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Integrating Advanced Technologies and Challenges Faced by Library Professionals in Academic Libraries of Pakistan

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Abstract:

This study examines the adoption of advanced technological trends in academic libraries of public sector universities in Pakistan, with particular emphasis on current practices, the positive impact of technology on library services, and the challenges faced by library professionals. The population of the study comprised all 109 public sector university libraries in Pakistan, from which a 73% response rate was achieved, along with qualitative interviews conducted with 14 participants(N=14). A mixed-methods research design was employed, utilizing questionnaires, semi-structured interviews, and documentary analysis for data collection. Quantitative data were analyzed using SPSS, while qualitative data were examined through NVivo software. The findings indicate that advanced technologies have a significant positive impact on the efficiency, accessibility, and quality of library services and information resources. Despite these benefits, the effective implementation of advanced technologies is constrained by several barriers, including inadequate funding, a shortage of skilled professionals, insufficient IT education, and limited training and awareness. Furthermore, the study reveals regional disparities in technology adoption, with public sector university libraries in Islamabad and Punjab demonstrating higher levels of technological advancement due to better infrastructure and resource availability compared to libraries in other regions of Pakistan. The study highlights the critical role of advanced technologies in enhancing academic library services and underscores the need for strategic investment, capacity building, and policy support to promote equitable and sustainable technology adoption across public sector university libraries in Pakistan.

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Introduction

Library professionals in academic libraries in Pakistan face several challenges in incorporating advanced technologies into their environments:

1. Inadequate Grant Funding: There is insufficient financial support for library automation and the necessary technological upgrades. This lack of funding limits the ability to acquire and implement new technologies.
2. Lack of Skilled Professionals: There is a deficiency of library specialists with the necessary skills and expertise in information technology. This gap makes it difficult to manage and utilize advanced technologies effectively.
3. Insufficient IT Education: Many library professionals lack formal education and training in information technology, which is crucial for operating and maintaining advanced technological systems.
4. User Education Programs: There is a lack of programs designed to educate users on how to operate and benefit from advanced technologies in libraries. This gap can lead to underutilization of available resources.
5. Training and Awareness: There is a need for more training programs and initiatives to raise awareness among library staff about the latest technologies and their applications. Without proper training, staff may struggle to adapt to new systems and tools.
6. Resistance to Change: Resistance to adopting new technologies can be a significant hurdle. This resistance can stem from a fear of the unknown, comfort with existing systems, or a lack of understanding of the benefits of new technologies.
7. Infrastructure Issues: Inadequate infrastructure, such as outdated computer systems, poor internet connectivity, and insufficient space for new equipment, can impede the adoption of advanced technologies.
8. Maintenance and Support: Ensuring ongoing maintenance and technical support for new technologies can be challenging, particularly in remote or underfunded areas.
9 Lake of budget, Training, special environmental and other common challenges are facing by the professional duration use of Advanced Technology in their libraries.

These challenges highlight the need for strategic planning, investment in professional development, and increased funding to support the successful integration of advanced technologies in academic libraries in Pakistan.

Background of the Study

In the contemporary digital era, academic libraries are undergoing rapid transformation due to the integration of emerging technologies. These developments have significantly reshaped information organization, access, and service delivery, positioning libraries as technology-driven knowledge centers rather than traditional repositories. Academic and research libraries are now expected to provide technology-based learning and research environments by incorporating Information and Communication Technologies (ICTs), e-learning platforms, digital repositories, and artificial intelligence tools, while continuing to support conventional library services (Chetty, 2012).

Modern scholars increasingly demand automated systems for data storage, advanced information retrieval, and innovative information dissemination mechanisms such as (SDI), (CAS), and web-based discovery tools. To meet these expectations, library professionals must continuously update their technical skills and adapt to evolving digital environments. The adoption of user-centered, web-based library systems has further enhanced access to resources and improved service efficiency (Sadeh, 2003).

In developing countries, particularly emerging economies, the effective adoption of advanced technological trends in academic libraries is essential to fully realize the benefits of ICTs (Ifijeh, 2014). Studies conducted in countries such as Nigeria indicate that the provision of IT-based services in academic libraries contributes positively to research and learning outcomes, emphasizing the importance of prioritizing technology implementation (Ani et al., 2005).

The integration of technology in university libraries of Pakistan began gaining momentum after 1987, supported by initiatives such as the Netherlands Library Development Program (NLDP), which facilitated professional training, hardware provision, software development, and the inclusion of IT in library science education. Additionally, the Higher Education Commission (HEC) of Pakistan has played a significant role in promoting ICT adoption through digital library initiatives and research support programs, contributing to technological progress in university libraries over the past decade (Madhusudhan & Dar, 2017; Mahmood, 1987).

Despite these advancements, the level of technology implementation in public sector university libraries in Pakistan remains limited compared to developed countries. Many libraries continue to face challenges such as inadequate funding, insufficient ICT infrastructure, a shortage of skilled professionals, and limited training opportunities, which hinder automation and digitization efforts (Jabeen & Khan, 2014; Jan et al., 2013). Identifying current technological practices and the barriers to their adoption is therefore essential for enhancing library services and ensuring the continued relevance of academic libraries in Pakistan's digital knowledge environment.

Objectives

1. To know the perceptions of librarians regarding the advanced use of technologies in libraries
2. To analyze the impact of advanced technology-based practices on library resources and services
3. To trace the barriers and the challenges in the use of advanced technologies in the libraries

Literature Review

Advanced technology and transmission tools are now being used to provide facilities to the clients through applicable networks for accessing knowledge with multiple technologies through internet. This cutting-edge technology, known as internet technology, has the potential to complement and improve educational achievements for the benefit of all (Esew & Ikyembe, 2013). This new development has generated automated facilities in the libraries (Youngok & Rasmussen, 2006).

In today' world, the library's information delivery services are adopting a new model with a different philosophy i.e., a shift from the conventional model to automated and web-based model. The conventional library materials and compilations are undergoing a significant paradigm shift. This observed significant change in the structure of overall libraries known as virtual, electronic and digital libraries is not without its challenges. Despite sharing the same goals of protecting, arranging and disseminating information sources just like the traditional libraries, they have their own unique qualities.

In other words, the real revolution in libraries comes with the support of ICT. The ICTs in the field of libraries have improved the access and the use of available resources. The ICTs consist of various technical tools used for connecting, stretching, storing, and controlling knowledge. ICT in a real sense is the mixture of both computer hardware and software. During the course of the innovation or transformation of libraries, it has been revealed that the library facilities have undergone different phases of development (Norad, 2002).

The earliest forms of information that the libraries provide to the scholars include papers, posters, human interactions and performances. These formats were watched by an age of additional modern ICT computer peripheral. Between these technologies, some are radios, telegraphs, AV meterials which were used for a few decades. Today, we can observe additional progression if by the libraries through ICT all over the world. This group of technology is consisted of computers, satellites, wireless phones (mobile), one-on-one networks, the cyberspace services, e-mail, the net, CD ROMs, private PC etc. (Obayelu & Ogunlade, 2006).

Library and information services all over the world have an integral part to participate in the progress of an independent culture. Libraries are open to knowledge and expertise. In the case of developing countries, libraries can offer approach to global information with the help of internet. People can use libraries at all levels to improve their living conditions (Samek, 2014).

A library should not be merely a store house of documents but also be running on systems and must devise means by which the

contents of diverse documents can be rapidly and effectively transmitted for its use (Osundina, 1973) . It is a fact that the information has a vital role in the human life. Though, due to the rigorous progress in the arena of science and technology, the role of evidence has also increased.

Furthermore, it emphasized the rapid growth of information occurring in the world known as the information burst. Therefore, for the scientific approach, a dire need was felt for information handling, preservation and its usage. That is why, across the world, the transformation of the LIS is taking a new and modern measurement which was never noticed before. Technology resulted in the development of new services as a result of a completely new approach of offering library services (Gbaje, 2007).

ICTs play a considerable role in managing the structure and the work activities of the libraries. Therefore, the employment of technologies based on new computer information systems is a major and influential tool that is capable of revolutionizing traditional cataloguing and classification, indexing, abstracting, and other procedures. These new library technologies for processing, storing, and communicating data and information should be maintained as incorporated systems (Nkanu & Okon, 2010).

There is no doubt that Internet technology is the big central mode of information in the libraries. This main mode of information exchange in the last period of the 20th century boosted the transaction of the library and information services. Today, the new technologies are also providing opportunities to the librarians for knowing how they can trust ICT knowledges in the implementation of library projects (Nkanu & Okon, 2010).

In spite of the extensive innovations in the field of libraries, there have been apparent challenges as well (Samuel, 2009) which may include the difficulties of satisfactory skilled work force, the problem of access, the connectivity, the funding, the literacy, the bandwidth and the cost implication and the good authority. In the past, libraries used to provide services that include CAS, SDI, reference facilities, referral, photocopy services, cataloguing, classification, indexing services.

The library traditional services have been upgraded by using innovation technologies as identified by (Ogar and Dushu, 2018) which include VRD using E-reso urces on net and CD-ROM, OPAC and Web OPAC searching facilities, gateways, portals and online database and FAQs, Librarian etc. The historical perspective of the libraries shows that the libraries have been just like store houses including archive of manuscripts, art and important documents needed by the public. Most of the books were not affordable for many of the people and the information collections had been put together under strict security checks. This situation had been prevailed for a longer period of time.

In their seminal work “Digital and Virtual Libraries: Transformation in Libraries and Information Services’’ Gururaj and Kumar, (2014 pointed out that a there can be seen a huge turning point in the evolution of the libraries.

On the other hand, Lynch, (2000), in his communication from Automation to

Transformation, clearly indicated three phase processions in the organization due to the application of the ICT.

1. **Modernization**: what is previously in progress but with additional efficiency.
2. **Innovation**: Having potential of new capacities due to tendencies such as ICT.
3. **Transformation**: Fundamentally altering the nature of the organization.

In the upgrading phase, the libraries have used the ICTs to accomplish the assembly and mechanize the library services since 1980s which in turn have enhanced the efficiency of the library's services to the customers. Later on, the innovative and transformation concepts have taken place in the libraries' activities and due to these newer concepts, the libraries as well as in print media have shifted to digital, and as a result, the networked information has appeared in the libraries. The researcher has also noted that with the acceptance of advanced technologies, modern information storage mediums, publishing styles, ways of communication, the web searching tools, and the methods of access to information lead near complexities.

The prominent implication is that the development of modern technologies in the libraries around the world in the libraries might be slow, but it is highly possible that the libraries have started practices of subscribing to the digital resources, e-books, e-journals and databases. The utilization of technologies is increasing gradually in the libraries, as it is now showed as a instrument for the data group, organization & dissemination.

Digital technology is important when data is to be met, kept, saved, and assessed as stated by(Kennedy et al., 1985). However, there is a great test of insufficient accomplished library personnel that could meet professional supplies (Oduwole, 2005) which has also been confirmed by the study conducted by (Choi & Rasmussen, 2003). According to their estimate, the present era of digitization brought challenges both for the libraries and the librarians; the information that is available in e-books, databases, archives, and other digital materials which has spurred library resource management, distribution, and organization to evolve, this is what search engines perform. In the delivery of this innovation, there have been found seemingly many drastic challenges along with the prevailing issues of information technology use in the libraries. The different informational activities have been conducted by some conventional methods as well as the adoption of new technologies

The latest technologies also facilitate the libraries and the publishers to provide bibliographic service to the library users (Ogunsola & Aboyade, 2005). EndNote, RefWorks, Zotero, and Mendeley are types of bibliographic software which can be used to build a list of references for a research paper. The utilization of technology helps in the fulfilling requirements of mechanical translation services. Various online programmes, including Google Translator, can be used to translate from other languages to English and vice versa for this purpose. Similarly, databases can be used to investigate many aspects of a subject of study. The researchers can beat research challenges by using the databases. As a result, in an online

environment, searching and retrieving data from a database has become quite simple. In most cases, libraries make database searching techniques available through their websites. Such advice is beneficial to researchers for studying and learning purposes.

The latest technology can play a vital role in managing the basic library activities managing the library collection, to provide the reference services, document delivery service, and access to the library collections along with assisting the users in information search and retrieval (Husain & Nazim, 2015). In the same way, Thomas and (McDonald, 2005) revealed that the technology in the 21st century was indispensable to use for making the library services faster and effective. It is a reality that a library's success is entirely dependent on its users' satisfaction and the quickest library service is more accessible through the World Wide Web and the internet used for this case. Traditional libraries have been transformed into knowledge centres as a result of new technological tools and procedures with librarians acting more like consulting information engineers or knowledge experts (Kumar & Biradar, 2010).

Modern technology has brought significant improvements in various parts of library operations. The employment of internet technologies for anything from cleaning to user management has remained mostly successful. Basically, libraries use technology to deliver effective services such as access to the OPAC, library databases, automated circulation of library books, and so on. As a result, the use of technology has had a significant impact on every aspect of academic library work as well as providing users with value-added information services and access to a wide range of digital-based information resources (Ghuloum, 2012). Advanced technology can aid in the creation, storage, transfer, and application of tacit and explicit knowledge (Okumus, 2013).

In the same way, Haneefa (2007) investigated the use of information technology in Kerala's special libraries and discovered that the most preferred area for automation is the library catalogue. According to the findings, users' discontent is primarily due to a lack of suitable technology infrastructure. For better results, he suggested improving library automation and focusing on effective and efficient technology implementation. Information technology (IT) is currently widely used in several sectors (Law et al., 2009). Similarly, (Peyala, 2011) believes that the use of IT has not only enhanced the ability to access, store, and process information within the library but it has also resulted in substantial changes in the notion of library organization, functioning, and management. The IT revolution has facilitated the processes of searching and recovering information. ICT improves the efficiency of organizational management processes and provides new ways of improving the capacity of response to its users (López et al., 2006).

In another study, Buarki et al., (2011) found information and communication skills as essential and important to the library and information science professionals as required by the employers. As a result, the researchers urge that ICT skills become a requirement and draws considerable attention in evaluating an applicant for employment in the library profession.

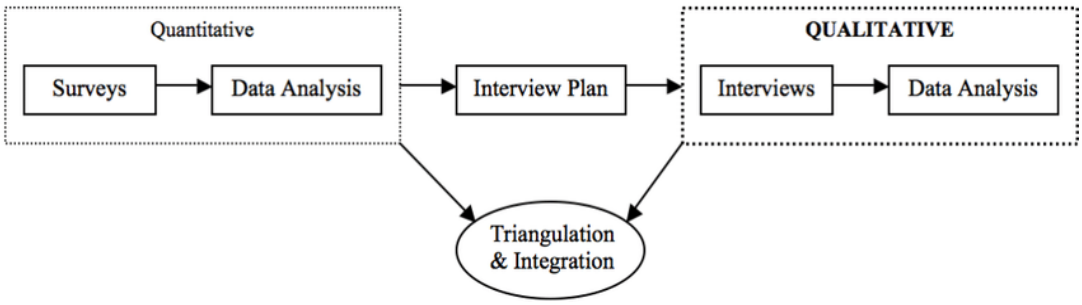
Anunobi and Benard, (2007) conducted research on how the university library can play a critical role as an information delivery system to support teaching, learning, and research in a variety of formats. They also discovered that before the advent of technology, serial acquisition was manual; now, with the advancement of technology, serial or periodicals' acquisition has become simple. The same is true for their retrieval to keep in view the preceding perspective, as consumers' curiosity for knowledge has shifted from print to electronic resources.

On the other hand, Chandrakar and Arora, (2010) investigated the use of nformation technology on copy cataloguing from a variety of reliable sources including Library of Congress (LC) catalogue. The results indicate that the proper application of technology in the library is critical. It has also been discovered that good infrastructure and an ICT established environment can give users better and faster services. It can instruct library staff on how to use ICT in various workflows for housekeeping operations.

Methodology

The Mixed methods research design has been selected to carry out the study.

This mixed methods research methodology is used for conducting research that involves collecting, analyzing, and integrating quantitative (e.g., experiments, surveys) and qualitative (e.g., focus groups, interviews) research. Mixed method research is one of the most important research methods of the 19th century that combines both the advantages of quantitative as well as qualitative research methods (Creswell & Clark, 2017). In this research, the researcher has decided to use the mixed method sequential explanatory research design. The figure below shows the design clearly.



Mixed Method of Research Work

(Creswell, 2017)

Results & Discussion

Sample Population

As the universe of the investigation has not been too large and it has been possible to collect data from the whole population. However, there are maximum universities developed in the last five years i.e., till 2015 and the researchers believe that the libraries of those universities do not possess that much technically sound equipment. Therefore, it has been decided to get data from the In-Charge librarian of those universities which have been developed before 2015. The number of those universities is 109. The questionnaires were distributed to all In-charge libraries of those selected Public Sector universities, libraries (Table 3.1).

Table 3. 1: Public Sector Universities in Pakistan.

Province	Total Public Sector Established Universities till 2019	Universities Established till 2015
Punjab	59	55
Sindh	27	24
Balochistan	09	06
KPK	31	24
Total	126	109

Response Rate in each Province

The entire right responses (66.7%) were separated further to control the reply rate in each province as shown in Table 3.2. It shows that the response rate of the Punjab province was the highest at 36.69%, followed by the Khyber Pakhtunkhwa (KPK) province that response rate was 13.7%. The reason for getting higher response rate in these two provinces was encouraging. Actually, these two provinces were accessible to researcher. The response rate of the respondents in the remaining two provinces Baluchistan were 3.6% Sindh 12.8% respectively.

Table 3.2: Response Rate in each Province

Province	Total population	Total Responses in each province
Punjab	55	40(36.69%)
Sindh	23	14(12.8%)
Balochistan	06	4(3.6%)
Khyber Pakhtunkhwa	25	15(13.7%)
Total	109(100%)	73(66.7%)

Gender Distribution of the Respondents.

The data regarding the gender of the respondents in Table 4.1 indicates that the high percentage of 80.82% of the respondents are male librarians in all public sector universities as compared to the female ratio of 19.1%. Further analysis of the respondents' gender in the provinces shows that the overall ratio of male respondents in the provinces is higher than female. However, the number of the females as compared to the males in the province of Baluchistan and Khyber Pakhtunkhwa was higher than the female ratio in the rest of the two provinces.

It shows that the frequency of the female's opting librarianship is lower than males in the country. The reason for less frequency of the female than the male in this profession might be due to less positive attitudes towards the female in performing jobs in such field where they are required to offer services to many male and female clients in the libraries.

Table 4.1: Gender Distribution of In-Charge Librarians in the Universities

Province	Male	Female	Total in a Province
Balochistan	3(75%)	1(25%)	4(5.47%)
Khyber Pakhtunkhwa	11(73%)	4(26%)	15(20.54%)
Punjab	33(82%)	7(18%)	40(54.79%)
Sindh	12(85.7%)	2(14.2%)	14(19.17%)
Total	59(80.8%)	14(19.1%)	73(100%)

Respondent's Designations

The facts about the designations of the respondents have been mentioned in the Table 4.2. It shows that there is a total of 34 (46.57%) respondents who are designated as Chief Librarians (Head of the Public Sector University Libraries). Similarly, 21 (28.76%) are designated as Senior Librarians and only 18 (24.65%) are Deputy Librarians among the total respondents.

It means that in the mainstream, 34 of the respondents are employed in the public sector libraries who are designated as the Chief Librarians.

Table 4.2: Designations of the Respondents

Designation of the Respondents	Frequency	Percentage
Chief Librarians	34	46.57%
Senior Librarian	21	28.76%
Deputy Librarians	18	24.65%
Total	73	73(100%)

Professional Qualification of the Respondents

The data related to the professional qualification of the respondents is shown in Table 4.3. It indicates that many the respondents (male 33 (55.9% and female 7 (50%) possess only master's degrees in the library sciences whereas the number of the male n=21 (35.5%) and the female n=7 (35.7%) possessing M. Phil qualification were same but the percentage of the female 2 (14.28%) holding PhD degree has been found higher than the male 5 (8.47%).

Overall, the data show that there has been less number n=7(9.58%) of the respondents having higher (PHD) professional qualification than the master's degree holders i.e., n=40(58.9%).

Table 4.3: Respondents' Qualifications (Professional)

Respondents	Ph. D	M. Phil	MLISc	Total
Male	5	21	33	59
	(8.47%)	(35.5%)	(55.9%)	(80.82%)
Female	2	5	7	14
	(14.28%)	(35.7%)	(50.0%)	(19.17%)
Total	7	26	40	73

	(9.58%)	(31.5%)	(58.9%)	(100%)

Experience (Librarianship & Advanced Technology Used Experience) of the Respondents

The professional and IT related experience of the respondents in various universities is given in the Table 4.3. It figures out that professional experience of the majority 38(52%) of the respondents has been between 26-30 years. It means that those possess experience up to 30 years and above have been the senior librarians of the higher age group. There has been only n=9 (12.3%) respondents who have 20 years of experience.

Table 4.4: Respondents' Experience (Professional & IT Related) (N=73)

Experience	Frequency	Percentage
Up to 20 years	9	(12.3%)
21-25 years	22	(30.1%)
26-30 years	38	(52.2%)
30+ years	04	(5.4%)
Total	73	(100%)

So far, the IT related experience has been concerned some 47 (46.37%) respondents of the study have 11-15 years of advanced technology used experience. There has been only n=26 (35.5%) having IT use experience. It means, that mainstream of the study members employed in the public sector universities of Pakistan are practicing advanced technology for the last 15 years.

Table. Advanced Technology Used Experience

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Years	Advanced Technology Used Experience Frequency	Percentage
1-5 years	5	6.8%
6-10 years	21	28.7%
11-15 years	32	43.83%
16 + years	15	20.54%
Total	73	(100%)

Barriers and the Challenges in the use of Advanced Technological Tools.

A very critical question posed by the researcher in order to know the barriers and the challenges in the use of the advanced technological tools and the technologies in public sector university libraries in Pakistan for the purpose to cope with and improve the quality of the services in the libraries is explained in the Table 4.4

The data explicitly show that the barrier, the budget constraints (mean=4.89, SD=.701), to maintain and update the technologies in the libraries have got 1st rank in the light of the participants' views. It means that the Budget is the backbone to providing good services through advance technologies in university libraries, but they face budget problems a lot. Similarly, other barriers to which participant strongly agree are the updated version of technology creates problems during the customizations (mean score=4.81, SD=.736), which has got 2nd rank in the list of priority. Similarly, the 3rd rank has been got by the barrier, lack of training (in-services) and CPD in the use of new technologies (mean score=4.76, SD=.762); 4th challenge is that to keep the backup of every document/file(s) is not possible every time (mean score=4.71, SD=.778); 5th is, nervousness/anxiety in using new technologies (mean score=4.65, SD=.789); 6th is lack of the staff working in the computer labs and the library (mean score=4.56); and 7th position is grabbed by the barrier, lack of IT qualification by the librarians (mean score=4.50).

The In-charge librarians have agreed to the barriers; security issues in the use of new technologies (mean=4.31) have been followed by the 'Lack of workstations in the libraries to provide services to the library users (mean=4.29), lack of support from the library staff (mean=4.01), negative attitude of the society towards the new technologies in the libraries (mean=3.89), and the electricity shortage problem in the libraries (mean=3.49).

The participants have not shown any opinion about the rest of barriers. It means the followings; no local support/Error Handling for every technology is possible (mean=3.34, SD=1.045), lack of inadequate knowledge about online e-resources (mean=3.23, SD=1.089), library users have less interest in the use of the new technologies (mean=2.22, SD=1.110), and slow speed of the internet or connectivity issues (mean=3.20, SD=1.137). However, the respondents have disagreed to the barriers: the unavailability of special environment/atmosphere for the advanced technology and time constraints in the use of the advanced technologies.

It means that the budget constraint, to update the technology and to keep backup of every document is not possible. Nervousness/anxiety in using new technology, lack of the staff working in computer labs and the library and the security issues in the use of technologies are highly important problems in view of the participants and need to resolve these on priority basis. The rest of the issues also need to be resolved for the effective and sound use of the technologies.

Table 4.5: Barriers in the Use of Advanced Technologies in the University Libraries

Barriers in the use of Advanced Technologies	Mean	SD	Rank
Budget constraints, to maintain and update the technologies in libraries.	4.89	.701	1st
The updated version of technology creates problem during the customizations	4.81	.736	2nd
Lack of training (in-services) CPD in the use of advanced technologies	4.76	.762	3rd
To keep the backup of every document / file (s) is not possible every time	4.71	.778	4th
I feel nervousness/anxiety in using advanced technologies	4.65	.789	5th
Lack of staff working in computer labs and library	4.56	.851	6th
Lack of IT qualification by the Librarians	4.50	.883	7th
I face security issues in the use of new technologies	4.31	.931	8th
Lack of workstations in the libraries to provide services to library users.	4.29	.951	9th
Lack of support from the library staff	4.01	.971	10th
The problem of negative attitude of society towards the new technologies in the libraries	3.89	1.010	11th
There is electricity shortage problem in your library	3.49	1.023	12th
No local support/Error Handling for every technology is possible	3.34	1.045	13th
Lack of inadequate knowledge about online e-resources	3.23	1.089	14th
Library users have less interest in the use of new technologies.	3.22	1.110	15th
Slow speed of internet or connectivity issues	3.20	1.137	16th
Language barrier in the use of new technologies.	2.56	1.175	17th
The unavailability of Special Environment/Atmosphere for advanced technology.	2.51	1.187	18th
Time constraints in the use of new technologies in the libraries	2.50	1.191	19th

Scale: Strongly disagree=1, Disagree=2, Neutral=3, Agree=4, Strongly agree=5

During the quantitative analysis, the researcher observed that respondents were encountering budgetary constraints. Consequently, they were questioned about the impact of these budget constraints on their efforts to implement advanced technologies in

libraries. Moreover, respondents were qualitatively probed to express their preferences for modes of training, how they characterized their adaptation to technological changes (including their feelings, fears, and excitement), whether information professionals would remain indispensable or be replaced by computers, and what IT-related qualifications librarians would recommend for the effective utilization of advanced technologies, in addition to their professional qualifications. The respondents provided comprehensive insights into these inquiries.

1 Do you believe that the Economic Crisis at Universities has had an impact on the use of advanced technologies in libraries?

As all the participants of the study confirmed that the Economic crisis has greatly affected the applicability of advanced technologies in their libraries and the Table 4.19 shows that the highest percentage 98.63% of the participants were of the opinion that the first most important prerequisite for the implementation of the advanced technologies in the libraries is the budget. Therefore, during in-depth interviews, they have been asked to reveal how the budget constraints have affected the applicability of the advanced technologies in the libraries. All the participants N=14 have agreed that the applicability of the advanced technology is conditioned with the provision of the adequate budget for the libraries. Similarly, among fourteen participants, six (n=6) have expressed that the administration has often turned a deaf ear to the demands of the library. 42% of them are of the opinion that the budget is very important for the applicability of advanced technologies in the libraries but to get an adequate budget, they have to make requests time and again. Furthermore, three out of fourteen have expressed that it is difficult to convince higher ups for the provision of the budget. Similarly, 14% **o**f the respondents have said that the authorities do not realize the importance of the advanced technologies in the libraries.

In brief, all the librarians have agreed that the budget is mandatory for the applicability of the advance technologies and half of them 50% are complaining regarding the negative response of the administration, as they don't pay heed towards their budgetary demands which compel them to make requests again and again.

Table 4.6: The Effects of Economic Crisis on the Applicability of the Advanced Technologies in the libraries (Multiple answers)

Sr. No	Statements	Frequency	Percentage
1	The applicability of the advanced technology is conditioned with the provision of the adequate budget for the libraries.	14	100%
2	The administration often turns deaf ear to the demands of the library.	7	50%
3	But to get an adequate budget, we need to request very frequently.	6	42%
4	The higher-ups are difficult to convince	3	21%

5	The authorities don't realize the importance of the advanced technologies in the libraries.	2	14%

Conclusion

After complete analysis of quantitative and qualitative data findings, the following conclusions are drawn:

1. Results show that the frequency of the female opting librarianship is lower than the males in the country. The reason for less frequency of the female than the male in this profession might be due to less positive attitude towards the female performing jobs in such fields where they are needed to offer the services to a large number of males and females in the libraries. The overall results show that the maximum number of librarians 28 (38.5%) both male and female belong to the age group 40+ years. It means that most of the In-charge/Chief librarians are senior members of the librarians' community.
2. It means that many of the librarians of the public sector university libraries are designated as the Chief Librarians. The overall data shows that there is less number n=7(9.58%) of the respondents having higher (PhD) professional qualification than the master's degree holders i.e., n=40(58.9%).
3. Most of the participants have 30 years of professional experience and that majority of participants working in the public sector universities of Pakistan are practicing advanced technology from the last 15 years. So far, the gender-wise IT related experience of the participants is concerned, the results show that the highest experience i.e., 16 years plus has been recorded of the female (21.42%) which is greater than the male (20%).
4. Status of the hardware technology in the libraries: From the above findings it is inferred that most of the hardware like computer terminals, server machines, charger points, and adapter kits, digital cameras, USB flash drives/External Hard drives, printers and scanners have been available in the majority of the libraries but, 3-D Printers, Kiosk, Barcode Reader, DVD/CD Writers and LCD Projector have been available in between 70 to 80 % of the libraries except a few modern and advanced hardware like Robotic Circulation and Holographic Technology, which have been available in only 11 to 12 libraries. It means that most of the hardware technology has been present in the university libraries except for a few modern and advanced hardware like Robotic Circulation and Holographic Technology.
5. Status of the software technology in the libraries: The following software Operating Systems are used in computer terminals and servers, Library Management Software, Anti-Virus software, Digital Library Software, Data Bases/Relational databases software, Citation Management Software, Anti-Plagiarism software, and Data Analysis Software. QR Barcode software, File Convertor Software, institutionally repository Software and Social Media Networks Software are available in most of the libraries. The only software available in half of the libraries has been Audio/Video services utilization software.
6. Physical Facilities: It is concluded from the findings that the furniture for the hardware, for example, the computer tables and the

chairs and stands etc. were satisfactorily available in the libraries. Similarly, there is enough space available for study in the libraries with other facilities such as lighting and ventilation. However, the librarians also showed less satisfaction with air conditioning, cubicles and cabin facilities.

7. Three Important prerequisites are: The participants consider the budget highly important for the implementation of the advanced technologies in the libraries followed by internet facilities. However, they consider the trained staff as less important than the budget and the Internet.
8. The findings related to advanced tools and the technologies in the public sector university libraries show that almost 13 technologies have been used in more than 50% of libraries. These technologies are OCLC, Electronic communication, Search Engine Technologies, Web-Cataloguing, Audio technology, Google translator (language Converter), Social Networking technologies, Preservation technology, Video conferencing, RFID technologies, Smoke Detector Technology, GSM technology, and E-biographies.

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