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Original Research Article

ADOPTION AND UTILISATION OF CLOUD COMPUTING IN SELECTED TERTIARY INSTITUTION LIBRARIES IN ONDO STATE.

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Abstract: This study investigated the adoption and utilisation of cloud computing in selected tertiary institution libraries in Ondo State, Nigeria. A descriptive survey research design was adopted. The study covered four tertiary institutions, with a population of 128 library professionals, paraprofessional staff and information and communication technology personnel. A questionnaire was used for data collection, and 48 respondents participated in the study. Data were analysed using frequencies, percentages, mean, standard deviation and Pearson Product-Moment Correlation at the 0.05 level of significance. The findings revealed a high level of cloud computing adoption (grand mean = 3.02) and utilisation (grand mean = 3.05). Cloud-based databases and electronic resources, cloud storage and collaboration platforms were prominent applications. Cloud storage was the most available service (87.5%), while cloud-based institutional repositories recorded the lowest availability (64.6%). Reliable internet connectivity (mean = 3.46) and staff ICT competence (mean = 3.35) were the highest-rated factors influencing adoption and utilisation. A positive, statistically significant relationship was established between adoption and utilisation ($r = .674$, $p < .001$). The study recommends improved ICT infrastructure, reliable internet connectivity, staff training and increased investment in institutional repositories and data backup services to enhance cloud computing applications in tertiary institution libraries.

Keywords: Adoption, Cloud Computing, Libraries, Tertiary Institution, Utilisation.

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Introduction

Cloud computing has emerged as one of the most significant technological innovations shaping the management and delivery of information services in libraries across the world. It provides on-demand access to computing resources such as storage, software, databases, networking, and applications through the Internet, enabling organisations to minimise infrastructure costs while improving operational efficiency (Ahmed et al., 2023). The growing demand for digital information resources, remote access to library collections, and collaborative research has accelerated the adoption of cloud computing in academic libraries.

Academic libraries are increasingly adopting cloud computing to enhance service delivery, facilitate seamless access to information resources, improve collaboration among users, and ensure efficient management of digital collections. Cloud-based applications such as institutional repositories, Integrated Library Systems (ILS), Online Public Access Catalogues (OPACs), digital repositories, Google Workspace, Microsoft 365, and cloud storage platforms have become integral to modern library operations. These technologies enable libraries to provide uninterrupted services regardless of users' geographical locations (Mabawonku et al., 2024). The adoption of cloud computing has transformed the traditional functions of libraries by enabling scalable storage, automated software updates, improved data backup and disaster recovery, resource sharing, and real-time collaboration among library users and professionals. Furthermore, cloud technologies have reduced the financial burden associated with maintaining physical servers and software infrastructure while increasing flexibility and accessibility of library services (Akawu, 2026).

Globally, the integration of cloud computing into library operations has gained considerable attention due to its potential to improve organisational performance, enhance information accessibility, and support digital transformation. Universities and research institutions increasingly rely on cloud-based technologies to provide reliable access to electronic resources, facilitate virtual learning, and strengthen research support services. Consequently, cloud computing has become an essential component of smart libraries and digital information environments (Shikali & Muneja, 2024). In developing countries, particularly Nigeria, academic libraries have gradually embraced cloud computing to improve information service delivery. The increasing availability of electronic information resources, online databases, institutional repositories, and virtual learning environments has created the need for cloud-enabled library services. Despite this progress, the level of adoption and utilisation differs considerably among institutions due to variations in technological readiness, funding, management support, and human capacity (Alabi et al., 2024).

Evidence from Nigerian studies indicates that many academic libraries have adopted selected cloud computing applications, although the extent of utilisation remains relatively low in several institutions. While cloud technologies have enhanced access to information resources and improved service efficiency, inadequate ICT infrastructure, unstable internet connectivity, erratic electricity supply, insufficient technical expertise, data security

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concerns, and inadequate staff training continue to hinder their effective implementation (Mabawonku et al., 2024; Akawu, 2026). Furthermore, librarians' awareness and competence significantly influence the successful adoption and utilisation of cloud computing technologies. Libraries with adequately trained personnel are more likely to implement cloud-based services effectively and maximise their benefits for information management and service delivery. Conversely, inadequate awareness and limited technical skills among library personnel remain major barriers to effective utilisation of cloud computing technologies (Dumbiri et al., 2024). Studies have also shown that users increasingly expect academic libraries to provide unrestricted access to digital information resources through cloud-enabled platforms. The expansion of online learning, electronic publishing, open-access repositories, and digital scholarship has further reinforced the need for cloud computing solutions that support flexible, reliable, and secure information services (Ahmed et al., 2023).

Statement of the Problem

The increasing reliance on digital technologies has made cloud computing an indispensable tool for modern library operations. Academic libraries are expected to leverage cloud-based technologies to provide efficient access to electronic resources, facilitate digital preservation, support institutional repositories, and improve library service delivery. Despite these expectations, evidence suggests that the adoption and utilisation of cloud computing technologies vary considerably among tertiary institution libraries in Nigeria. Several studies have reported the adoption of cloud computing in academic libraries in different parts of Nigeria and identified its potential to improve information accessibility, operational efficiency, and resource sharing. However, these studies also indicate that many libraries have not fully utilised available cloud computing technologies due to infrastructural, financial, organisational, and technical constraints. Consequently, the anticipated benefits of cloud computing are yet to be fully realised in many tertiary institution libraries.

More importantly, existing empirical studies have concentrated on academic libraries in states such as Lagos, Ogun, and Niger, while little or no empirical evidence exists on the adoption and utilisation of cloud computing in tertiary institution libraries in Ondo State. As a result, there is insufficient information regarding the extent to which libraries in the state have adopted cloud computing technologies, the services supported by these technologies, the factors influencing their utilisation, and the challenges hindering effective implementation. This lack of empirical evidence creates a knowledge gap that limits informed decision-making by library administrators, institutional management, and policymakers regarding investment in cloud computing infrastructure and capacity development. Without such evidence, efforts aimed at improving technology-driven library services may not adequately address the actual needs and challenges of tertiary institution libraries in Ondo State. It is this gap that necessitates the present study on the adoption and utilisation of cloud computing in selected tertiary institution libraries in Ondo State.

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Objective of the Study

The main objective of this study is to investigate the adoption and utilisation of cloud computing in selected tertiary institution libraries in Ondo State. The specific objectives are to:

1. Determine the level of adoption of cloud computing in selected tertiary institution libraries in Ondo State.
2. Examine the extent of utilisation of cloud computing in selected tertiary institution libraries in Ondo State.
3. Identify the cloud computing services available in selected tertiary institution libraries in Ondo State.
4. Identify the factors influencing the adoption and utilisation of cloud computing in selected tertiary institution libraries in Ondo State.

Research Questions

The following research questions are structured to guide the study:

1. What is the level of adoption of cloud computing in selected tertiary institution libraries in Ondo State?
2. To what extent is cloud computing utilised in selected tertiary institution libraries in Ondo State?
3. What cloud computing services are available in selected tertiary institution libraries in Ondo State?
4. What factors influence the adoption and utilisation of cloud computing in selected tertiary institution libraries in Ondo State?

Research Hypothesis

H_0: There is no significant relationship between the adoption of cloud computing and the utilisation of cloud computing in selected tertiary institution libraries in Ondo State.

Literature Review

Mabawonku et al. (2024) found that cloud computing had been adopted in the academic libraries studied in Lagos and Ogun States, Nigeria. The technology was applied mainly for collaboration among staff and users, accessibility and storage of digital resources. The findings indicate that adoption had moved beyond awareness to practical use in library operations. Anike and Otubelu (2025) similarly found that librarians in public university libraries in South-East Nigeria had applied cloud computing services in their libraries. The study, which covered 129 librarians from ten public universities, established that cloud computing was being applied for library service delivery despite challenges relating to pricing, acceptance, security, sustainability and post-adoption concerns. The finding indicates that cloud computing adoption had reached an operational level in the university libraries studied, although the extent of application was affected by several infrastructural and organisational challenges. Akawu (2026) reported that there is a high level of agreement concerning the adoption and utilisation of cloud computing in university

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libraries in Niger State. The findings show that respondents strongly agreed that cloud computing improved access to library materials from anywhere (M = 4.39), provided remote and convenient access to library services (M = 4.36) and enhanced the speed and efficiency of service delivery (M = 4.34). Compared with Mabawonku et al. (2024) and Anike and Otubelu (2025), Akawu's findings provide stronger evidence of the perceived extent of utilisation of cloud computing for service delivery.

Belel et al. (2025) found that the utilisation of cloud computing technologies for service delivery was generally low among librarians in academic libraries in the North-East Zone of Nigeria. The findings established that 66.1% of the responses indicated low or zero extent of use, while web-based email recorded the highest utilisation. The study also reported that awareness of cloud computing was 58.3%. Regression analysis showed that awareness had a significant positive influence on utilisation, with $R = 0.813$, $R^2 = 0.661$, $F(1,155) = 85.85$, $p < .05$. Okeke and Mezue's (2026) study revealed a low extent of utilisation, with an aggregate mean of 2.34 for cloud computing technologies used for core library services. Federal institution librarians recorded a mean of 2.41, while state institution librarians recorded 2.28. The difference was not statistically significant, as z-cal = 1.24 < z-crit = 1.96. The study further reported that enhanced remote access and cost reduction were rated to a very great extent, while poor internet connectivity and irregular power supply were also rated to a very great extent as challenges. Dime and Okeji (2023) reported that librarians in 67 university libraries across English-speaking African countries utilised cloud computing technologies including YouTube, Google Drive, OPAC, Google Forms, Gmail and Google Scholar. The technologies were used for storing and sharing files, sharing library orientation videos, research collaboration, conducting user-satisfaction surveys, online document editing and virtual/online reference services. The study did not report a single aggregate mean or percentage for the extent of utilisation.

Muhammad and Ahmed (2025) found that cloud computing services were not uniformly available in the three federal university libraries studied in North-Western Nigeria. Although all the selected libraries had the required ICT facilities, the study established that not all cloud-computing services were available. The electronic resources available through cloud computing were mainly e-books, e-journals and e-theses. The availability of these services was constrained by inadequate funding, epileptic power supply, lack of dedicated library servers, inadequate security measures, insufficient computers, inadequate bandwidth, and limited numbers of e-books and e-journals. Eneh et al. (2024) study established that cloud computing supported remote access to information resources, data storage and library service delivery, thereby allowing users to access resources from different locations. The findings also indicated the need for adequate infrastructure and training to support the implementation of cloud computing in university libraries. Isiaka et al. (2024) reported that several cloud-computing services were available and being used in academic libraries in Kwara State. The authors established that OCLC was reported by 81 respondents (75.0%), WorldCat by 80 (74.1%), and Google Docs by 59 (54.6%). Other available applications included Encore and Ex Libris, each reported by 54 respondents (50.0%), DuraSpace by 52 (48.1%), Scribd by 50 (46.3%), and Discovery

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Services, OSS Lib and Polaris Library System by 49 respondents (45.4%) each. Alexandria was reported by 35 respondents (32.4%), while Ex-Libris Cloud was reported by 30 (27.8%). The findings therefore show that the availability of cloud-computing services differed considerably across applications, with OCLC and WorldCat having the highest reported availability.

Ibrahim et al. (2025) found that the adoption of cloud computing in university libraries was influenced by organisational, environmental, technological and human factors. Organisational factors included top-management support, training and education, organisational intention and organisational readiness. Environmental factors comprised competitive pressure, regulatory policies, government support and cloud-service-provider support. Technological factors included relative advantage, compatibility and complexity, while human factors included staff attitudes and perceptions towards IT change, internal IT proficiency and previous technological experience. Yakubu et al. (2025) revealed that five out of the six determinants examined were significant predictors of cloud-computing adoption among academic libraries in North-Eastern Nigeria. The study further found that trust moderated only one of the relationships examined. The findings therefore established that the determinants examined were not equally influential, and that particular attention should be given to the significant determinants when academic libraries make decisions regarding cloud-computing adoption. Ibrahim et al. (2025), in a separate study focusing on cloud-based digital preservation services in university libraries, found that compatibility, availability and reliability of cloud technology, university readiness, management support, cloud-migration strategy, staff perception and attitudes towards IT change were significant drivers of adoption. The findings particularly indicate that both technological conditions and institutional preparedness are important for successful cloud adoption.

Methodology

This study adopted a descriptive survey research design to investigate the adoption and utilisation of cloud computing in selected tertiary institution libraries in Ondo State, Nigeria. The study was conducted in four selected tertiary institutions, namely Federal University of Technology, Akure (FUTA), Adekunle Ajasin University, Akungba-Akoko (AAUA), Adeyemi University of Education, Ondo, and Olusegun Agagu University of Science and Technology (OAUSTECH), Okitipupa. The total population of the study comprised 128 Professional librarians, Para-professional library staff and ICT personnel in the four selected tertiary institution libraries. The four institutions were selected purposively, while proportionate stratified sampling was used to select respondents from the identified staff categories. Data were collected using a questionnaire developed by the researchers. The questionnaires were administered personally by the researchers, with the assistance of trained research assistants. Data collected were analysed using frequencies, simple percentages, mean and standard deviation to answer the research questions, while the hypothesis was tested using Pearson Product-Moment Correlation (PPMC) at the 0.05 level of significance.

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Results

Table 1: Distribution of Respondents by Institution

Institution	Frequency	Percentage (%)
Federal University of Technology, Akure (FUTA)	18	37.5%
Adekunle Ajasin University, Akungba-Akoko (AAUA)	12	25%
Adeyemi University of Education, Ondo (AFUED)	10	20.8%
Olusegun Agagu University of Science and Technology Okitipupa (OAUSTECH)	8	16.7%
Total	**48**	**100%**

Table 1 shows the distribution of respondents by institution. Out of the 48 respondents, 18 (37.5%) were from the Federal University of Technology, Akure (FUTA), representing the highest number of respondents. Adekunle Ajasin University, Akungba-Akoko (AAUA), had 12 respondents (25%), while Adeyemi University of Education, Ondo (AFUED), had 10 respondents (20.8%). Olusegun Agagu University of Science and Technology, Okitipupa (OAUSTECH), recorded the lowest number, with 8 respondents (16.7%). The table therefore shows that FUTA had the highest representation, while OAUSTECH had the lowest among the four institutions surveyed.

Table 2: Distribution of Respondents by Gender

Gender	Frequency	Percentage (%)
Male	21	43.8%
Female	27	56.3%
Total	48	100%

Table 2 shows the distribution of respondents by gender. From the analysis, 27 (56.3%) were female, while 21 (43.8%) were male. This indicates that female respondents were more represented than their male counterparts, with a difference of six respondents.

Table 3: Distribution of Respondents by Years of Experience

Years of Experience	Frequency	Percentage (%)
1-5 years	13	27.1%
6-10 years	15	31.3%
11-15 years	11	22.9%
16 years and above	9	18.8%
Total	**48**	**100%**

Table 3 shows the distribution of respondents by years of experience. The results indicate that 15 respondents (31.3%) had between 6 and 10 years of experience, representing the largest group. This was followed by 13 respondents (27.1%) with 1 to 5 years of experience and 11 respondents (22.9%) with 11 to 15 years of experience. The remaining 9 respondents (18.8%) had 16 years and above of experience. The findings show

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that most of the respondents had between 6 and 10 years of experience, while those with 16 years and above constituted the smallest group.

Table 4: Level of Adoption of Cloud Computing in Selected Tertiary Institution Libraries in Ondo State

Level of Adoption of Cloud Computing	VH (%)	H (%)	L (%)	VL (%)	Mean	SD
Cloud storage services have been adopted in the library	17 (35.4%)	23 (47.9%)	6 (12.5%)	2 (4.2%)	3.15	0.78
A cloud-based library management system has been adopted	14 (29.2%)	21 (43.8%)	10 (20.8%)	3 (6.3%)	2.96	0.87
Cloud-based databases and electronic resources have been adopted	18 (37.5%)	22 (45.8%)	7 (14.6%)	1 (2.1%)	3.19	0.76
A cloud-based institutional repository has been adopted	11 (22.9%)	21 (43.8%)	12 (25.0%)	4 (8.3%)	2.81	0.88
Cloud-based backup services have been adopted	13 (27.1%)	23 (47.9%)	9 (18.8%)	3 (6.3%)	2.96	0.84
Cloud collaboration platforms have been adopted	15 (31.3%)	22 (45.8%)	9 (18.8%)	2 (4.2%)	3.04	0.82
Grand Mean					**3.02**	**0.83**

Key: Very High (VH) = 4, High (H)= 3, Low (L)= 2, Very Low (VL)= 1.

Table 4 presents the level of adoption of cloud computing in selected tertiary institution libraries in Ondo State. The grand mean of 3.02 and standard deviation of 0.83 indicate a high level of adoption of cloud computing in the libraries. Cloud-based databases and electronic resources had the highest mean score of 3.19, followed by cloud storage services with a mean of 3.15 and cloud collaboration platforms with a mean of 3.04. Cloud-based library management systems and cloud-based backup services both recorded a mean of 2.96, while cloud-based institutional repositories had the lowest mean score of 2.81. The findings show that cloud computing has been adopted across the libraries, particularly for databases, electronic resources and storage services. However, the relatively lower mean score for institutional repositories suggests that their adoption is less widespread compared with the other cloud computing services examined.

Table 5: Extent of Utilisation of Cloud Computing in Selected Tertiary Institution Libraries in Ondo State

Extent of Utilisation of Cloud Computing	VH (%)	H (%)	L (%)	VL (%)	Mean	SD
Cloud computing is used for storing and managing library data	12 (25.0%)	27 (56.3%)	7 (14.6%)	2 (4.2%)	3.02	0.72

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Cloud computing is used to provide access to electronic resources	23 (47.9%)	17 (35.4%)	6 (12.5%)	2 (4.2%)	3.27	0.82
Cloud computing is used for backup and recovery of library records	9 (18.8%)	25 (52.1%)	11 (22.9%)	3 (6.3%)	2.83	0.79
Cloud computing is used to provide remote access to library services	15 (31.3%)	19 (39.6%)	11 (22.9%)	3 (6.3%)	2.96	0.87
Cloud computing is used for staff collaboration and communication	21 (43.8%)	18 (37.5%)	8 (16.7%)	1 (2.1%)	3.23	0.79
Cloud computing is used for sharing digital information resources	10 (20.8%)	29 (60.4%)	7 (14.6%)	2 (4.2%)	2.98	0.70
Grand Mean					**3.05**	**0.78**

Key: Very High (VH) = 4, High (H)= 3, Low (L)= 2, Very Low (VL)= 1.

Table 5 shows the extent of utilisation of cloud computing in selected tertiary institution libraries in Ondo State. The grand mean of 3.05 and standard deviation of 0.78 indicate a great extent of utilisation. Providing access to electronic resources recorded the highest mean score of 3.27, followed by staff collaboration and communication with a mean of 3.23. Sharing digital information resources had a mean score of 2.98, while providing remote access to library services recorded 2.96. Cloud computing for storing and managing library data had a mean of 3.02, while backup and recovery of library records recorded the lowest mean score of 2.83. The findings indicate that cloud computing is used mainly to provide access to electronic resources and support staff collaboration, while its use for backup and recovery of library records is comparatively lower.

Table 6: Availability of Cloud Computing Services in selected tertiary institution libraries in Ondo State

Cloud Computing Services	Available (%)	Not Available (%)
Cloud storage	42 (87.5%)	6 (12.5%)
Cloud-based library management system	35 (72.9%)	13 (27.1%)
Cloud-based institutional repository	31 (64.6%)	17 (35.4%)
Cloud-based databases/e-resources	40 (83.3%)	8 (16.7%)
Cloud-based backup services	34 (70.8%)	14 (29.2%)
Cloud collaboration tools	39 (81.3%)	9 (18.8%)
Online document-sharing services	37 (77.1%)	11 (22.9%)
Cloud-based communication platforms	41 (85.4%)	7 (14.6%)

Table 6 shows the availability of cloud computing services in selected tertiary institution libraries in Ondo State. From the analysis, cloud storage was the most available

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service, as reported by 42 respondents (87.5%), followed by cloud-based communication platforms, with 41 respondents (85.4%), and cloud-based databases and electronic resources, with 40 respondents (83.3%). Cloud collaboration tools were available to 39 respondents (81.3%), while online document-sharing services were reported by 37 respondents (77.1%). Cloud-based library management systems were available to 35 respondents (72.9%), while cloud-based backup services were available to 34 respondents (70.8%). Cloud-based institutional repositories recorded the lowest availability, with 31 respondents (64.6%). The findings indicate that cloud storage and communication platforms were the most widely available services, whereas institutional repositories were the least available among the services examined.

Table 7: Factors Influencing the Adoption and Utilisation of Cloud Computing in Selected Tertiary Institution Libraries in Ondo State

Factors Influencing the Adoption and Utilisation of Cloud Computing	SA (%)	A (%)	D (%)	SD (%)	Mean	SD
Reliable internet connectivity influences adoption	29 (60.4%)	14 (29.2%)	3 (6.3%)	2 (4.2%)	3.46	0.80
Availability of ICT infrastructure influences adoption	22 (45.8%)	19 (39.6%)	5 (10.4%)	2 (4.2%)	3.27	0.82
Management support influences adoption	18 (37.5%)	23 (47.9%)	4 (8.3%)	3 (6.3%)	3.17	0.83
Staff ICT competence influences utilisation	26 (54.2%)	15 (31.3%)	5 (10.4%)	2 (4.2%)	3.35	0.84
Availability of electricity influences utilisation	20 (41.7%)	17 (35.4%)	7 (14.6%)	4 (8.3%)	3.10	0.95
Staff training opportunities influence adoption	16 (33.3%)	25 (52.1%)	4 (8.3%)	3 (6.3%)	3.13	0.82
Institutional funding influences adoption	23 (47.9%)	18 (37.5%)	3 (6.3%)	4 (8.3%)	3.25	0.91
Awareness of cloud computing influences adoption	15 (31.3%)	24 (50.0%)	6 (12.5%)	3 (6.3%)	3.06	0.84
Grand Mean					**3.22**	**0.85**

Key: SA = Strongly Agree (4), A = Agree (3), D = Disagree (2), SD = Strongly Disagree (1).

Table 7 shows the factors influencing the adoption and utilisation of cloud computing in selected tertiary institution libraries in Ondo State. The analysis revealed that reliable internet connectivity had the highest mean score of 3.46, followed by staff ICT competence (3.35) and availability of ICT infrastructure (3.27). Institutional funding recorded a mean of 3.25, while management support and staff training opportunities had mean scores of 3.17 and 3.13, respectively. Availability of electricity recorded a mean score of 3.10, while awareness of cloud computing had the lowest mean score of 3.06. The grand mean of 3.22 indicates that the respondents agreed that these factors influence the adoption and utilisation of cloud computing in the libraries.

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Table 8: Pearson Product Moment Correlation between Adoption and Utilisation of Cloud Computing

Variables	N	Mean	SD	R	Sig. (2-tailed)	Decision
Adoption of cloud computing	48	3.02	0.58	0.674	< .001	Significant
Utilisation of cloud computing	48	3.05	0.61			

Table 8 shows the Pearson Product Moment Correlation between the adoption and utilisation of cloud computing in selected tertiary institution libraries in Ondo State. The analysis revealed a positive and significant relationship between adoption and utilisation of cloud computing (\(r = 0.674, p < 0.001\)). This indicates that increased adoption of cloud computing is associated with increased utilisation in the libraries. Since the significance value is less than 0.05, the relationship is statistically significant. Therefore, the null hypothesis of no significant relationship between adoption and utilisation of cloud computing is rejected.

Discussion

The findings indicate that cloud computing has been adopted in the selected tertiary institution libraries in Ondo State, particularly for cloud-based databases and electronic resources, cloud storage and collaboration platforms. The comparatively lower mean score for institutional repositories suggests that adoption varies across the services examined. This pattern is similar to the findings of Mabawonku et al. (2024), who reported the use of cloud computing for resource storage, accessibility and collaboration in academic libraries in Lagos and Ogun States. Anike and Otubelu (2025) also documented the application of cloud computing in public university libraries in South-East Nigeria. The present findings extend this evidence to selected tertiary institution libraries in Ondo State, while showing that adoption is more pronounced for some applications than others.

The extent of utilisation followed a similar pattern. Access to electronic resources and staff collaboration and communication recorded the highest mean scores, whereas backup and recovery of library records had the lowest. Dime and Okeji (2023) reported that librarians in university libraries across English-speaking African countries used cloud applications for file sharing, research collaboration, document editing and virtual reference services. Akawu (2026) likewise reported positive assessments of cloud computing for remote access and the delivery of library services. These studies support the present finding that cloud computing is being used for practical library activities rather than being limited to its mere availability. However, the relatively lower utilisation of backup and recovery services raises a distinction between using cloud computing for immediate service delivery and using it to support the protection and recovery of library records. The data establish this difference in reported utilisation, although they do not explain its underlying causes.

The availability data further show that cloud storage, communication platforms, and cloud-based databases and electronic resources were the most commonly reported services.

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Institutional repositories and backup services were less widely available. This pattern agrees with Isiaka et al. (2024), who found variations in the availability of cloud computing applications across academic libraries in Kwara State. Muhammad and Ahmed (2025) similarly reported that cloud computing services were not uniformly available in the federal university libraries they examined in North-Western Nigeria. The convergence of these findings suggests that cloud computing provision in academic libraries is uneven across applications and institutional settings. In the present study, the difference between the availability of cloud storage and that of institutional repositories also indicates that the presence of cloud infrastructure should not be taken as evidence that all cloud-based library services are equally established.

Reliable internet connectivity emerged as the most highly rated factor influencing adoption and utilisation, followed by staff ICT competence, ICT infrastructure and institutional funding. These results highlight the importance respondents attached to the technical and human resources required to implement cloud-based services. Ibrahim et al. (2025) identified technological, organisational and human factors as relevant to cloud computing adoption, including infrastructure readiness, management support, staff training and attitudes towards information technology. Eneh et al. (2024) also emphasised the need for adequate infrastructure and training in university libraries. The present findings are consistent with these studies, particularly in the importance attached to connectivity and staff competence. Belel et al. (2025) further found that awareness of cloud computing significantly influenced utilisation among librarians in academic libraries in North-East Nigeria. Although awareness recorded the lowest mean among the factors examined in the present study, its mean of 3.06 still reflects general agreement among respondents. The result therefore does not suggest that awareness is irrelevant; rather, respondents rated reliable connectivity and staff competence more highly.

The Pearson correlation analysis established a positive, statistically significant relationship between adoption and utilisation of cloud computing (\(r = .674, p < .001, N = 48\)). This indicates that higher reported adoption was associated with higher reported utilisation among the respondents. The result is important because it provides statistical evidence of a relationship between the two variables in the selected libraries. It complements earlier studies documenting the practical application of cloud computing in academic library operations, including those of Mabawonku et al. (2024) and Anike and Otubelu (2025). Nevertheless, the correlation should not be interpreted as evidence that adoption causes utilisation. Both variables were measured within a descriptive survey, and the analysis establishes association rather than causation.

Conclusion

Cloud computing has become relevant to the delivery of library services in the selected tertiary institutions in Ondo State, particularly in providing access to electronic resources, storing library data, and facilitating staff collaboration and communication. However, its adoption and utilisation differ across services, with institutional repositories and backup and recovery services receiving comparatively less attention. The findings also

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identify reliable internet connectivity, staff ICT competence, ICT infrastructure and institutional funding as important considerations in the implementation of cloud computing. Furthermore, the significant relationship between adoption and utilisation demonstrates that the two are closely associated, although the availability of cloud services does not, in itself, guarantee their effective use.

Improving the application of cloud computing in these libraries requires sustained investment in ICT infrastructure, reliable internet connectivity and staff capacity development. Library management should also give greater attention to institutional repositories and backup and recovery services to strengthen the management, preservation and accessibility of digital information. These priorities are important for extending the benefits of cloud computing beyond routine access to electronic resources and communication. By addressing the identified gaps, tertiary institution libraries can make more effective use of cloud-based technologies to support information access and improve service delivery.

Recommendation

Based on the findings of the study, the following recommendations are made;

1. The management of tertiary institutions and library administrators should prioritise the adoption of cloud-based institutional repositories, library management systems and backup services to address the relatively lower adoption levels recorded for these technologies in the selected libraries.
2. Library administrators should strengthen the utilisation of cloud computing for data backup and recovery, as well as remote access to library services, through the implementation of regular backup procedures, effective recovery plans and secure remote-access platforms.
3. Tertiary institution libraries should improve the availability of cloud-based institutional repositories and backup services by providing the necessary software, technical facilities and financial resources to support the storage, preservation and accessibility of digital information resources.
4. The management of tertiary institutions should invest in reliable internet connectivity, adequate ICT infrastructure, regular staff training and sufficient funding to enhance the adoption and utilisation of cloud computing in their libraries.
5. Library administrators should integrate the adoption and utilisation of cloud computing into their technology planning and evaluation processes by conducting periodic assessments of the use of adopted cloud services.

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