IMPACT OF EMERGING TECHNOLOGIES ON UNIVERSITY LIBRARIES OF PAKISTAN

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Abstract

It is a common accepted fact that digital technology has made room for itself in every field and sphere of life. Libraries are no exception in this regard. In this modern era, all the libraries store information not only in the form of books, but also in the form of audio, video and other multimedia sources. The paper in hand investigates the impact of emerging technologies on university libraries of Pakistan. A total of 91 public sector university libraries have been targeted for this purpose. A reasonable number of libraries have been responded. The findings of the study reveal that the implementations of emerging library technologies have positive impact on library services and resources in the public sector universities in Pakistan. It was pinpointed that inadequate funding for library automation, lack of skilled library professionals, lack of user education programs on emerging library technologies, frequent power failure are the major barriers to the implementation of latest technologies in university libraries of the country. These obstacles can be eradicated by giving due attention and maximum opportunities to the libraries of the country.

Key words: Emerging library technologies-Pakistan; University libraries-Pakistan; digital technology- Libraries; Modern library trends- university libraries and latest technologies and their impact.

INTRODUCTION

Today's world is a world of emerging technologies, because it has affected all spheres of our lives. Digital technology has revolutionized our office work, transactions in banks, industries, education, simulation for training, business, health care, law, police, airline system and homes. As library is also an integral part of our community, it is equally affected by this technological revolution. Choo Ming Ding (1996:79-87) states that the impact of technology on all levels of library operations cannot be underestimated. In the age of 21st century, Library and Information Science professionals must be aware of emerging technologies. The librarians need to develop technology based skills to cope with the modern challenges. M.Bavakutty (2006: 6-9) explains that information explosion, shrinking budget and price hike of documents, shift in the medium of publication and lack of adequate staff are the major reasons that necessitate dependence on latest technologies in university libraries.

Khana (2014) is of the view that students feel comfortable while using modern library technologies. Radio Frequency Identification system (RFID), a modern library tool will also reduce the workload of the library work force.

S.R.Das (2008:221-223) writes that the major technological changes that had a thorough impact are the growth and development of bibliographical utilities and integrated automated cataloguing system with the help of MARC format. The working environment of the technical section of the library is changing gradually and will assume a new shape in the near future in almost all academic libraries. Pervez Ahmad & M. Yaseen (2009:3) highlights the positive effects of automation which are as follows:

- a raise in expertise level
- probably higher job satisfaction
- an increase in the multiplicity of everyday jobs
- better elasticity

The advent of emerging technologies in the libraries and information centers of Pakistan took place two and half decades ago. As a matter of fact, most of the universities in Pakistan have recently introduced the adoption of emerging technologies in their libraries or planning to introduce the same. The public sector university libraries of Islamabad and Punjab have better digital technology infrastructure as compared with the rest of the university libraries of the country because of comparatively better financial affluence and proximity to the federal capital Islamabad as well as the HEC headquarters(S.U Jan & Rafia A. Sheikh:2011). Muhammad Ahsan (2009) discusses that digitization process in information centers or libraries of Pakistan is at the stage of infancy. Pakistan has not achieved the required progress in the field of digitization due to inadequate finances, lack of computer knowledge and lack of skilled professionals in the area of digitization; these are the main reasons due to which our country is lagging behind the developed countries. Although some of our institutions are trying to digitize some of their library documents. These organizations/ universities include HEC, National Library of Pakistan, Central Library of Quaid-e-Azam University in Islamabad, Central Library of the University of Punjab and some private organizations. In order to preserve the intellectual heritage in the form of manuscripts and other rare materials related to arts, social sciences (especially culture and history of the country), these are in the process of digitization. The total collection of manuscripts in our country is 0.15 million placed in libraries and in some personal custody. It is the necessary that we digitize their materials to preserve the cultural heritage.The major limiting factors for hesitation in the use of emerging technologies in university libraries are lack of technology-based set up, deficiency of IT trained human resource, lack of awareness of the digital resources, low user demand rate, financial constraints, limited computer network system, lack of awareness about the digital protection methods and lack of technological education for digital access. The projects of introducing modern technologies in the public sector university libraries will be possible if and only if the above mentioned barriers are overcome (S.U.Jan: 2012).

OBJECTIVES OF THE STUDY

The main objective of this study is to analyze the impact of emerging technologies on university libraries of Pakistan. This survey was particularly conducted to examine the benefits of the emerging library technologies. Some of the major objectives are to:

1- *Examine why technology-based services are better than manual services.*
2- *Assess the Impact of technology based technical services on university libraries.*
3- *Know the attitude of librarians towards the application of emerging library technology.*
4- *Explore the barriers to emerging library technologies.*
5- *Suggest means and ways for eradicating these barriers.*

PREVIOU STUDIES

According to Taylor (2005), a literature review should be organized and directly related to the topic on which the research is being conducted. Secondly, it should describe a brief summary of what is known as well as unknown to the readers so far. Thirdly, it should point out the areas of controversy and certain queries that require more investigation.

Shivram Verma (2005), in his book "*Academic library system*" discusses the emerging technologies that have had a marvelous effect on university information resource centers over the past two decades and hardly any one will differ that this effect has been positive. Roswitha Poll (2005) opines that, in the present era of digital technology, university libraries have offered many modern services by transforming the traditional services into automated library services. These services have opened new ways of information handling, accessing and processing. These services comprise of specialized e- delivery services, online learning tools, e-reference, digitized library stock, electronic publishing and introduction of some new and latest information portals. These services have helped the researcher, faculty member and student in getting their required information. These services require adequate funding and also systematic planning to utilize these funding. It is reported that these new services have a very positive impact on the demands of users' community. Aina (2004) believes that the services which the libraries used to provide in the past to the users have absolutely changed as a result of modern invention and discoveries in the field of communication technology. The libraries are now taking full advantage of these inventions and bringing them into practical usage for the services of their subscribers. ICT has played a leading role in this connection. ICT is now used in the storage, analyzing and communication of information. This trend has facilitated the users and library personnel to a great extent. Not only this, it has also made the function of a library faster and more effective as compared with the past.

Chinwe V.Anunobi (2008) while commenting says that with the appearance of modern, fast, cheap and effective technology, the role, function and responsibilities of every library has undergone a revolution. M.Shariful Islam of Bangladesh (2007) explains that emerging technologies are influencing the basic functions of information resource centers in different

aspects. The different aspects include a growing demand of library documents, information explosion, modern libraries trends, and the exploration of latest and affordable computers. James W.Marcum (2003:2) writes that keeping in view the increasing usage of emerging library technologies, it is supposed that in a year or so, all the libraries will be dependent on information technology for their proper operation and effective functions. K.R Mulla (2006) states that in the last two decades digital technology has made room for itself in every field and sphere of life. Libraries are no exception in this regard. In modern era, all the libraries store information not only in the form of books, but also in the form of audio, video and other multimedia sources.

Keralapura (2009: 184-185), Chinwe V.Anunobi (2008) M.Shariful Islam (2007) K.R Mulla (2006), Bushra Almas Jaswal (2005: 87-104), Krishen Gopal (200), Janet Gertz (2000:97-104) and Chepesuik (1997:47-49) describe the advantages of emerging technologies. They were of the view that digital technology has enhanced the ability of libraries to serve their communities in a more sophisticated way, lower their costs, and full participation in the new networked world. They further spell out that no physical boundary, round the clock availability, multiple accesses, information retrieval, preservation, conservation and no space restrictions are the major fruits that can be achieved by adopting emerging library technologies.

Rubina Bhatti (2010), Muneera Nasreen Ansari and Bushra Adeeb Zuberi (2010), Muhammad Arif & Khalid Mehmood (2010:10), Syed Jalal-ud-din Haider (2007:173-176), Rahman Shafiq & Pervaz Ahmad (2007),   M. Bavakutty, et.al (2006: 249) , Kumar Parveen, Mamta Mestri and S Pararmeshwar (2006:150-158) and Anusha Wijayaratne (2005:21-22) write that computer illiteracy, poor technological infrastructure, slow internet connectivity, un-organized planning for library automation, lack of criteria for selection of appropriate hardware and software, financial constraints, absence of standards, ambiguity and most important lack of consent of library professionals and lack of competent manpower, growing population, poverty, less importance to modern facilities, energy crisis are the root causes of slow progress of emerging library technologies.

RESEARCH METHODOLOGY

To arrive at a concrete conclusion and to meet the specific objectives of the present research study, different research methodologies (questionnaires, interviews and observation) have been employed. The study is also supported by comprehensive literature review and web analysis.

The total population of the present investigation was the libraries and information resource centers of the public sector universities of the country. The detailed information about the mailing addresses, contact numbers, web addresses and nature of these universities and university libraries have been accessed from the website of Higher Education Commission in Islamabad. There are a total 160 Universities / Degree Awarding Institutions (DAIs) in Pakistan. Out of these, 91 are public sector universities while the rest are working in private

sector (www.hec.gov.pk) . As the universe of the investigation was not too large, therefore no sampling was made and questionnaires were distributed to all librarians of the 91 public sector universities. The response rate was good. The province wise feedback of the questionnaires is recorded as under. Basic statistical tools and simple percentage analyses have been used for the processing of data by applying Statistical Package for Social Sciences Software (SPSS) and MS-Excel.

Table - Response rate of participated universities

Geographical Zone	Total PSUL	Responded PSUL	Not responded	Response rate
Islamabad	22	20	02	91%
Punjab	22	18	04	82%
Sindh	17	15	02	88%
Khyber Pakhtun Khwa	19	17	02	89%
Balochistan	06	05	01	84%
AJK & NA	05	03	02	60%
Total	91	78	13	86%

RESULTS AND DISCUSSION

In order to determine the impact of emerging technology on university library and information resource centres, university librarians were asked various questions to obtain information about the issue. The queries in the most of the questions in this section were rated in 5 point scale (strongly agree, agree, uncertain, disagree and strongly disagree). The average Mean (X), Standard Deviation and Coefficient of Variation have been calculated. These tools are used to examine the concentration and dispersion of respondents' opinion. The least value of Standard Deviation and Coefficient of Variation show the consistency of librarians' opinion while maximum values of A.M, SD and C.V shows the variability of opinions.

1-   Technology based services are better than manual services?

Various questions have been asked from the university librarians to discover whether technology based services are better than manual services? If yes, then what are the features that distinguish technology based services from manual services. Table 1 presents the librarians' views in this regard.

Table 1.1.Technology based services are better than manual services

Comparison Total	Islamabad	Punjab	Sindh	KPK	Balochistan	AJK&NA	
Agree 69(88%)	20(100%)	17(86%)	13(88%)	15(89%)	02(40%)	02(66%)	
Disagree	----------	----------	---------	---------	--------	---------	
No such facility 01(34%)	00(00%) 09(12%)		01(06%)	02(12%)	02(11%)	03(60%)	
Total	20	18	15	17	05	03	78

Table 1 shows that majority university libraries under study agreed that technology-based library services are better than manual services. Some university librarians reported that they have no such facilities in their university libraries.

If yes, then why?

Table 1.2   Why technology-based services are better than manual services

Statement	Mean	S.D	C.V
1- They are accurate	2	0.41	20.50
2- They are consistent	1	0.50	25.00
2- They can be provided with lesser time	2	0.87	43.22
4- They can occupy lesser space	1	0.53	26.50
6- They can be provided round the clock	2	0.45	21.11
7- Can be tailor made for specific needs	2	0.40	20.23

Note: M-Mean, S.D- Standard Deviation, C.V- Coefficient of Variation

1-Strongly Agree, 2- Agree, 3-Uncertain, 4-Disagree, 5-Strongly Disagree

Librarians were asked specific questions to find out as to what are those features that distinguish technology based services from the manual services. The respondents agreed that technology based information services are consistent (X=1 with S.D=0.50). They can occupy

lesser space (X=1, SD=0.53). Technology based services are accurate; can be provided with lesser time, can be provided round the clock and can be tailor-made for specific purposes (X=2, SD=0.41, 0.45, 0.87). The statements, "technology based information services are accurate" produced the most positive response (C.V=20.50) among all the above statements.

3- Technology- based technical services have a positive impact on library services and resources?

The respondents were asked to report whether technology based technical services have a positive impact on library services and resources or not? For this purpose, the librarians were asked various library services. The comments have been rated in a scale: (Strongly Agree to Strongly Disagree)

Table 2 Impact of technology based technical services on university libraries

Description		Mean	S.D	C.V
1- Acquisition work		2	0.60	30.00
2- Cataloguing of documents		1	0.36	18.00
3- OPAC	2	0.76	38.00	
4- Use of e-DDC	2	0.70	35.00	
5- Digitization of documents		2	0.52	26.00
6- Circulation Control	1	0.47	23.50	
7- Information retrieval	1	0.35	17.33	
8- Stock verification		2	0.54	27.07
9- Accounting and management	2	0.60	30.00	
10- Electronic theft detection system	1	0.50	30.00	

Table 2 shows that university librarians strongly agreed with the statement that "emerging library technology has positive impact on cataloguing of documents and information retrieval" (X=1; SD=0.35, 0.36). Table 4.37 reveals that library technology has a positive impact on circulation control of the university libraries (X=1; SD=0.47). It is also seen from the same table that technology based technical services have positive impact on electronic theft detection system (X=1; SD=0.60).

Table 2 reveals that librarians agreed with the statement that technology has positive impact on acquisition work of the university libraries, accounting and management work (X=2; SD=0.60). This table also shows that emerging technologies have positive impact on stock verification (X=2; SD=0.54). The impact of technology on use of Electronic Dewey Decimal Classification(E-DDC) and Online Public Access Catalogue(OPAC) has also been

recorded as positive (X=2; SD=0.70,0.76).

The Co-efficient of Variation (CV) for statement No.07 of the above Table is least (17.33), most of the librarians have answered to this statement that "technology has a positive impact on information retrieval". This reflects the consistency among the responses of the librarians. Statement No.2 of the same Table gives the (CV=18.00 per cent) which is the next least co-efficient of variation and shows consistency among the responses of the respondents. There are diverse opinions about the use of OPAC (CV=42 .67 per cent). It is concluded that technology based library services have a positive impact on cataloguing of documents and information retrieval.

4- Attitude of university librarians towards the application of Digital Technology (DT) in the PSU libraries of Pakistan

The attitude of librarians towards the application of digital technology in university library services and resources is an important factor because librarians are the people who introduce and provide new services and resources to the users. The librarians have the responsibility to fulfill the needs and demands of their clientele. Librarians with positive attitude towards the application of digital technology in university libraries can help the libraries to introduce modern information sources and services. It is highly relevant to assess the attitude of librarians towards the application of digital technology in libraries. Librarians were asked to indicate their attitude and responses towards this matter.

Table 3 elucidates the attitude of university librarians towards the application of digital technology in the university libraries.

Table 3- Attitude of librarians towards the application of emerging library technology

Description	Mean	S.D	C.V
1- DT are to improve the quality of library services	2	0.89	44.85
2- DT applications improve the efficiency of Library	2	0.40	20.10
3- DT enhances the knowledge and expertise	2	0.66	33.33
4- DT reduces the work load of the library Professional	4	0.50	12.54
5- DT increases the regular budgeting	2	1.08	53.90
6- DT takes over the traditional way of information handling in the library	3	0.54	26.98

Table 3 shows that librarians have positive attitude and agreed with the statement: digital technology application improves the efficiency of the library(X=2; SD=0.40). It is also seen that the emergence of digital technologies improve the knowledge and expertise of the library professionals (X=2; SD=0.50). The above Table reflects that university librarians agreed that

digital technology applications improves the quality of library services (X=2; SD=0.89). The librarians also agreed with the statement that: digital technology increases the regular budgeting of the university libraries (X=2; SD=1.08).

However, librarians are uncertain about whether digital technology takes over the traditional way of information handling or not? (X=3; SD=0.54). It is also observed from the Table 3 that librarians disagreed with the statement: "DT reduces the workload of the library professionals" (X=4; SD=0.54).

The calculated mean(X), Standard Deviation (SD) and Coefficient of Variation (CV) prove that the "applications of digital technology improves the efficiency of the library and it does not reduces the workload of the library professionals".

5- Barriers to the application of emerging library technologies in the university libraries

Farasat (2009) describes that the library automation in Pakistan is still in the stage of infancy and offers many barriers to their implementation. Efforts are in the pipeline to eradicate the hindrances in their way. However, an effort was made to know from the university librarians about the barriers to the implementation of emerging technologies in their respective university libraries. Table 4 contains the data about barriers to the adoption of modern library technologies.

Table 4- Barriers to emerging library technologies

Barriers		Mean	S.D	CV
☐ Information technology infrastructure	2	0.57	28.5	
☐ Copyright	1	0.51	25.5	
☐ Security	2	0.62	31.00	
☐ Professional skills	2	0.75	37.33	
☐ Frequent electricity failures	1	0.78	78.00	
☐ The will/motivation is lacking	3	0.55	27.5	
☐ Internet provision by the institutions /organization within which the Library is located:	2	0.77	38.51	
☐ Internet, Internet Speed etc	2	0.55	27.52	
☐ Financial constraints	1	0.31	31.11	
☐ Systematic planning for digitization	2	0.44	22.23	

It is seen from Table 4 that university librarians strongly agreed with the view that finance is a major barrier in the way of adopting emerging library technologies(X=1; SD=0.31).They strongly agreed and pinpointed that copyright is another major issue in the way of automation and digitization (X=1; SD= 0.51). It was also observed that respondents strongly agreed with the query that frequent electricity failure is also a barrier (X=1; SD=0.78).

Table 4 shows that university librarians agreed with the statement: "lack of systematic planning for automation and digitization" is also a barrier to the implementation of emerging technologies in university libraries of Pakistan (X=2; SD=0.44).

It can also be observed that university librarians also agreed with the statement: "Internet, internet speed, information technology infrastructure, security and professional skills are the main barriers to the implementation of modern library technologies" (X=2; SD= 0.51, 0.62, 0.75 and 0.77).As seen from Table 4, it is clear that librarians were uncertain about the statement: "the will/motivation of the university librarians towards modern library trends is lacking" (X=3; SD= 0.55).

The calculated mean, SD and CV prove the view that among all the statements " lack of systematic planning for automation and digitization of university libraries" generated the most positive response (CV=22.23).

Librarians' reply to an open ended question

The professional librarians were given an open ended question *"Any other information /experience that you want to share about the impact of digital technology on library services and resources?"* at the end of the questionnaire. The following are the responses:

- Faculty members should emphasize on Library and Information Science (LIS) postgraduate students to learn as how to access e-resources and how to manage e-records? This can be an integral part of the course on information storage and retrieval taught to LIS Masters' students.
- There is a serious and dire need of IT based teaching staff in the LIS schools to provide the necessary technology –based training needed in the 21st century.
- Responded librarians were of the opinion that development and implementation of a uniform standard integrated library software is the need of the day. They stressed that library standards used in university libraries must be uniform. The librarians also urged that required modern technology be provided to all university libraries of the country. The professionals be given periodic trainings on these emerging library technologies.

CONCLUSION

University libraries need appropriate funding for the provision of standard and effective information services to the users. This budget should be made available to the university libraries for obtaining required hardware and software infrastructure. Well-defined planning for the utilization and categorization of this budget be given due importance.

It is also recommended that required modern technologies be provided to all the university libraries of the country. The professionals be given periodic training on these emerging library technologies. Electricity failure is a major obstacle to the smooth operation of emerging library technologies. To resolve this issue, the provision of a powerful Un-interrupted Power Supply or generator be installed in the premises of the library. To put the public sector university libraries on modern library trends, maximum opportunities as well as resources be provided to all the libraries of the country.

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