



**AWARENESS AND UTILISATION OF CLOUD COMPUTING TECHNOLOGIES BY LIBRARIANS IN
ACADEMIC LIBRARIES OF NORTH EAST ZONE, NIGERIA**

BY

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Abstract

This study examined the awareness and utilisation of cloud computing technologies by librarians in academic libraries of the North-East Zone, Nigeria. The study pursued four objectives and tested one null hypothesis, adopting a survey research design. The population comprised 209 librarians drawn from three federal university libraries in the zone, namely Ramat Library, University of Maiduguri; Goodluck Ebele Jonathan Library, Yobe State University, Damaturu; and Zubairu Mohammed Library, Abubakar Tafawa Balewa University, Bauchi. The entire population was studied given its manageable size. Data were collected using a self-designed questionnaire titled the Questionnaire on Awareness and Utilisation of Cloud Computing Technologies by Librarians in Academic Libraries (QEAUCTLAL), which was pilot-tested among 30 library staff at Federal University Kashere Library, Gombe State, yielding a Cronbach Alpha reliability coefficient of 0.87. A total of 157 questionnaires were returned and used for analysis, representing a 75.1% response rate. Descriptive statistics of frequency distribution and percentages were used to answer research questions one to three, while simple linear regression was used to answer research question four and test the hypothesis at the 0.05 level of significance. Findings revealed an overall awareness level of 58.3%, indicating that librarians were generally aware of cloud computing technologies, although awareness of institutional repositories, Google Apps, Dropbox, and WorldCat remained below average. However, utilisation of cloud computing technologies for service delivery was found to be generally low, with 66.1% of responses indicating low or zero extent of use, apart from web-based email, which recorded the highest utilisation. Major challenges identified included slow internet connectivity, epileptic power supply, inadequate technical skills, data security concerns, irregular staff training, and data privacy issues, with 64.6% of respondents affirming these as significant barriers. Regression analysis showed that awareness had a very strong positive influence on utilisation of cloud computing technologies ($R = 0.813$, $R^2 = 0.661$, $F(1,155) = 85.85$, $p < .05$), leading to the rejection of the null hypothesis. The study concluded that although librarians in the North-East Zone possess a reasonable level of awareness of cloud computing technologies, this awareness has not translated into extensive professional utilisation, largely due to infrastructural, technical, and institutional constraints. The study recommended enhanced awareness campaigns, provision of reliable power and internet infrastructure, sustained staff training, and stronger institutional support to improve the utilisation of cloud computing technologies in academic library service delivery in the zone.

Keywords: Cloud computing, Awareness, Utilisation, Librarians, Academic libraries and North-East Zone



Introduction

Cloud computing has emerged as one of the major technological developments transforming the management, storage, accessibility and delivery of information services in academic libraries. It refers broadly to the provision of computing resources, applications, storage, platforms and related services through networked environments rather than relying exclusively on locally installed hardware and software. In academic libraries, cloud computing provides opportunities for libraries to move beyond traditional, locally hosted systems toward more flexible and remotely accessible technological infrastructures. Its applications include cloud-based integrated library management systems, digital repositories, online catalogues, collaborative platforms, electronic resource management, file storage and sharing, institutional communication, social networking services and other web-based library services. Bashorun et al. (2020) observed that cloud computing is capable of transforming academic library operations by supporting the movement from conventional library practices toward networked, virtual and increasingly paperless information environments. Similarly, Asim et al. (2024), in a systematic review of cloud computing adoption and use in academic libraries, identified applications such as cloud-based library automation systems, email services, social media applications, cloud storage, consortium services, digital libraries and file-sharing platforms. These developments demonstrate that cloud computing is not merely a technological innovation but an important infrastructure for improving the efficiency, flexibility, accessibility and scalability of contemporary academic library services.

The increasing relevance of cloud computing in academic libraries is particularly associated with its potential to improve the way librarians manage information resources and provide services to users. Unlike traditional computing arrangements that may require libraries to purchase, maintain and periodically upgrade expensive local servers and software, cloud-based systems can provide access to computing resources through remote infrastructure. This can facilitate resource sharing, collaborative cataloguing, remote access to information, data storage and the integration of different library services. In addition, cloud computing can support librarians in performing professional activities from different locations, thereby improving flexibility and continuity of service delivery. However, the successful implementation of cloud computing depends considerably on librarians' knowledge, awareness, attitudes and ability to use the technology. In a Nigerian study, Tella et al. (2020) found that factors such as facilitating conditions, perceived benefits, ease of use, security, maintenance, flexibility, reliability and expected improvement in productivity were associated with the adoption of cloud computing for web-based services in academic libraries. The study further reported that security and reliability were particularly influential factors in adoption. This suggests that the availability of cloud computing facilities alone may not guarantee their adoption; librarians must understand the technology, appreciate its professional benefits and possess the competence required to incorporate it into library operations.

Awareness is therefore a fundamental prerequisite for the effective utilisation of cloud computing technologies by librarians. Awareness involves librarians' knowledge and understanding of the existence, characteristics, applications, benefits and possible limitations of cloud-based technologies in relation to library work. A librarian who is aware of cloud computing is more likely to recognise opportunities for applying cloud technologies to cataloguing, circulation, reference services, digital preservation, document management, collaboration, electronic resource management and information dissemination. Evidence from Nigeria, however, suggests that awareness does not always translate automatically into professional utilisation. Zubairu et al. (2021), in their study of selected Nigerian private university libraries, reported that most library personnel were aware of cloud computing and used cloud-based applications more frequently for personal than professional purposes. The study also found that library management software and services such as mailing and social networking were among the areas in which cloud-based services were being used, while concerns about security and intellectual property protection remained important. Similarly, Njoku and Ken-Agbiriogu (2021) examined awareness and use of cloud computing in selected academic libraries in Imo State, Nigeria, demonstrating the growing importance of understanding the relationship between librarians' awareness and actual use of cloud technologies. These findings



indicate that awareness should extend beyond simply knowing that cloud computing exists; it should encompass practical knowledge of how different cloud applications can be incorporated into professional library activities.

The issue of librarians' awareness becomes even more important because the level of awareness may differ considerably across institutions and geographical regions. Idahosa and Eireyi-Edewede (2023), in their investigation of librarians in university libraries in South-South Nigeria, found that librarians had a low level of awareness of cloud computing technology, although their attitude toward its deployment was high. This finding is significant because a positive attitude toward technology may not necessarily result in actual utilisation when users lack adequate knowledge, training or institutional support. The researchers consequently recommended workshops, training and retraining programmes to improve librarians' awareness and capacity to apply cloud computing technologies to library services. More recently, research on academic libraries in Kwara State showed that librarians were using several cloud-computing applications, including OCLC, WorldCat and Google Docs, for library service delivery (Isiaka et al., 2024). The study demonstrates that cloud computing is gradually becoming part of practical library operations, particularly in areas involving information access, collaboration and resource management. Nevertheless, differences in awareness, technological competence, institutional infrastructure, funding and staff readiness may influence the extent to which librarians move from basic knowledge of cloud computing to meaningful and sustained utilisation.

Utilisation of cloud computing technologies by librarians is also influenced by organisational, technological and environmental conditions within academic libraries. Effective utilisation requires dependable internet connectivity, adequate electricity supply, appropriate hardware, institutional policies, technical support, financial investment, staff training and management commitment. Where these conditions are inadequate, librarians may be aware of cloud computing but remain unable or unwilling to use it extensively in their professional activities. Studies conducted in Nigeria have repeatedly identified security, reliability, cost, technical expertise and resistance to change as important considerations in cloud-computing adoption. Alabi et al. (2024), for example, reported that poor institutional subscriptions and staff resistance to change were among the major challenges associated with cloud computing adoption in Nigerian university libraries, while continuous training of library professionals was identified as an important strategy. Similarly, a 2024 study of academic libraries in Lagos and Ogun States found that library personnel were aware of cloud computing and recognised its potential for collaboration, accessibility and digital-resource storage, but adoption was constrained by financial limitations, data-security concerns, shortage of in-house experts and resistance to change. These findings suggest that awareness and utilisation should be examined together because high awareness may exist alongside limited utilisation when institutional and infrastructural barriers are not adequately addressed.

Against this background, the study of awareness and utilisation of cloud computing technologies by librarians in academic libraries of North East Zone, Nigeria is important because academic libraries are increasingly expected to provide flexible, technology-driven and user-centred information services. The issue is particularly relevant in developing countries such as Nigeria, where universities are expanding their electronic resources and digital services while simultaneously facing challenges relating to infrastructure, funding, staff competencies and technological change. Recent studies indicate that cloud computing has considerable potential for improving library service delivery, but the extent to which this potential is realised depends on librarians' awareness, professional competence, institutional support, technological infrastructure and confidence in cloud-based systems (Asim et al., 2024; Idahosa & Eireyi-Edewede, 2023). Research on North-Eastern Nigerian academic libraries have also demonstrated that cloud-computing adoption is influenced by multiple technological, organisational and environmental factors, while more recent work has examined the role of trust in librarians' intention to adopt cloud computing (Yakubu et al., 2025). Therefore, investigating librarians' awareness and utilisation of cloud computing technologies can provide empirical evidence on whether librarians possess sufficient knowledge of cloud technologies, the extent to which they apply them in professional activities, the services for which they are used, and the barriers limiting effective utilisation. Such evidence can assist university



library administrators and policymakers in designing appropriate training programmes, strengthening technological infrastructure, improving institutional support and developing policies that encourage secure and effective use of cloud computing technologies for enhanced academic library service delivery.

Statement of Problem

Despite the presence of computerization and the integration of automated library services that result in digitization of resources, academic libraries in Nigeria face a multitude of challenges that hinders their growth. These challenges encompass issues like unreliable internet connections, the technical proficiency of librarians, a shortage of computer-literate staff, inadequate power supply, lack of maintenance and updating practices, and insufficient funding. Furthermore, problems include bandwidth subscription, the routine upkeep of computer hardware, software glitches, staff training deficiencies, and the deliberate obsolescence of commercial software. The need for workforce training and development, along with outdated business applications, also adds to the concerns faced by automated libraries. By embracing cloud computing, libraries can alleviate technological burdens, such as hardware failures, software issues, and staff training gaps. This shift allows libraries to concentrate on expanding their collections, enhancing patron services, and fostering innovation. With the use of cloud computing, libraries may simply share data with users, doing away with the need for local backups, maintenance, and storage. The establishment of digital libraries and repositories, the facilitation of data searches, the hosting of websites, the access to academic content, the storage of files, the improvement of library automation procedures, and other tasks can all be accomplished by libraries using cloud computing. The researchers observed that librarians seems not to frequently use these cloud computing such as Institutional repository (e.g. Dspace, E-prints, Fedora and other open access repository), Web based email (e.g Gmail, Yahoo mail, Hotmail etc.), Social networking (e.g Facebook, Twitter, Whatsapp), Databases (e.g Science Direct, Ebscohost, Hinari, Agora etc.), Library website, WorldCat, Google Apps (Google Drive, Google Doc), YouTube and Dropbox for library services. Thus, it is against this background that the study examined Awareness and Utilisation of Cloud Computing Technologies by Librarians in Academic Libraries of North East Zone, Nigeria.

Purpose of the Study

The study determined the;

1. Awareness on Cloud Computing Technologies by librarians in Academic Libraries of North East Zone, Nigeria
2. Extent of Utilization of Cloud Computing Technologies by Librarians for Services in Academic Libraries of North East Zone, Nigeria
3. Challenges associated with Utilization of Cloud Computing Technologies in Academic Libraries of North East Zone, Nigeria.
4. Influence of awareness on utilisation of Cloud Computing Technologies in Academic Libraries of North East Zone, Nigeria

Research Questions

The following research questions were answered.

1. What is the awareness on Cloud Computing Technologies by libraries in Academic Libraries of North East Zone, Nigeria?
2. What is the extent of Utilization of Cloud Computing Technologies for Service delivering by librarians in Academic Libraries of North East Zone, Nigeria?
3. What are the challenges of utilization of Cloud Computing Technologies in Academic Libraries of North East Zone, Nigeria?
4. What is the influence of awareness on utilisation of Cloud Computing Technologies in Academic Libraries of North East Zone, Nigeria?



Hypothesis

To direct the study, the following null hypothesis was formulated.

H1. There is no significant influence of awareness on utilization of Cloud Computing Technologies in Academic Libraries of North East Zone, Nigeria.

Methodology

Survey research method was adopted for this study. The study population comprised 209 librarians from three federal university libraries in North-East Nigeria: Ramat Library, University of Maiduguri (n = 146), Goodluck Ebele Jonathan Library, Yobe State University, Damaturu (n = 37), and Zubairu Mohammed Library, Abubakar Tafawa Balewa University, Bauchi (n = 26). The population distribution was obtained from the staff registers of the respective university libraries for the 2025/2026 session. Since the population of two hundred and nine (209) is manageable, the researcher used all members of the population in collecting data for the study. A self-created questionnaire was utilized by the researcher as the instrument for gathering data. The self-designed questionnaire titled: Awareness and Utilisation of Cloud Computing Technologies by Librarians in Academic Libraries (QEAUCTLAL). A pilot study was conducted among 30 library staff at the Federal University Kashere Library, Gombe State, who were not part of the main study. The data obtained were analysed using the Cronbach Alpha reliability technique to determine the internal consistency of the instrument. The analysis yielded a reliability coefficient of 0.87, indicating that the instrument was reliable for the study. Descriptive statistics, specifically frequency distributions and percentages, were used to answer Research Questions One, Two, and Three, while simple linear regression (R-value) was used to answer Research Question Four.

The corresponding p-value was used to test the hypothesis at the 0.05 level of significance. Decision Rule: For Research Question One, percentages of 50.0% or above indicated awareness, while percentages below 50.0% indicated lack of awareness. For Research Question Two, combined High Extent and Moderate Extent responses of 50.0% or above indicated a high extent of utilization, while combined Low Extent and Zero Extent responses of 50.0% or above indicated a low extent of utilization. For Research Question Three, combined Strongly Agree and Agree responses of 50.0% or above indicated agreement that a factor constituted a challenge, while percentages below 50.0% indicated disagreement. For Research Question Four, R-values of 0.10–0.39, 0.40–0.59, 0.60–0.79, and 0.80–0.99 indicated low, moderate, high, and very high relationships, respectively. The null hypotheses were rejected at $p < .05$.

Results

The table 1 presents the response rate of questionnaire administered and retrieved in the three (3) University Libraries under study.

Table 1: Distribution and Return of Questionnaire

Academic Libraries	Questionnaire administered	Questionnaire returned	Questionnaire not returned/ invalid
RLUM	146	97 (66.4%)	49 (33.6%)
GEJLYSU	37	34 (91.9%)	3 (8.1%)
ZMLATBU	26	26 (100%)	0 (00.0%)
Total	209	157(75.1%)	52 (24.9%)

KEY:

RLUM: Ramat Library, University of Maiduguri, Maiduguri

GEJLYSU: GoodLuckEbele Jonathan Library, Yobe State University Library, Damaturu

ZMLATBU: Zubairu Mohammed Library, AbubakarTafawaBalewa University, Bauchi

Table 1 reveals that a total of 219 copies of the questionnaire were distributed to the respondents, and that 137 of the copies were successfully completed and recovered. This was deemed practical, resulting in a response rate of 75.1%.



Research Question 1: What is the awareness on cloud computing technologies by librarians in the academic of North East Zone of libraries?

Table 2: Awareness of cloud computing Technologies by librarians in the library

S/N	Cloud Computing	Aware	Not Aware
1	Institutional Repository (e.g Dspace, E-Prints, Fedora and other open access repository)	76 (48.4%)	81 (51.6%)
2.	Web based email (e.g Gmail, Yahoo mail, Hotmail, etc.)	119 (75.8%)	38 (24.2%)
3.	Social Networking (e.g Facebook, Twitter, Whatsapp)	143 (91.1%)	14 (8.9%)
4.	Databases (e.g Science Direct, Ebscohost, Hinary, Agora)	98 (62.4%)	59 (37.6%)
5.	Library Website	101 (64.3%)	56 (35.7%)
6.	WorldCat	58 (36.9%)	99 (63.1%)
7.	Google Apps (Google Drive, Google Doc)	68 (43.3%)	89 (56.7%)
8.	Youtube	97 (61.8%)	60 (38.2%)
9.	Dropbox	64 (40.8%)	93 (59.2%)
	TOTAL	824 (58.3%)	589 (41.7%)

The findings in Table 2 show the awareness of cloud computing technologies among librarians in academic libraries in the North-East Zone of Nigeria. The findings reveal that librarians were aware of social networking platforms (91.1%), web-based email services (75.8%), library websites (64.3%), databases (62.4%), and YouTube (61.8%) as more than 50.0% of the respondents indicated awareness of these technologies. This indicates that the majority of the librarians were aware of these cloud computing technologies. However, the findings further show that librarians were not aware of institutional repositories such as DSpace, E-Prints, and Fedora (48.4%), Google Apps including Google Drive and Google Docs (43.3%), Dropbox (40.8%), and WorldCat (36.9%), as less than 50.0% of the respondents indicated awareness of these technologies. This suggests that awareness of these cloud computing technologies among librarians is relatively low.

Furthermore, the overall awareness percentage of 58.3% exceeded the benchmark of 50.0%, implying that librarians in academic libraries in the North-East Zone of Nigeria were aware of cloud computing technologies.

Research Question 2: What is the extent of utilization of cloud computing technologies in services delivery in the libraries?

Table 3: Utilization of Cloud Computing Services in the library

S/N	Statements	HE	ME	LE	ZE
1	I utilize library portal/website for new arrivals, book request, queries, and feedback	18 (11.5%)	43 (27.4%)	47 (29.9%)	49 (31.2%)
2.	I use Web OPAC, online renewal, and reservation storage	7 (4.5%)	24 (15.3%)	33 (21.0%)	93 (59.2%)
3.	I use the cloud (Drop Box, Google Apps (Google Drive, Google Doc) in backing up library information resources	19 (12.1%)	29 (18.5%)	45 (28.7%)	64 (40.8%)
4.	I often store the library data	7 (4.5%)	24 (15.3%)	33 (21.0%)	93 (59.2%)



	and files in the public server				
5.	I do use the library management system software (LMS) on the cloud	20 (12.7%)	35 (22.3%)	59 (37.6%)	43 (27.4%)
6.	I do use the Web based email (e.g Gmail, Yahoo mail, Hotmail, etc.) for communication	52 (33.1%)	41 (26.1%)	33 (21.0%)	31 (19.7%)
	TOTAL	123(13.1%)	196(20.8%)	250(26.5%)	373(39.6%)

Key: HE: High Extent; ME: Moderate Extent; LE: Low Extent; ZE: Zero Extent

The findings in Table 3 show the extent of utilization of cloud computing technologies in service delivery in federal university libraries in North-East Nigeria. The findings reveal that the use of the library portal/website for new arrivals, book requests, queries, and feedback (31.2%), Web OPAC, online renewal, and reservation services (59.2%), cloud platforms such as Dropbox and Google Apps for backing up library information resources (40.8%), and public servers for storing library data and files (59.2%) were predominantly rated as zero extent, indicating that these cloud computing technologies are largely not utilized. The use of cloud-based library management system software (37.6%) was predominantly rated as low extent, indicating limited utilization, while the use of web-based email services such as Gmail, Yahoo Mail, and Hotmail for communication (33.1%) was predominantly rated as high extent, indicating that it is the most utilized cloud computing technology among the respondents. Furthermore, the overall findings show that 33.9% of the responses indicated a high or moderate extent of utilization of cloud computing technologies, while 66.1% indicated a low or zero extent of utilization. Since the combined percentage for Low Extent and Zero Extent (66.1%) exceeded the benchmark of 50.0%, it implies that cloud computing technologies were utilized to a low extent in service delivery in federal university libraries in North-East Nigeria.

Research Question 3: What are the challenges of using cloud computing technologies in the libraries?

Table 4: Challenges of using Cloud Computing Technologies in the library

S/N	Statements	SA	A	D	SD
1	Slow internet connectivity	64 (40.8%)	45 (28.7%)	29 (18.5%)	19 (12.1%)
2.	Epileptic Power Supply	49 (31.2%)	47 (29.9%)	43 (27.4%)	18 (11.5%)
3.	Lack of technical skills is hampering efficient use of cloud computing in your library	43 (27.4%)	59 (37.6%)	35 (22.3%)	20 (12.7%)
4.	Data Security	57 (36.3%)	43 (27.4%)	23 (14.6%)	34 (21.7%)
5.	Irregular Staff training and development	52 (33.1%)	41 (26.1%)	33 (21.0%)	31 (19.7%)
6.	Data Privacy	64 (40.8%)	45 (28.7%)	31 (19.7%)	17 (10.8%)
	TOTAL	329 (34.9%)	280 (29.7%)	194(20.6%)	139(14.8%)

Key: SA: Strongly Agree; A: Agree; D: Disagree; SD: Strongly Disagree

The findings in Table 4 show the challenges of using cloud computing technologies in federal university libraries in North-East Nigeria. The findings reveal that slow internet connectivity (40.8%), epileptic power supply (31.2%), lack of technical skills hampering the efficient use of cloud computing (37.6%), data security (36.3%), irregular staff training and development (33.1%), and data privacy (40.8%) were predominantly rated as strongly agree, indicating that these are the major challenges affecting the use of cloud computing technologies in the libraries. Furthermore, the overall findings show that 64.6% of the responses indicated strong agreement or agreement that the listed factors are challenges to the use of cloud computing technologies, while 35.4% indicated disagreement or strong disagreement. Since the overall agreement percentage of 64.6% exceeded the benchmark of 50.0%, it implies that librarians in federal university libraries in North-East Nigeria agreed that



slow internet connectivity, epileptic power supply, lack of technical skills, data security, irregular staff training and development, and data privacy are major challenges affecting the use of cloud computing technologies in the libraries.

H₁. There is no significant influence of awareness on utilization of Cloud Computing Technologies in Academic Libraries of North East Zone, Nigeria

Table 4: Result of Simple Linear Regression of the influence of awareness on utilisation of Cloud Computing Technologies in Academic Libraries of North East Zone, Nigeria (N=157)

Variables	R	R ²	Adjusted R ²
Awareness	0.813	0.661	0.659
Utilisation of Cloud Computing Technologies			

The result presented in Table 4 shows the relationship between librarians' awareness of cloud computing technologies and their utilisation of such technologies in academic libraries in the North-East Zone, Nigeria. The analysis was based on a sample of 157 respondents and employed simple linear regression. The result produced an R-value of 0.813, indicating a very strong positive relationship between awareness of cloud computing technologies and their utilisation. This means that as librarians' awareness of cloud computing technologies increases, their level of utilisation also tends to increase. The R² value of 0.661 indicates that awareness of cloud computing technologies accounts for approximately 66.1% of the variation in the utilisation of cloud computing technologies among librarians in the academic libraries studied. The adjusted R² of 0.659 further indicates that, after adjusting for the sample and model characteristics, approximately 65.9% of the variance in utilisation can be explained by awareness. The difference between the R² and adjusted R² values is very small (0.002), suggesting that the regression model provides a relatively stable estimate of the relationship between awareness and utilisation. In practical terms, the finding suggests that librarians who possess greater knowledge and understanding of cloud computing technologies are more likely to utilise them in their professional activities, such as cloud-based information storage, electronic resource management, digital library services, online collaboration, document sharing, remote access to information resources and other technology-supported library operations. The result therefore provides substantial evidence that awareness is an important factor associated with the utilisation of cloud computing technologies in academic libraries in the North-East Zone, Nigeria. The finding implies that merely providing cloud-computing infrastructure may not be sufficient to guarantee effective utilisation; librarians must also understand the nature, functions, applications and benefits of the technologies. Adequate awareness can enable librarians to recognise appropriate cloud applications and confidently incorporate them into routine professional activities, while inadequate awareness may result in underutilisation of available technologies even where the necessary infrastructure exists.

Discussion of the Findings

The finding on the of librarians' awareness of the cloud computing shows that majority of the librarians were aware of the cloud computing application in the libraries. This finding is in agreement with the work of Salih (2020) who supported the fact that librarians were fully aware of the concept of cloud computing by stating that libraries have always welcomed cloud-based services such as e-journal access, statistics tracking, digital library hosting and other allied services and activities. The study is also in support with that of Lazarus and Eucharia (2021) who indicated that there is certain level of awareness on cloud computing technologies in the libraries. In the same vein the study corroborates with that of Jibrin, Musa, Shittu and Yusuf (2019) who confirmed that there is high level of awareness among the librarians on cloud computing application in the libraries.

The findings on the utilization of the cloud computing services revealed that their low level of usage of the cloud computing by the librarians. The finding of the analysis is supported by Edwin (2018) who indicated that majority of librarians do not use the cloud computing for library services rather they use it for their personal purposes. In contradiction to the findings of the study, the work of Zubairu, Akinola, and Hamzat (2021) which reported that



majority of librarians use cloud computing for providing services to users, they further support that library management software were frequently used as well as storage of data and files and import and export and resource repository.

The findings on the challenges that hinder effective use of cloud computing indicated slow internet connectivity, epileptic power supply, lack of technical skills, data security, irregular staff training and development, data. The finding is in agreement with Pegu (2023) who reported that data security and privacy as a challenge by further reporting that people fear that their information will no longer be confidential, and that it may be more prone to theft and loss because the libraries do not have complete ownership of the servers on which these contents are kept. In the same vein, the findings was also supported by Hussaini, Vishistha, Garba, ad Jimah (2017) who indicated that the cloud computing dependence on internet connection is another constraint in its application and use in the libraries as there is budget constraint which may affect the purchase of adequate bandwidth.

The findings on influence of awareness on the utilisation of Cloud Computing Technologies in Academic Libraries of North-East Zone, Nigeria revealed that there is significant influence of awareness on the utilisation of Cloud Computing Technologies in Academic Libraries of North-East Zone, Nigeria. The finding is in agreement with that of Lazarus and Eucharua (2021) who found that there existed a certain level of awareness regarding cloud computing technologies and models among the libraries examined. Moreover, it was determined that libraries in the institutions under scrutiny had indeed adopted cloud computing Technologies, with some of the primary positive outcomes being enhanced resource cost-effectiveness and efficient file sharing. The finding is also in agreement with that of Idahosa and Eireyi-Edewede (2023) who noted that libraries around the world are aware and also use Cloud Computing in a number of areas that could be unknown to them.

Conclusion

The study concludes that librarians in academic libraries in the North-East Zone, Nigeria, possess a fairly good level of awareness of cloud computing technologies, with an overall awareness rate of 58.3%, although gaps remain in knowledge of institutional repositories, Google Apps, Dropbox, and WorldCat. Despite this level of awareness, the utilisation of cloud computing technologies for library service delivery remains generally low, as only web-based email recorded appreciable use, while cloud storage, Web OPAC, and cloud-based library management systems were largely underutilised. The low utilisation is associated with challenges such as slow internet connectivity, epileptic power supply, inadequate technical skills, data security and privacy concerns, and irregular staff training. The study further established that awareness has a strong and statistically significant positive influence on utilisation, explaining approximately 66.1% of the variance in the utilisation of cloud computing technologies. Therefore, improving utilisation requires a combined strategy of strengthening librarians' awareness and practical skills while simultaneously addressing the infrastructural, technical, security, training, and institutional barriers that constrain effective use of cloud computing technologies in academic libraries.

Recommendations

Based on the findings of the study, the study offers the following recommendations:

1. The library has a role to play in creating more awareness programmes and mechanisms among librarians on the availability and benefits of cloud computing
2. The library should employ more effective strategies such as using e-mail alert messages, Whatsapp App for communicating with patrons and also among the staff concerning the proper use of the cloud computing for effective library services.
3. University libraries should have standby power generating source. This will be very important particularly in the situation of power outage; besides the generator, the university management should make frantic effort to generate an alternative source of electricity such as solar and inverters as this will be relatively cheap and help the process of using electronic resource provision on the cloud thereby reducing dependence on generating set.



4. Institutional bandwidth should be increased and readily available as the cloud computing are more dependent on the internet. University library should have their own dedicated bandwidth with fast Internet connectivity. This will improve the use of the cloud applications and as well put an end to the problem of network fluctuations and slow speed in the process of uploading or downloading resources from the databases or cloud.
5. Adequate trainings should be put in place for librarians to acquire the adequate skills needed to use the cloud computing.

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