of satisfaction from an effective leader possessing certain attributes related to information technology. Shaikh (2009) conducted a study related to information and communication technologies in the higher learning institutes of Pakistan. The study aimed to investigate the acceptance and utilization of technology. It was found that the institutes of Pakistan were far behind the institutes of progressive nations. In Pakistan, technology was not properly being implemented and utilized. Pakistani institutes were not facilitated with required IT equipment. There was a serious shortage of funds, support, training, positive mindset, passion, etc. The study recommended an urgent need to formulate Information Technology Policy at the national level so that technology may effectively be applied in the institutes of Pakistan like other leading nations of the world.

Arif and Mahmood (2012) conducted a study on the dynamic role of library practitioners in the digital age. The study aimed to explore the usage of Web 2.0 technologies in Pakistan. The findings of the study revealed that social networking websites were highly popular for sharing and retrieving information in the present age. Information Technology had brought a great revolution in the personal and professional lives of people. Web 2.0 had provided great ease for library practitioners and users. It was shown that most of the librarians did not have any awareness related to new technologies. They needed training programmes to make efficient use of technological tools. It was found out that libraries needed to adopt Web 2.0 technologies. They needed to develop a vast vision. Aharony (2013) investigated the attitude of library professionals towards the adoption of mobile services. He mentioned that librarians were fully aware of the significance of technology and they realized that they couldn't offer value-added services to end-users without technology adoption. They were willing to adopt technological tools for offering satisfactory services to library clients. On the web pages of the university- sites, alert services could be offered to facilitate the library's users. The role of the library professionals became more dynamic through the provision of innovative services. It was a dire need of time to fully utilize emerging technologies to gain several benefits. Moghaddam, Dehghani, Anaraki, and Dizaji (2013) highlighted that majority of the librarians in the universities of Iran agreed to implement technological tools in their libraries keeping in view the utility and significance from users' point of view. Technology had become the most valuable component in providing efficient services to diverse users. Implementation of technology in the libraries reduced human efforts and efficient services could easily be provided. Technology not only brought efficiency in routine functions and operations of the libraries but also saved precious time. Librarians needed to improve skills in technology for spreading learning and research culture.

Library practitioners need to explore unknown things. They need to develop maker spaces for bringing a real change in their libraries. The role of libraries had become more dynamic in the present age of ever-changing technologies. Koh (2015) stated that libraries were turning into learning labs due to note-worthy revolution in information technology. The role of library practitioners had been changed due to immense changes in libraries and technology. Technology was ever-changing. Librarians with an old-mindedness could not run their libraries smoothly. They could not promote book reading culture. They could not plan good policies for their libraries. Library professionals need to change themselves according to the demands of the changing times.

They needed creativity in their work. They needed advanced level training to provide electronic services to the users for saving their priceless time. Library practitioners need to participate in continuous professional development programmes. They need to gain updates about emerging technologies. They need to attain skills in open-source software. They need to implement cost-effective technologies in their libraries. They can gain multiple benefits by utilizing technologies effectively. Smith and Hayman (2015) conducted a study related to decision-making for the application of emerging technologies in libraries. The findings of the study revealed that library practitioners needed creative thinking to lead their organizations well. Library schools needed to teach market-oriented courses so that they could produce innovative professionals in the market for coming up to the needs of the present age of ever-growing changes. They couldn't produce creative graduates without changing teaching practices. They needed to provide IT-based education. They needed to quit traditional methods of teaching. They needed to promote virtual-based learning so that the graduates might develop relevant skills and perform well after grabbing their jobs. Hsiao and Tang (2015) investigated such factors which played a supportive role in the implementation of technologies in the libraries. Self-efficacy was the most prominent factor that led to the adoption of emerging technologies in the libraries. Without active leadership, it was not easy to implement the latest technological tools. The willingness of library staff mattered the most in adopting ICTs in the information centers. Organizational support, adequate funding, benefits of technology, competitive environment, and perceived usefulness of technology were also worth mentioning factors that supported the adoption of technological tools.

Pirshahid and Fahimnia (2016) described that library professionals were aware of wikis and blogs and made utilization of advanced tools for providing satisfactory services to their users. RSS feeds, digital apps, data mining, semantic technologies, and instant messaging were not frequently utilized by library practitioners. Web 2.0 tools were highly essential for the sharing of information resources. These tools could also be of great help for resource-sharing networking among the libraries. The finance barrier and lack of training opportunities were major problems in the adoption of technological tools in the university libraries. Yuvaraj (2016) stated that wireless technologies had emerged at a rapid speed. In recent years, the technology of Li-Fi was taking place. It was a new technology. It was a visible light communication technology. It utilizes light waves rather than radio technology to provide data. It was revealed that Li-Fi will provide fast connections to the internet. It will be used frequently by organizations. It will replace other

technologies. It will bring a great revolution in the field of technology. It will be excessively used. It will provide multiple benefits. It will provide great comfort. It will provide easiness for the researchers. It was revealed that library practitioners must get knowledge of such innovative emerging technologies so that they could apply the same in their libraries for serving their users efficiently.

Weerasinghe and Hindagolla (2018) mentioned that advancements in technology had changed the moods of library services. Now, libraries were no more offering old-fashioned services. Librarians were expected to perform quick services through innovative approaches using social media channels so that users could be facilitated efficiently and library resources and services could be promoted. Social media was attracting users to a great extent and librarians could easily promote their services. Libraries were expected to play the role of community engagement centers. The adoption of emerging technologies was influenced by user's perceptions and beliefs. Acceptance of users was highly essential before the launch of any services in the libraries. Sarkar (2019) stated that library professionals need to work in the 3D environment according to changing needs of users and to play their essential role for the uplift of library's resources and services having utilized smart technological tools. New tools needed to be implemented in libraries including data mining, virtual reality, augmented reality, big data, integrated systems, semantic web, etc. to provide efficient services to the users and community. Patrick, Ho, and Chiu (2021) highlighted that smart library services needed to be provided through customization keeping in view the needs of the library's users. In the present age of ICTs, users had become smart through the advent of technology-gadgets and devices and they expected more value-added services from the libraries. Library professionals could not meet the expectation of the users without technology adoption and therefore it was highly essential for them to implement emerging technological tools in their libraries to serve the users via the latest methods and techniques to show their visibility otherwise their role and functions could be replaced by their active competitors.

## **Methodology**

It is social science research that is usually based on interviews, questionnaires, and personal visits. This study is based on a quantitative research method followed by survey research. The purpose of this study is to investigate the technology acceptance attitude of library practitioners working in university libraries of Lahore, determine the factors affecting their attitudes in the

adoption of technology, and furnish suggestions for the effective utilization and application of the latest technological tools.

A quantitative approach followed by a survey research design was opted to complete the study on the technology acceptance attitude of library practitioners. As the researchers wanted to collect data from a large size sample therefore for such kinds of studies quantitative research is the most appropriate as many researchers and experts have also stated that quantitative research is the best way to collect data from a large population.

The population of the study was consisted of all public and HEC recognized private sector university library professionals of Lahore. There were 120 working Librarians in the public and private sector universities of Lahore. This information was obtained from reliable sources like the PULISAA list of librarians and the Sada-e-Librarian Directory of Pakistani Library Professionals. Census Sampling Technique was applied to gather the required data. Librarians were chosen as subjects of the study keeping in view their leading role. The libraries were listed on the website of the Higher Education Commission of Pakistan. There were 13 public sector universities and 21 private sector universities in Lahore on the list given by the Higher Education Commission of Pakistan.

The survey questionnaire was utilized as an instrument to obtain primary data from the library professionals. The questionnaire is an effective instrument to gather descriptive data for measuring attitudes and for answering the required research questions. It helps to attain information related to different trends from a vast population. Different researchers have also highlighted the significance of the questionnaire. They have stated that the questionnaire is a primary data collection tool. Keeping in view the effectiveness of the questionnaire, the researchers used this tool to gather data. The questionnaire was passed through the process of pre-testing and pilot study to check the validity and reliability of the tool. It was accompanied by a cover letter as well as a self-addressed return envelope. The questionnaire contained several close-ended questions. In constructing the questionnaire, help was taken from the reviewed literature and subject experts. The questionnaire was designed in different parts by the researchers. The first part included demographical information, the second part was about the library practitioners' behavior toward information technology, and the third part was about the factors affecting information technology applications. A pilot study to ensure the reliability and validity of the instrument was conducted and overall Cronbach Alpha was 0.82.

The researchers created an online questionnaire through Google Docs Form. That questionnaire was sent to all respondents through e-mail. The heads of the libraries were contacted through telephonic conversation to submit the duly filled questionnaire as early as possible by themselves and their supporting colleagues i.e., Senior Librarians/Deputy Chief Librarians and librarians. The response rate was 76%. From 120 respondents, 91 respondents submitted the duly filled online questionnaire.

### **Data Analysis and Findings**

Information was collected about the gender, qualification, age group, type of institute, and experience as a librarian from the respondents.

### **Demographic Information of Participants**

Results of the study show that majority of the participants were males. They were 66 (72.5%) in number. Twenty-five (27.5%) participants were females. Thirty-six (39.6%) respondents had their age between 25 to 34, forty-eight (52.7%) respondents had their age between the ranges of 35 to 44, six (6.6%) respondents had their age between 45 to 54 while 1 (1.1%) was above 55 years. 7 (7.7%) had less than 5 years- experience, 41 (45.1%) had experience from 5 to 10 years, 35 (38.5%) respondents had experience ranging from 11 to 15 and 8 (8.7%) had experience had above 15 years- experience. 56 (61.5%) respondents had the degree of Masters, 31 (34.1%) had the degree of MS/ M. Phil, and 04 (4.4%) had the degree of Ph.D. Following table 1.0 shows respondents' information about gender, age, experience and qualification.

**Table-1: Descriptive Analysis about Respondents' Demographic Information**

<b>Variables</b>	<b>F</b>	<b>%</b>
<b>Gender</b>		
Male	66	72.5
Female	25	27.5
<b>Age (years)</b>		
25-34	36	39.6
35-44	48	52.7
45-54	6	6.6
>55	1	1.1
<b>Experience</b>		
<5	7	7.7

5-10	41	45.1
11-15	35	38.5
>15	8	8.7
<b>Qualification</b>		
Masters	56	61.5
M. Phil.	31	34.1
Ph. D.	4	4.4

### **Respondents' Awareness of Using IT**

The respondents were asked to rate their awareness of using information technology. They were provided different options from 'Not at all familiar' to 'Extremely Familiar'. Acquired results show that 9 (9.9%) respondents were extremely familiar with the usage of information technology, 36 (39.6%) were moderate familiar to avail information technology, 1 (1.1%) was not familiar, 26 (28.6%) respondents were slightly familiar to utilize information technology and 19 (20.9%) were somewhat familiar in the utilization of information technology.

### **Participants' Opinion about Technology**

Respondents were asked to show their attitude towards technology. Acquired responses reveal that majority of the respondents agreed that technology had refined library services with a mean of 4.25. Most of the respondents showed positivity towards technological tools. Following Table 1 shows that the majority of the participants have a positive attitude towards technology. They believed that technology is a fast-changing field. IT has brought innovation in the libraries. Social networking has been increased through IT. Technology is a great time-saver. IT has made search and retrieval easy. Librarians have become smart due to technology. Visibility of the libraries increases via technological tools. Libraries having IT facilities are considered more prestigious than libraries without IT facilities. The benefits of IT are more valuable than its financial cost.

**Table-2: Descriptive Statistics of Respondents' Opinion about Technology**

<b>Statements</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>
Technology has refined library services.	91	4.25	.754
Technology is a fast-changing field.	91	4.24	.735
IT has brought innovation in the libraries.	91	4.04	.744

Social networking has been increased through IT.	91	4.08	.718
Technology is a great time-saver.	91	4.21	.768
IT has made search and retrieval easy.	91	4.18	.769
Librarians have become smart due to technology.	91	4.08	.778
Visibility of the libraries increases via technological tools.	91	4.04	.829
Libraries having IT facilities are considered more prestigious than libraries without IT facilities.	91	4.13	.806
The benefits of IT are more valuable than its financial cost.	91	4.08	.778

*Note: 5=Strongly Agree, 4=Agree, 3= Neutral, 2=Disagree, 1=Strongly Disagree*

### **Factors Supporting towards Technology-Adoption**

Respondents were asked to show their opinion about the factors that played a central role in technology-adoption of the technology in the libraries. Acquired results revealed that the factors of competitive environment and positive mindset were the most pertinent factors with a mean of 4.12. Other worth mentioning factors that play a necessary role in the implementation of technological tools in the libraries include changing needs of the users, innovative approaches, age of social media, innovative working styles, organizational support, sufficient budget, appreciation by the top management, IT trained manpower, willingness, personal passion, and leadership traits.

**Table-2: Descriptive Statistics of Factors Supporting towards Technology-Adoption**

<b>Factors Supporting IT</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>
Competitive environment	91	4.12	.758
Changing needs of the users	91	4.11	.849
Innovation	91	3.95	.780
Age of social media	91	3.81	.868
Creative mind set up towards emerging information technologies	91	4.05	.835
Positive attitude towards information technologies	91	4.12	.772
Support from the organization	91	4.05	.765
Sufficient financial resources	91	3.96	.829

Special allowance for implementing technological tools	91	4.05	.780
Availability of adequate resources	91	4.02	.760
Sustainable backup	91	3.95	.886
Policies by authorities	91	3.87	.748
IT trained staff	91	4.03	.722
Liking behavior towards new technologies	91	4.15	.714
Cooperative team	91	4.04	.744
Technical expertise	91	4.02	.730
Ready for change	91	4.08	.749
Organizational head's priority towards technology-adoption	91	4.19	.815
Library Heads' interest towards technology-adoption	91	4.18	.797

*Note: 5=Strongly Agree, 4=Agree, 3= Neutral, 2=Disagree, 1=Strongly Disagree*

## **Discussion**

Technological development is highly essential in the present age of Information Communication Technologies. Needless to say, technology has paved the way for progressing in every field including librarianship. Library operations have become simple and smooth due to innovations in technology. Tools of technology have become part and parcel of working professionals. All professionals gain unending benefits from technology. Library users make usage of IT as a tool of gathering required data, participating in online classes, to grab learning through several online portals, and to make preparation for various sorts of examinations. Educational institutions use technology to bring innovation in teaching methods and to facilitate the students to attend online lectures. Global Village has come into existence only due to technological advancements. All people of the world may contact one another through messaging, video calls, and social websites.

Survival of the libraries is not possible without the adoption of technology. Technology has become a basic need of the information centers. Library's resources and services need to reshape according to the changing users' needs. Libraries will be left far behind than other professions if proper use of technology is not made and technological tools are not implemented particularly in university libraries. Research related tasks may not be brought to completion

without making effective utilization of technology. Online tools and databases play a necessary role in bringing compliance to research-based activities. Traditional libraries can't meet the information and research needs of the users in the present age. Most of the users don't visit the libraries physically. They want to retrieve the required information through communication technology. They excessively use Information and Communication Technologies (ICTs) for getting their tasks done efficiently. Librarians need to design services according to with changing patterns of users' needs. They need to organize online resources and provide online services so that all segments of the society may be served without facing any barriers.

Marketing and promotion have become extremely important to lead in this competitive age. Librarians have also strong competitors including computer professionals, media professionals, and archivists. Library professionals need to make efficient usage of social media so that available resources and services may be promoted in the community and users may have awareness about the availability of information resources. Resource learning literacy is highly vital and this may be done by using various social media channels. Whatsapp, Facebook, Youtube, Orkut, Instagram, and Twitter are the main sources of communication with library's users and they may be updated about the new arrivals of the library also.

Technology further facilitates the routine operations of the library. Circulation services may be provided quickly through technology. Through an automated system, books may be issued and returned easily and without any human error. The library clearance process becomes easy through technology. Library membership may be provided to the users through automated software. RFID technology may be used to avoid the theft cases of books and other valuable property of the library. Virtual Reference Services may be provided smoothly to the users. Digital libraries may be developed through various software including Caliber and DSpace. Institutional repositories may be developed through the utilization of technology. Webinars may be conducted to provide short term training to the users. Data mining and semantic web services may be provided to the end-users. The library can play the role of a Digital Community Centre through the adequate implementation of emerging technologies.

Libraries of the advanced countries have implemented the latest technological tools to better facilitate the users. Robotic services are being provided in the libraries and information centers of prosperous nations. Artificial intelligence is being properly utilized there to provide value-added services. The role of libraries and librarians is of great value in the leading nations of

the world because an adequate budget is allocated for the uplift of libraries so that learning and research culture may be flourished and educational places may stand atop in the ranking of the world's best institutions. In Pakistan, only a few libraries are using advanced technology. Uniform services and policies don't exist even in the university level libraries of Pakistan.

All university libraries of Pakistan need to show a virtual presence. All resources and services should be offered through digital moods. User-friendly websites need to be developed covering maximum information resources to support the users and assist in the online teaching of the universities. Digital repositories should be developed using emerging technologies so that users may access relevant information without consuming so much time. Digital reference service around the clock should be made available. Digital transactions of the information should be made possible. An integrated library system should be implemented. Users' demands should be stored in the database so that similar services may be designed for bringing efficiency. Virtual tours of the libraries should be shaped.

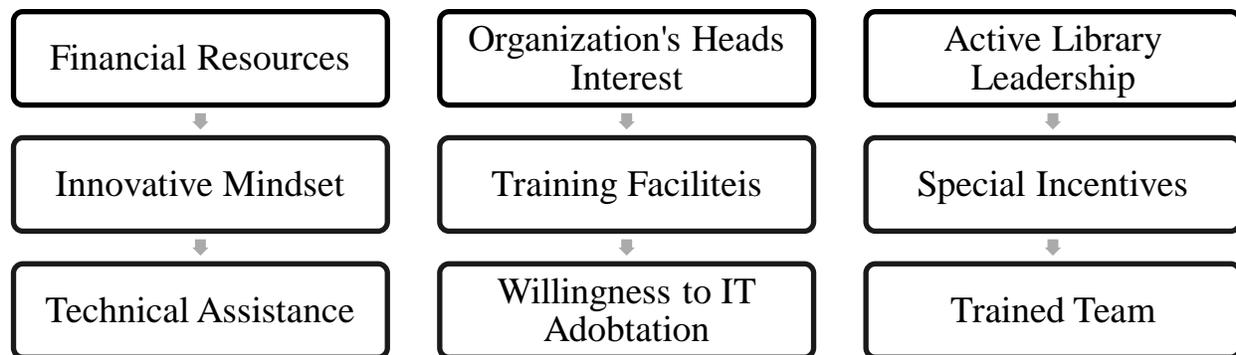
Technology-revolution has changed the information-seeking patterns of the users; therefore, library professionals need to be vigilant to play their vital role so that users may be facilitated according to their expectations and keep on appreciating the library system.

Results of this study show that library professionals need to have a positive and creative attitude towards technology-adoption otherwise their career is at risk. Without the implementation of technological tools, satisfactory services may not be provided to the users. Library professionals need to show willingness with high spirits toward IT adoption so that institutions may grow well through the vital role and services of library professionals. Factors of innovative leadership, the interest of the organization, adequate financial resources and IT trained staff assist in the implementation of technological tools in the libraries.

The findings of this study are similar to the research findings of Smith and Hayman (2015), Hsiao and Tang (2015), Pirshahid and Fahimnia (2016), Weerasinghe and Hindagolla (2018), Sarkar (2019), and Patrick, Ho, and Chiu (2021). These researchers also highlighted the importance of positivity toward technology adoption and the factors which proved useful in the implementation of technological tools in the university libraries. All these researchers mentioned through empirical studies that value-added services could be provided to the users only through technology adoption in the libraries. Technology was a basic need of humans in the present age of innovations and changes. Technology had not only brought challenges for the library professionals

but also created several opportunities to excel in the field. Smart devices needed to be implemented in libraries for the provision of smart services to the users of the age of technological advancements. Library practitioners of the universities could not survive without a positive attitude towards technology and implementation of technological tools in the university libraries.

Following Figure 8.0 reveals major factors that assist in technology adoption in university libraries:



**Figure-1: Major Factors Leading towards Technology-Adoption**

### **Recommendations**

Based on the conclusions of the study, the following recommendations are furnished for the technology adoption in the university libraries:

- Technology applications should be utilized in libraries to serve the users efficiently.
- Library practitioners should realize the utility of technology.
- All library practitioners should possess a positive behavior towards technological innovations so that libraries may prosper like other departments.
- Library professionals should be computer literate as it is the most needed competency of the present age.
- IT infrastructure should be available in the libraries.
- Library practitioners should have the proper training to make a fruitful usage of information technologies.
- Special IT Unit should be established in the university libraries.
- Library practitioners should have skills of proper planning.
- Library Team engaged in the implementation of technological tools to facilitate the end users should be provided special incentives as encouragement.
- Librarians should take a personal interest in the adoption of technology in their libraries.

- Chief Librarians must be enthusiastic to implement emerging technology to bring an idea change for playing a vital role in the best interests of the organization.
- A competent team should be appointed in libraries for accomplishing IT-based projects.
- IT skilled manpower should be recruited in libraries.
- Short term courses related to technology should be taught to the working libraries so that they might grab requisite skills and implement the latest technological tools in the university libraries for serving end-users efficiently.
- Continuing Education Programs (CEPs) should be provided to in-service library professionals related to Information Technology.
- Sufficient financial resources should be provided to uplift the library’s services and empower the library professionals.

Practical steps for technological-tools-adoption in university libraries are shown via figure-3 given as following:



**Figure-2: Practical Steps for Technological-Tools-Adoption**

## References

- Aharony, N. (2009). Web 2.0 use by librarians. *Library & Information Science Research*, 31:29-37.
- Aharony, N. (2013). Librarians' attitudes towards mobile services. *Aslib Proceedings*, 65 (4): 358-375
- Ameen, K. (2011). Changing scenario of librarianship in Pakistan: managing with the challenges and opportunities. *Library Management*, 32 (3): 171 – 182
- Arif, M. and Mahmood, K. (2012). The changing role of librarians in the digital world: Adoption of web 2.0 technologies by Pakistani librarians. *The Electronic Library*, 30(4): 469 – 479.
- Borekci, D. Y. (2009). Leader's ICT usage's influence on follower's positive work attitudes via perceived leader-follower relations. *Journal of Leadership & Organizational Studies*, 16 (2): 141-158.
- De Sarkar, T. (2019). Library in 3D virtual world: a critical review. *VINE Journal of Information and Knowledge Management Systems*, 49 (2): 213-228
- Dunlap, I. H. (2008). Going digital: the transformation of scholarly communication and academic libraries. *Policy Futures in Education*, 6 (1): 132-141.
- Ebrahimzadeh, P. , Naghshineh, N. and Fahimnia, F. (2016). Knowledge and use of Web 2.0 by librarians in university libraries of East Azerbaijan, Iran. *The Electronic Library*, 34 (6): 1013-1030
- Frey, T. (2006). The future of libraries: Beginning the great transformation. DaVinci Institute. Available at <http://www.davinciinstitute.com/page.php?ID=120> (Accessed March 2019).
- Gulati, A. (2004). Use of information and communication technology in libraries and information centres: an Indian scenario. *The Electronic Library*, 22 (4): 335-350
- Hsiao, C.-H. and Tang, K.-Y. (2015). Investigating factors affecting the acceptance of self-service technology in libraries: The moderating effect of gender. *Library Hi Tech*, 33 (1): 114-133
- Isfandyari M., Sedehi, M., Dehghani, M., Nemati-Anaraki, L. and Hasanzadeh-Dizaji, E. (2013). The status of information technology in Iranian hospital libraries: A comparative study of managers' attitude. *Program: electronic library and information systems*, 47 (3): 220-238.
- Koh, K. (2015). Competencies for Information Professionals in Learning Labs and Makerspaces. *J. of Education for Library and Information Science*, 56(2): 165-175.
- Kreitner, R. and A. Kinicki. (2007). *Organizational Behavior*. 7th ed. Boston: McGraw-Hill.

- Murray, J. and C. Tschernitz. (2005). The impact of electronic information delivery on reference enquiries. *Online Information Review*, 29 (2): 157-167.
- Rabina, D.L. & Walczyk, D.J. (2007). Information Professionals' Attitude Toward the Adoption of Innovations in Everyday Lives, *Information Research*, 12(4) [Available at <http://InformationR.net/ir/12-4/colis12.html>]
- Ramzan, M. (2004). Effects of IT utilization and knowledge on librarians' IT attitudes. *The Electronic Library*, 22 (5): 440 – 447.
- Smith, E. and Hayman, R. (2015). Sustainable decision making for emerging educational technologies in libraries, *Reference Services Review*, 43 (1): 7 – 18.
- Weerasinghe, S. and Hindagolla, M.C.B. (2018). Technology acceptance model and social network sites (SNS): a selected review of literature. *Global Knowledge, Memory and Communication*, 67 (3): 142-153.
- Wilson, A. J. (2007). New strategies for delivering library resources to users: Rethinking the mechanisms in which libraries are processing and delivering bibliographic records. *The Journal of Academic Librarianship*, 33 (2): 228-242.
- Yip, K.H.T., Lo, P., Ho, K.K.W. and Chiu, D.K.W. (2021). Adoption of mobile library apps as learning tools in higher education: a tale between Hong Kong and Japan. *Online Information Review*, 45 (2): 389-405.
- Yuvaraj, M. (2016). Li-Fi technology in libraries: An introduction and overview. *Library Hi Tech News*, 33 (6), 1-4. Available at <https://doi.org/10.1108/LHTN-02-2016-0007>