HJRS HEC Journal Recognition System
Category Y
International Research Journal of Arts, Humanities and Social Sciences (IRJAHSS)
Vol 2 Issue 1 (Oct-Dec 2024)
ISSN (Online): 3006-4740
ISSN (Print): 3006-4732

Awareness and Response of College Librarians towards Cloud Computing in Khyber Pakhtunkhwa, Pakistan

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Abstract

The evaluation of the awareness and response of librarians in college libraries on cloud computing was highlighted in this study. The objectives of the study were to ascertain the awareness level, response, and difficulties associated with cloud computing adoption in Khyber Pakhtunkhwa. On the nature of the study, this has been descriptive research by use of survey approach and use of quantitative method has also been made. The location of the population was Government general colleges in southern districts of Khyber Pakhtunkhwa and 66 librarians from both male and female colleges comprised population. An adopted questionnaire by Idhalama O.U and Fidelis (2020) was used to collect data. The quantitative data was analyzed using SPSS version 22 in order to obtain the mean scores and standard deviation. Some of the findings are that most of the librarians knew about cloud computing and hence they were not lacking behind. Librarians have a fairly favourable reaction towards cloud computing. Similarly, the respondents had to think about how cloud computing should be practiced in college libraries. The study also identified the following major constraints: There is a question and answer relationship of trust between the cloud service provider and the consumer on aspects such as; integrity, ownership, privacy of data as well as the lack of legislation that may guide /guard deployment of cloud computing. The

study recommends that the government should make policies to regulate the activities of cloud service providers and allocate funds to college libraries regularly as well librarians should be trained at regular intervals to update their knowledge about cloud services.

Keywords: Librarians Awareness, Librarians Response, Cloud Computing Technology, Khyber Pakhtunkhwa, Pakistan.

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1. Introduction

ICT in the future and for now, it is applied to various societal aspects, whereas LIS is facing numerous challenges at the moment. Ironically, libraries are having trouble defending their offerings in the age of the Internet. To stay up with the global technology transformation, new concepts are produced within the discipline. The level at which we share and retain information is determined by cloud computing, which emerged from the Internet and the web (Abidi, 2012).

According to American NIST (USA), Cloud computing is a place that provides simple network connection as demanded for an array of computers used jointly (such as applications and maintenance) that is immediately adopted to serve the technology's consumers with little to no struggle on the part of the service vendor (Mell, 2016). In support of this, Frankenfield (2019), cloud computing got its name because the data being transmitted was acquired distantly, whether in a cloud or a virtual world. In an investigation by Liu, Liu, and Huang (2012), it was found that learners can access a bulk of information and interact with one another quickly and effortlessly while using cloud computing networks.

1.1 Cloud Computing Models

Buyya, Broberg, and Goscinski (2014), assert, however, that different cloud computing services are available depending on the client's needs. They are referred to as service models, and examples include the following: -

1. **Software as service:** To use this program this model necessitates libraries to purchase access, Data, software, and hardware upkeep for the libraries are the responsibility of the service provider. Examples include Libguides, Google Apps, Hotmail and Monkey Surveys, etc.
2. **Service as a platform:** This service can provide libraries with access to the resources they require to implement, test, deploy, and utilize the cloud platform they require. However, service providers, not libraries, are responsible for managing information systems and internet access on their own. 800APP and sales force is a couple of examples.
3. **Infrastructure as a service:** This service provides storage and sharing of data and is accessible to libraries through several platforms with choices such as a demand-based or "Pay as you go " model. A resource centre, bandwidth, the use of a private line, servers and a server room, a firewall, and a storing area make up the other storage devices. Elastic compute cloud from Amazon, Rack Space, and other similar services are examples of this kind of service.

1.2 Cloud Computing and Libraries

Academic libraries are those that may be in universities, polytechnics, mono-technics, colleges, etc (Maidabino, 2010). The academic library, according to Maidabino (2010), is a source of inspiration and knowledge for students, teachers, researchers, and other academicians. It has a variety of collections, including those of monographs, digital media, and computerized databases which comprise the bulk of the resources used by its users. Libraries are a crucial part of universities. In order to meet the nature, content and distribution needs of their end users, libraries have to go on growing to face these emerging technologies (Mavodza, 2013).

The availability and methods of information storage and access have shifted significantly from print media to non-print, including Compact Discs, Machine Readable Tape, Magnetic Tapes, CD ROMS, Microform Publications, Hard Disks, Punched Paper Tapes, Internet Publications, Educational Video and Transparencies, Books on Cassettes, and Cloud Computing. Over ten years ago, libraries began employing some cloud computing services. As "cloud applications," online databases are accessible. The term "cloud applications" can also be used to describe large union catalogues. As curricula change and new materials become available for library services, A constant decision-making process goes into selecting which of these information sources and services to use (Gbaj and Aliyu, 2014).

Many countries, mostly in the west, are involved in creating tactics to hasten the adoption of cloud computing. In the following aspects, for instance, by reducing the cost of software buying and getting a license, and that is far much closer to reaching a considerably higher cloud computing will definitely enhance the academic productivity among the community members. Some academic libraries, particularly in nations that are considerably more developed and have superior technology (America and Europe), have adopted cloud computing technology (Ercan, 2010). Even though there is sufficient and ongoing funding, academic libraries in the United States including those at North Carolina State University and Eastern Washington University forgo licensing other programs to save money. Developing nations have taken advantage of these technologies' potential and advantages (Erenben, 2009). According to Babu (2012), recent technological advancements that provide chances and choices to save money by introducing reasonably priced computer servers, ample storage, and platforms for sharing and working together in enterprises and educational institutions have acted as the major drivers to the continued growth and use of cloud computing.

Although numerous research on various elements of cloud computing has been conducted, including Maharana, Majhi, and Meher (2015), about awareness, usage, and Adoption; Agandi, Agandi, and Gul (2013); (Tritt and Kendrick, 2014); Pal, (2013); Ashktorab, and Taghizadeh (2012); Yuvares (2015) on issues and future outcomes; Sudhier and Seena (2018) and Swapna and Biradar (2017studies on cloud computing adoption and usage and Rahoo (2020) invertigated how library personnel in Sindh Province understood and employed cloud computing tools.

2. Literature review

Yuvraj (2013) investigated the application utilization of cloud technology in the main libraries of 29 Indian central universities. The survey instrument was created and data was collected from 407 library patrons from all university libraries. Thus, as per the results, 32.4 percent of the respondents possess basic computer skills in the form of a qualified computer science certificate with a Master's degree in library and information science. It emerged that 86.7

percent of library teams are willing to provide cloud-based library services. In core universities, librarians expressed a readiness to employ cloud computing layers, primarily

software, platforms, and infrastructure. The main issues raised by library professionals are data privacy and the security of personal information.

Majhi et al., (2015), researched seventeen Universities of Odisha state in India. The survey of said universities' institutional structures drew input from 56 librarians in all. The outcome showed that there was minimal use of the cloud for library operations and services. Overall, basic cloud services were used by 75% of librarians for personal use, and 42% of them utilize clod tools to offer library services as well as expressed a willingness to implement cloud-based technologies in routine library operations and services since they perceive that doing so will lower overall costs and facilitate collaboration.

2.1 Awareness about Cloud Computing

It has been observed that cloud computing, which gives users interaction with reliable computing by adding resilience and centralizing processes and storing, is famous in certain libraries and disliked in others. For his part, Patel (2014), said that libraries have consistently embraced cloud-based facilities like statistics tracking, e-journal access, hosting digital libraries, and additional related facilities and activities, demonstrating that the idea of cloud computing is well understood by librarians. For example, since the year 2000 A.D., software as a service (SaaS) usage has been widespread. According to further arguments made by the author that it might not be very noticeable in some developing nation’s libraries while in 21st-century libraries in developed countries, cloud computing seems to be rather commonplace. In addition to this, Seena and Suhier (204), pointed out that librarians all over the globe are familiar with CC and practicing cloud computing in a variety of parts that they might not be aware of. For example, hosting websites, digital libraries, and automated libraries, etc.

Aiyebelehin, A. J., Makinde, B., Odiachi, and Mbakwe (2020), looked into librarians' knowledge of and utilization of cloud computing (CC) services in a few Edo State universities. A questionnaire was utilized as the tool in a descriptive survey study design. 132 professional and paraprofessional librarians made up the study's population. The entire population was chosen using the total enumeration method since its size was reasonable. The data was analyzed using a straightforward percentage, frequency count, and mean. The examination of the collected data revealed that the librarians had a very high level of familiarity with the practice of OCLC, WorldCat, and Google Docs. For collection development tasks and cataloging, it was discovered that librarians utilized CC services and technology. Based on the research, it was advised that library administration must support librarians by allocating enough cash to the institution to help with the purchase and upkeep of cloud computing infrastructure.

Seena and Sudhier (2014), examined librarians' awareness regarding cloud computing technology in the Library of Kerala University. As a result, exposed that the most of librarians, 42.16 percent, are unaware of CC technology, even though 21.57 percent of those polled had limited knowledge. On the other hand, backing cloud computing awareness among librarians, Muhammad et al. (2017) found about 75% of respondents strongly agreed (SA) that understand how to use cloud computing. In contrast, Motamidian (2011), notes in his research work, that users awareness of cloud computing where 23 percent of respondents found unfamiliar with the idea of Cloud Computing is considered a reasonably large number. As a result, advocated for increased endeavors to promote the idea of Cloud Computing. Mahalakshmi and Sornam (2012), studied cloud computing applications and awareness among librarians working in engineering colleges in the Indian district of Coimbatore and discovered that the majority of respondents (98.2%) were familiar with the term Cloud Computing and 87.7 percent are aware of how use

Cloud Computing in libraries. About (52.6%), more than half of respondents believe that in Indian libraries cloud computing can be utilized.

K. Ishaq, A. Abid, S. Farooq, U. Farooq, and M. Ijaz (2019), conducted a study to find out how well-informed students were about cloud computing benefits, drawbacks, and security concerns in the educational setting. The necessary information was gathered from a population of 212 participants from undergraduate and master programs. The results show a lack of understanding of cloud computing uses, advantages, and security risks. The consequences of this inadequacy are grave because users of the cloud face several problems, including the loss and leakage of personal data, which can have negative social, sentimental, and professional repercussions on a student's life. The authors suggest utilizing cloud computing to its fullest potential in educational institutions while maintaining user security in light of both its usefulness and its sensitivity in educational institutions.

Pillai and Seena (2018), found that cloud computing technology was used and understood at Kerala University. In their study, they included the opinions of 102 semi- and professional library staff members, and they used survey questionnaires to gather data. According to the results of the study, the majority of the professionals used Google applications in their practice, and 42,16% of the librarians had incomplete ideas about cloud computing. The study also discovered that just 14.7% of librarians are familiar with Web OPAC and journal searching services, while the bulk of them are unaware of cloud service models. According to the research, most library staff members need to receive cloud computing technology training. Chudasma, Bhatt, and Trivedi (2019), noted some facts of the use of cloud computing in several libraries of the Gujarati Universities. There were 225 responders in all, including both library users and staff. Among the respondent 78. 67% claims to have heard of cloud computing while 21 .33% may be using it but are not fully aware of it. According to the data analysis,96 percent of participants agreed that cloud technologies found helpful for library services.

Rahoo (2020), investigated how Sindh Province library personnel used and were aware of cloud computing technologies. 165 library professionals comprised the sample in which 75% of those surveyed utilize cloud computing tools in a personal capacity. Regarding the cloud computing technologies for providing library services, 25 percent of both male and female participants admitted using it. According to the findings, library professionals do not have a lot of understanding or awareness of cloud computing applications. Due to data security concerns, most librarians use cloud computing applications exclusively for private use.

Idhalama and Fidlles (2020), looked into how librarians at the library of the University of Dar-e-Salam felt and acted toward cloud computing. The study's target group consisted of 125 librarians, but only 94 of them responded to the survey, which was the only way to gather data. Of the 90 respondents, 90 (95.7 percent) agreed that they were familiar with cloud computing, while 4 (4.3 percent) Disagreed. Of the 94 participants, 67 (71.3%) thought cloud computing was a powerful technology. This impression is unquestionably favorable. On the contrary, 49 (52.1 percent) consented that cloud computing was less effective. Respondents' attitudes toward cloud computing are reasonable, with 56 (59.6 percent) confirming this and 33 (35.1 percent) strongly disagreeing and 54 (57.3%) % of librarians think cloud computing is beneficial for storing massive quantities of information; 57 (60.6 percent) believe that CC facilitates sharing of mobility, data, and cooperation; and 49(52.1 percent) believe that cloud computing improves efficiency and usefulness of library service provision. The paper’s results continued that the

library professionals at the University of Dar-se-Slaam knew about Cloud Computing services and had favorable perceptions of it and had a positive attitude toward Cloud Computing.

Miss (2021), an Aid to Library Services: Cloud Computing Awareness and Implementation in Nigerian Libraries. With a response rate of 92.5 % this was an indication that the library staff from the 4 university libraries under investigation had an understanding of cloud computing. This implies that majority of the respondents from the surveyed Osun State universities had an understanding of the concept of Cloud Computing. This can further be concluded that they are still not lagging behind.

Akinyoola, O. G. (2023), found out that, librarians in academic libraries in Southwest Nigeria have knowledge about cloud-based technology and have been using one or more application in academic library but their attitude towards the use of cloud based technology was negative. In the study Idahosa, M., & Eireyi-Edewede, S., (2023) ,Perceived Awareness and Attitudes of Librarians towards the Deployment of Cloud Computing Technologies in University Libraries in South-South Nigeria in South-South Nigeria was used and the study revealed that cloud computing technology is not well understood by the librarians in the university libraries in the South-South Nigeria.

2.2 Response of College Librarians towards adoption of Cloud Computing

The perception towards CC is seen from different perspective by librarians from various libraries. According to Seena and Sudhier (2014), survey it was reveled that a number of librarians highly appreciate the notion that application of cloud computing will enhance the quality of library services. This demonstrates how positively library professionals feel about cloud computing. Similarly, research by Pal. (2013) and Swapna and Birader (2017), found that the change in the library service in respect of networking and other facilities, librarians and patrons are able to get their present apps and documents from distant areas anytime. This is to mean that, through cloud computing, the librarians can be able to access the libraries from anywhere. However, an investigation by Yuveraj (2015), addressed issues regarding cloud computing, showing that there is uncertainty surrounding whether migrating to the cloud is the best option for meeting customers' requirements or not. This was a blatant indication that while fewer people are enthusiastic regarding cloud computing, some are delaying adoption, as suggested by the research.

Yuvaraj (2014), investigates the intentions of the behavior of librarians to adopt cloud computing apps. From the three TAM instruments attitude, perceived usability and perceived usefulness questionnaire was developed to measure librarians behavioral intentions with regard to cloud computing services. Survey assessing perceived utility, perceived ease of use, attitude and behavior intention towards the use of cloud computing apps has been administrated to 457 library professionals. The results show that perceived ease of use by librarians as a significant determinant of attitude towards use. Of equal importance to the perception of cloud computing apps was the rated ease-of-use of the applications. The results confirm the effects of cloud computing tools in a library setting.

According to Tritt and Kendrick (2014), a few library professionals like to store their data on accessible hard discs rather than the cloud. This appears to be due to librarians' mistrust of the cloud as a data storage option. Yuvaraj (2015), in contrast, disclosed a widespread assumption that by transferring the library to cloud computing, Cloud service providers will handle all tasks, hence eliminating the need for library IT staff, Contrary to what a study conducted by Pal (2013),

found that cloud computing requires the assistance of library IT workers since they augment or substitute local cloud computing resources, as well as support for both hardware and software upkeep. The majority of literary works show that people's attitudes toward cloud computing vary for a variety of reasons.

2.3 Perceived difficulties associated with the adoption of Cloud Computing

In relation to the security and trust perspectives, cloud technology does not diverge from any other technology (Yuvaraj, 2015). One of the main challenges of utilizing the cloud has to do with safety and privacy of data stored in the cloud (Hussaini et al., 2017). Agandi, Agandi and Gul, (2013);Trit and Kendrick, (2014) and Sahu, (2015) say due to people's concern about their digital information falling into the wrong hands, efforts to persuade them to utilize this technology are not having the desired impact. According to a survey conducted by Sahu (2015), people are concerned that data will no longer be private or that it will be more vulnerable to stealing and destruction because no server own by libraries on which their content is stored. Alotaibi (2013), study raised issues regarding the ownership and mobility of data. When it comes to data ownership and mobility, people often wonder if they can get all of their data back if they decide to stop using cloud services. After you discontinue the service, how positive are you that the supplier will delete your data? What concerns privacy is how much information cloud service providers are gathering and why. Trirr and Kendrick,(2014); Agandi, Agandi and Gul, (2013);Pal, (2013) and Sahu (2015), discovered that fewer librarians and library patrons have welcomed Cloud Computing but overall are concerned about the proprietary ship and the confidentiality of data. A horrible insider threat that one is afraid of is another cause of concerns about privacy and security. This worry stems from service providers' unwillingness to disclose their hiring practices, asset access policies, or monitoring practices. Existing and upcoming users worry that cloud computing data may be at risk if hostile insiders are not watched. This was supported by Ashktorab and Taghizadeh (2012), who found that data is always at risk of loss or theft, whether it is deleted without a backup, the encoding key is lost, or someone gains illegal access. Considering that a library won't have any local or physical backups if data managed by cloud computing is erased (Pal, 2013).

The dependency of cloud computing on internet access presents another difficulty. Cloud computing cannot be implemented in libraries that do not have or have intermittent internet access (Swapna and Birader 2017; Hussaini et al., 2017). When using cloud computing, all functions of an organization in question will come to a complete stop when Internet access goes down for whatever reason, till the resumption of connectivity (Swapna and Biradar, 2017). According to an investigation by Agandi, Agandi, and Gul (2013), The development of several technologies has been accelerated by the Internet., including cloud computing. Consequently, it becomes very challenging for the library to regain the internet link once it is lost (Pal, 2013). Besides its dependence on internet access, Cloud Computing (CC) raises bandwidth requirements due to its requirement for fast connections to function properly (Swapna and Birader, 2017; Hussaini et al. 2017). Therefore, funding for libraries must be sufficient to operate their services while relying on cloud computing. In support of this Hussaini et al., (2017), found that a further barrier to libraries using cloud computing is a lack of funding. The costs associated with equipment acquisition, infrastructure installation, and implementation.

Wada (2018), researched cloud computing use in libraries, he emphasized that electronic assets, internet access, architecture of client-server, remote access points, and certified digital librarian, are considered the key criteria for CC adoption and conversion of traditional libraries

into smart libraries. Makori (2016), voiced worry that the difficult economic conditions in Kenya meant that libraries and information centers faced a lot of operational issues. He added that cloud computing is being promoted as the ideal option to oversee and assist service delivery in local libraries as well as information resource centers. Yuvaraj (2013), focused on the use and cloud computing adoption in libraries, including 29 main Universities in India. A total of 407 library patrons from across all of the universities participated in the survey tool, which was created. Hence, 32.4 % of all respondents, besides having professional qualification /training in Library Science also had basic computer skills in form of a certification in computer science. Approximately 87 percent of librarians are eager to provide cloud-based library services. Professional librarians expressed their readiness to employ cloud computing layers, primarily free software, and platforms, including infrastructure as cloud computing in major institutions. The main issues raised by library professionals are the privacy of data and personal data safety. Yuvaraj, (2015) studied with the title "Academic Libraries: Problems and Opportunities of Using Cloud Computing at Banaras Hindu University". The main goal of this project (BHUL) was adoption and maintaining cloud applications. Findings showed that BHUL offers its users cloudbased library resources and services with value-added. The staff of the library is equipped to counter the emerging issues of cloud computing in the campus library via the internet and the social media.

3. Objectives of the study

1. To ascertain the awareness level of Government general college librarians about cloud computing in Khyber Pakhtunkhwa.
2. To examine the response of Government general college librarians regarding the adoption of cloud computing.
3. To navigate the difficulties associated with cloud computing adoption

4. Research Methodology

This study employed the descriptive research method within the survey design. There are 66 librarians included in the study from Government general colleges in southern districts of Khyber Pakhtunkhwa. The sample included the entire population of the study therefore, census enumeration sample technique was used due to the fact that the population is small and manageable. Since the population is small while there is both time and money available for the research, the entire population was selected to be studied. Google Forms was employed to create the items of the questionnaire which were administered to the respondents via email, personal WhatsApp contacts and Khyber Pakhtunkhwa male and female librarians' official WhatsApp groups. The data collected was analysed using descriptive statistics by the help of Statistical Package for Social Science (SPSS) version 22. As a result, using SPSS version 22 to administer the questionnaires produced excellent results and allowed the researcher to contact a large number of respondents and quickly and simply collect data.

5. Findings and Discussion

5.1 Demographic Information of Respondents

Responses to questions about respondents' sex, age range, educational background, and experience were requested. These variables helped to define awareness and reactions towards

cloud computing. The compiled data was processed to arrive at the conclusion shown in Tables 4.1-4.4.

5.2Gender

Table 4.1 shows that, on average, 46 respondents (69.7%) were male, while 20 respondents (30.3%) were female.

Table 1

Gender

S.NO	Gender	Frequency	%
1.	Male	66	69.7
2.	Female	20	30.3

5.3 Age of the Respondents

The researcher was obliged to find out the age of the respondent librarians and this is important in the context of this study because previous studies showed that age of the librarians influenced the Computer usage. Thus, the researcher was interested in their ages and educational levels regarding their perception of cloud computing acceptance. Table 4.2 reveals that the majority of the respondents representing 45.5 % (n=30 of 66) respondents fall in the age group of 31-40 years. The remaining 24.2 % (n=16 of 66) respondents lie in the age range of 21-30 years. While 24.2 % (n=26 of 66) respondents are in the age range of 41-50. The age groups 51-60 account for 6.1 % of all respondents (n = 4 of 66). The age bracket between the ages of twenty one and thirty holds the largest working population.

Table 2

Age of respondents

Age of Respondents	Frequency	%
21-30	16	24.2%
31-40	30	45.5%
41-50	16	24.2%
51-60	04	06.1%
Total	66	100%

5.4 Educational Qualification

The researcher tried to establish the academic achievement of college librarians to get a clear picture on their level of education. This is important for this study because it shall provide an insight into their training on how to utilize cloud computing responsibly. This section examines the characteristics of librarians education level and it was found that the majority of them, 68.2% (n=45 of 66), had a Master of Library Science (MLS), Master degree in Library and Information Science (MLIS), or Master in Information Management (MIM). Additionally, it reveals that 07 out of 66 respondents, or 10.6%, hold a bachelor's degree in library and information science (BS-

LIS) or above. Similarly, 18.2 % (n=12 out of 66) respondents held a Master of Philosophy Degree or higher (M.Phil.). It was discovered that 3.05% (n=2 of 66) of the respondents have a Doctor of Philosophy degree (PhD). Table 4.3 depicts the specifics. According to the study, librarians had earned degrees at various academic levels, including bachelors, masters and doctoral levels, as shown in table 4.3 below. This implied that academic librarians had some level of technology exposure and were prepared to accommodate new developments like cloud computing. This concurs with the findings of Buyya (2012) study, which found a

"significant link between educational attainment and technological acceptability. Based on their intensive training to obtain their appropriate qualification, people with higher levels of education typically have an improved ability to conceptualize the benefits and drawbacks of a given technology.

Table 3

Educational Qualification of the Respondents

Degree Level	Frequency	%
BS-LIS	07	10.6
B.LISc	00	00.0
M.LISc	45	68.2
M.Phil	12	18.2
PhD	02	03.0
Total	66	100

5.5 Working Experience

Table 4 depicts the librarians' professional background, where 24.2 % (n=16 of 66) librarians are between 1- 5 years, also, 27.3 % (n=18 of 66) are between 6-10 years' experience, 22.7 % (n=15 of 66) are between 11-15 years' experience, 13.6 % (n=9 of 66) are between 16-20 and 3.0 % (n=2 of 66) lies under 21-25 respectively. Finally, 9.1 % (n=6 of 66) above 26 years.

Table 4

Working Experience of the Respondents

Experience in years	Frequency	%
1-5	16	24.2
6-10	18	27.3
11-15	15	22.7
16-20	09	13.6
21-25	02	03.0
Others	06	09.1
Total	66	100

5.6 Librarians Awareness about Cloud Computing

In a separately distributed questionnaire the respondents were requested to express their perceived level of awareness of cloud computing in terms of its agreement or disagreement. The mean scores and standard deviations derived for each segment regarding level of awareness about cloud computing are shown in Table 4.5 which shows that respondents are aware of following information or concepts about cloud computing: new development in the field of technology (μ=

3.97); for adequate for information delivery (μ =3.78); data storage (μ =3.78); Iaas, Paas, Saas and Daas are component (μ =3.8); connected to visualized system (μ =4.00); remote access to information sources (μ =3.93); ubiquitous access(μ =3.74); and network access to information(μ =4.00).

The analyzed data further indicates that librarians also expressed their disagreement with a mean score greater than 2.50, that cc is a distraction (μ =2.75) and CC has nothing to do with IT (μ =2.78) falls under the option of neutral. The reasons for providing a neutral choice about some of CC concepts may be due to librarians' less frequent use of and ignorance of these resources. The participants level of agreement with the majority of the cloud computing awareness ideas given is significant to notice and expressed no opinion about very few. In light of this, it means that most of the library personnel is not in a state of ignorance, and has an understanding of this concept.

This result is consistent with a study by Njoku and Ken-Agbiriogu (2021), on Awareness and Use of Cloud Computing: Implication for Selected Academic Libraries in Imo State, Nigeria where it emerged that both librarians from IMSU and AIFCE indicated fairly high level of awareness about these technologies, but librarians from POLYNELE claimed to have good understanding about these tools. Meanwhile, it suggests that these institutions' libraries are not ignorant of or unfamiliar with the current technological trend in any awareness level consideration. Further supporting this, Idhalama and Fidelis (2020) reported in their study on the library of Dar-e-Salam University that 90 (95.7%) of the librarians surveyed said that they were aware of concepts of cloud computing, whereas 4 (4.3%) disagreed expressing their unfamiliarity with CC. According to Majhi, Meher, and Maharana (2015) research into 17 Indian university libraries, where 85.7% of librarians and information scientists were familiar with cloud computing. According to Rahoo (2020), who investigated the extent to which library professionals in Sindh Province are familiar and actually using cloud computing applications; they found these librarians and information science professionals lacked sufficient knowledge and awareness of these applications. In addition, A survey conducted by Pillai and Seena (2018) on the awareness of Cloud computing technology among employees of Kerala University library reported that about 42.16 % of the participants had little or no knowledge about Cloud computing technology. Akinyoola, O. G. (2023), reported that, librarians in academic libraries in Southwest, Nigeria aware of cloud-based technology and have been using one or more applications in academic libraries but their attitude towards the use of cloud-based technology was Negative. In a research study conducted by Idahosa & Eireyi-Edewede, (2023), on Librarians' Awareness and Attitude Towards Deployment of Cloud Computing Technologies in University Libraries in South-South Nigeria, it was observed that the librarians in the studied university libraries have meager awareness of cloud computing technology.y.

Table 5

Mean Score of Respondents about Awareness of Cloud Computing

Statement	μ	SD
1. I know that Cloud Computing (CC) is a new development in the field	3.97	1.080

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

5.7 Response towards Cloud Computing Adoption

The second research question regarding the present investigation was to examine the manner in which librarians reacted to use cloud computing for libraries. The goal of this section is to examine how librarians approach embracing new technologies. The survey contained eight statements which focused on the use of the cloud computing technology in the delivery of service in college libraries. The information detail from 66 responders is shown in Table 4.6. Mean scores and SD were calculated for the overall "Response towards cloud computing" as well as its substatements to calculate the phenomenon. Table 4.6 shows that the mean score (μ) for the most of statements is between (μ =2.51-2.86) which is near to the 3rd value of the scale that is "neutral". These results suggest that college librarians in southern districts of Khyber Pakhtunkhwa, Pakistan are not appropriately prepared for the practice and adoption of cloud computing technology which is an alarming signal for college libraries in the modern technological era. The seventh statement in position is "Libraries should stay away from cloud computing". Its mean score is (μ =2.37) which is near to 2nd value of disagree and the last statement that is "Cloud computing must be practiced in all libraries" mean score is (μ=3.95) near

2. I know that CC is a distraction.	2.75	1.038
3. Cloud computing is for adequate information delivery in libraries.	3.78	0 .754
4. Cloud computing has to do with cloud data storage.	3.78	0.936
5. I know that IaaS, PaaS, SaaS and DaaS are components of cloud computing.	3.83	0.814
6. I know that cloud computing is connected to virtualized system.	4.00	0.744
7. Cloud computing is manually inclined.	3.21	1.000
8. CC brings together data for a data base with remote access.	3.93	0.801
9. Cloud computing encourages ubiquitous access.	3.74	0.615
10. CC enables convenient network access to information resources.	4.00	0.656
11. CC has nothing to do with IT.	2.78	1.074

to 4th value of agree, indicates that the college librarians have positive response towards cloud computing practice and adoption. The standard deviation (SD) of all statements is positive but above 1.0 that is SD>1.0. It points up that the population data is more spread out. It showed that the respondents have no similarity in the practices of those statements. Majority of statements' mean values are more than (2.50) and only one statement mean score is above (3.50). The results

of objective two showed that respondents had a favorable opinion about cloud computing, which is considered to be reasonable. This is consistent with Rahoo (2020), study on the use of cloud computing technologies and awareness among librarians in Sindh Province, which indicated that 43.9% of participants were ready to include cloud computing in online references. There are still 1.8 respondents who are interested in library automation. This is consistent with the findings of Idhalama and Fidelis (2020), in their study examining the Dar-e-Salam University librarians perceptions and attitudes about cloud computing. According to their findings, 56 (59.6 percent) of the respondents provided a favorable response to cloud computing. Once more, this is in line with Chetty's (2014) study, where all respondents noted that basic investments made by the government and other companies in cloud computing are not wasted efforts. As opposed to this, a study by Aharony (2014), suggested that many librarians are disgusted by the use of developing technology in libraries.

Table 6

Mean Score of Respondents Response towards Cloud Computing

Statements	μ	SD
1. I do not feel like using cloud computing in my library.	2.69	1.095
2. I secretly use cloud computing in my daily work.	2.80	1.070
3. Always not happy when using cloud computing.	2.66	0.981
4. Cloud computing is a difficult task hence, I don't use it.	2.78	1.102
5. I do not need cloud computing to do my job effectively.	2.51	1.070
6. It will take me many years to accept cloud computing.	2.86	1.079
7. Libraries should stay away from cloud computing.	2.37	1.004
8. Cloud computing must be practiced in all libraries.	3.95	0.951

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

5.8 Perceived Difficulties Associated with Cloud Computing Adoption

The participants were asked about the challenges that are normally expected when it comes to cloud computing. Their responses are provided in Table 4.7. Participants considered the associated difficulties: Fear of losing access to data if decide to cease utilizing computing services (μ =3.45); not having a local or physical backup (μ =3.54); strong network connection (μ =3.90); and expensive in term of bandwidth charges (μ =3.65) as agreed. The respondents do not clearly state that any of the associated difficulties strongly disagreed or disagreed. There were a few issues for which they did not respond. These included: third-party invading privacy (μ =3.33) and a lack of confidence that all data stored on the cloud will be deleted once a client decides not to use the services anymore (μ =3.34). The absence of these comments regarding the challenges of cloud computing may be attributed to two possibilities; the first is that these librarians did not find cloud computing satisfactory enough, the second is that they lacked adequate knowledge regarding these cloud computing resources. If that is the case then the authorities need to further develop awareness strategies regarding cloud computing.

According to the findings in Table 4.7 above, these difficulties further affect the extent of acceptability and the use of cloud computing in the Khyber Pakhtunkhwa government general college libraries. This conclusion is accurate because Neethu and Vanaja (2017) found that

implementation of cloud computing is hindered by issues such as the danger of data loss, slow internet connection, security issues, etc. This is consistent with Latif's (2016), study " which describes the evaluation of the concerns with cloud computing." He claimed that the key elements for winning over users and successfully deploying cloud technology are "data protection, data management, and security." The results are consistent with Breeding (2012) research, which looked at issues preventing the implementation of cloud computing in developing nations. Breeding pointed out that among other things, staff training is a barrier when using cloud computing in libraries, selecting the best candidates for the job, privacy, and data security. This shows that there may still be challenges related to concerns with trust, the actual operation of the system, or the location of preserved data notwithstanding their acceptance and continued usage of the system.

Oyeleye, Fagbola, and Daramola (2014), in the study of the "adoption of cloud computing's effects, pros, and cons in Public universities in South-West, Nigeria" acknowledged that cloud computing enhances effectiveness of cost. According to Arpaci (2017), cloud computing implementation can be encouraged if organisations concerned with education increase knowledge management awareness. Atuase (2019) discovered major challenge in the study of academic libraries is using cloud computing to protect research data. These challenges included the absence of appropriate standards and policy guidelines, trust issues by academic libraries, failure of the cloud service providers to employ proper authentication mechanisms in academic libraries, and in turn, the advantages of ceding computing to the cloud are not as widely cherished.

Table 7

Respondents Perceived difficulties associated with cloud computing adoption

Statements	μ	SD
1. Likeliness of third party invading privacy.	3.33	.966
2. Fear of inability to get data back when a decision to stop using Computing services are made.	3.45	.914
3. Lack of assurance all information stored in the cloud will be deleted once a client has decided to cancel the service.	3.34	.885
4. Lack of physical or local backup to cover the effects of missing data.	3.54	.897
5. Cloud computing applications require a strong network connection.	3.90	.673
6. Operating with reliance on cloud computing is expensive in terms of bandwidth charges.	3.65	.813

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

6. Conclusion

As a result of problems and changes in the world, library patrons have higher expectations from the library. Many accomplishments of academic libraries have been altered by ICT from digital content providers to print resources. Without a doubt, technology-aided library personnel by converting content into a digital format and putting it at the user's disposal via a network. Cloud computing is more advantageous because it allows for quick storage and worldwide access in a networked setting.

According to the study's findings, college librarians in Khyber Pakhtunkhwa southern districts are not reluctant to new technologies. For researchers, this is an intriguing development

because no library or librarian in the twenty-first century will ever thrive without fully embracing computerization and emerging technology. As a result, this study concluded that understanding and responding favorably to cloud computing are not sufficient. The findings highlighted in this study suggest that academic library librarians embrace the idea of using cloud computing tools. However, there are profound issues related to cloud adopting, such as data ownership, privacy, security, and legal jurisdiction, which are still remain as librarians' issues.

The contribution of this study has offered an understanding of cloud computing in Government College libraries that contains an awareness of the opportunities that are available with cloud computing, the alteration of the old traditional systems to the uptake of cloud computing, and the difficulties encountered in doing so.

7. Recommendations

The government should establish adequate regulatory bodies to ensure the government rules and procedures used to support the quality of cloud services. The cloud may not become the mainstream technology because of technological advancement but owing to increased use of cloud computing the key focus area has to be cooperation among cloud service providers supplemented with sound cloud regulations which should be developed further. At this time, only internet laws apply to cloud computing.

To overcome the challenges surrounding cloud adoption, librarians need to receive training and practice to establish a productive and effective cloud-based library. When engaged in this training, librarians will be given the chance to weigh their choices based on a number of factors that can be used to make decisions on choosing a cloud service provider and other related choices. Authorities can help college libraries by allocating enough funding for the launch of cloud-based services. If libraries are to remain relevant, then the need to use cloud technology to offer services has to persist. Overall, it will remain to provide libraries with the opportunity to disseminate information in a manner more efficiently than has ever been possible, thus enabling them to perform their role as the providers of information.

The main duty is to take proactive action and embrace new technology and abilities to enhance library services. On a personal and professional level, we must make sure that both library personnel and users are making use of a wide range of cloud services.

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