

Evaluating the Effectiveness of Cloud-Based Library Management Systems in Nigerian Academic Libraries

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Abstract

This study evaluated the effectiveness of cloud-based Library Management Systems in enhancing service delivery within Nigerian academic libraries. It focused on adoption dynamics, operational impacts, challenges, and implementation strategies. It employed a descriptive survey research design. The researcher gathered data from 90 professional librarians across three purposively selected institutions: Spiritan University, Nneochi Abia State, Federal University of Technology Akure Ondo State, and Adekunle Ajasin University Akungba Ondo State. The target population comprised 250 librarians from these universities, from which a sample size of 90 respondents was determined using Taro Yamane's formula at a 5% error margin. Primary data were collected through a validated, 30-item structured questionnaire patterned after a 4-point Likert scale of Strongly Agree=4, Agree=3, Disagree=2, Strongly Disagree=1 for quantitative responses, complemented by six open-ended questions for qualitative insights, achieving a 100% return rate. Data analysis utilized descriptive statistics mean, frequency, percentage, and standard deviation, with a decision mean benchmark of 2.50 (items ≥ 2.50 accepted as significant). Findings revealed that critical adoption factors including ICT infrastructure availability ($\bar{x}=3.3$), librarians' technical competence ($\bar{x}=3.2$), and perceived cost benefits ($\bar{x}=3.3$), strongly influenced cloud LMS uptake. While unreliable internet connectivity ($\bar{x}=3.4$) and data security concerns ($\bar{x}=3.2$) emerged as challenges. Cloud systems significantly improve resource accessibility ($\bar{x}=3.4$), operational efficiency ($\bar{x}=3.2$), and scalability, offering substantial benefits over traditional systems despite infrastructural constraints. The study recommended a comprehensive staff training, phased implementation, robust vendor evaluation, and institutional investment in reliable internet infrastructure to ensure successful adoption.

Keywords: Cloud-Based, Library Management Systems, Academic Libraries, Nigeria.

Introduction

In this digital era, cloud computing has emerged as a transformative technology offering academic libraries unprecedented opportunities to improve operational efficiency, reduce infrastructure costs, and provide seamless access to information resources. Cloud-based library management systems (LMS) represent a paradigm shift from traditional client-server-based integrated library systems, to internet-based platforms without the burden of maintaining extensive on-premises infrastructure (Iwari & Hamzat 2017). According to Senyo, Effah, & Addae (2016), while many Nigerian librarians demonstrate awareness of cloud computing concepts, their perceptions towards its adoption remain mixed, with some expressing reservations about security, reliability, and sustainability. It then seeks to assess the effectiveness of its use in libraries.

Libraries must develop clear policies addressing data governance, security protocols, user privacy, and disaster recovery procedures before deploying cloud systems. Nwaogu (2021) noted that Strategic partnerships with reliable cloud service providers and consultation with standards organizations can facilitate smooth transitions. Investment in staff development through training programs, workshops, and professional conferences is crucial for building the technical capacity necessary for managing cloud-based systems (Ekere, 2017).

Given the transformative potential of cloud-based library management systems and the unique challenges facing Nigerian academic libraries, there is an urgent need for systematic research that examine the factors influencing adoption, implementation experiences, and strategies for successful deployment (Babafemi & Adedibu 2017). This study sought to contribute to the growing

body of knowledge on cloud computing in Nigerian libraries by investigating the effectiveness of cloud-based library management systems.

Statement of the problem

The emergence of cloud-based library management systems presents a potentially transformative solution for effective library and information services in the academic libraries. However, the adoption of this technology in Nigerian academic libraries seems to be sluggish and inconsistent. It puts the Nigerian academic libraries at a critical juncture in their quest to provide efficient and responsive information services to their user communities while some institutions have shown interest in migrating to cloud-based platforms, many others remain hesitant. This seems to show limited empirical evidence to guide decision-making processes. Perhaps, library administrators and stakeholders lack comprehensive understanding of the specific factors that either facilitate or hinder the adoption of cloud-based LMS within the Nigerian context, where unique environmental challenges such as unreliable power supply, poor internet infrastructure, and limited technical expertise complicate technology implementation.

The absence of contextually relevant implementation strategies tailored to the Nigerian academic library environment further compounds the problem. While international literature offers general guidelines for cloud computing adoption, these frameworks often fail to address the specific infrastructural, financial, and human resource constraints that characterize Nigerian institutions. Consequently, there is an urgent need for research that not only evaluates the effectiveness of cloud-based library management systems in Nigerian academic libraries but also identifies

practical strategies that can enhance successful implementation and sustainability within this unique context. This study addressed this critical knowledge gap by providing comprehensive insights into the adoption factors, operational impacts, challenges, benefits, and implementation strategies for cloud-based LMS in Nigerian academic libraries.

Research Questions

The following research questions guided the study

1. What are the main factors influencing the adoption of cloud-based library management systems (LMS) in Nigerian academic libraries?
2. How do cloud-based LMS impact library operations and services in Nigerian academic libraries?
3. What are the challenges of implementing cloud-based LMS in Nigerian academic libraries?
4. What strategies can Nigerian academic libraries employ to ensure successful implementation of cloud-based LMS?

Literature Review

Factors Influencing the Adoption of Cloud-Based Library Management Systems

A Cloud-Based Library Management System, CLMS, is a web-based software application that automates library operations and is hosted, managed and maintained by a vendor on remote servers. Unlike the traditional on premise LMS, the library does not purchase or maintain physical servers. Instead, it accesses the system over the internet through a subscription model (Okeji & Nwosu, 2020). According to Eze & Chukwu (2023), a cloud-based LMS is “library automation

without the burden of infrastructure” because the technical responsibilities are shifted to the service provider.

The decision to adopt Cloud-Based Library Management Systems, CLMS, in academic libraries is rarely made overnight. It is the result of several internal and external factors interacting together such frequent internet downtime and low bandwidth, which directly affects access to cloud portals (Ogundeji & Abioye 2021). One of the strongest factors is perceived usefulness and service improvement. Libraries adopt cloud LMS when they believe it will solve real problems. Nwosu and Okafor (2022) found that many Nigerian libraries migrated to the cloud because they were tired of frequent system crashes caused by power failure and server damage. The promise of 24/7 availability, remote access for students, and automatic backup made cloud systems attractive. **Corpuz**, (2020), added that during COVID-19, libraries with cloud OPAC were able to serve users remotely while physical libraries were closed. This experience convinced many management teams that cloud technology is no longer a luxury but a necessity. Ifidon & Nwoko (2021) observed that in universities where the Vice Chancellor and University Librarian championed automation, adoption was faster and smoother. Management support translates to budget approval, policy backing, and staff motivation.

Conversely, where leadership is indifferent, even the best cloud proposal dies on paper. Adeyemi (2021) noted that librarians often need to “sell” the idea to management by showing cost-benefit analysis and how cloud LMS will help with NUC accreditation. Babafemi and Adedibu (2017) stated that availability of stable internet, adequate computers, and alternative power supply determines adoption. Libraries in urban areas with better infrastructure adopt faster than those in

rural locations. Anunobi and Nwabueze (2017) also pointed out that the presence of skilled IT staff influences the decision, because management wants assurance that someone can handle basic troubleshooting. Owolabi, Idowu, & Okocha (2019) found out that where librarians are ICT-compliant and open to learning, adoption is encouraged. But where staff fear technology or lack training, they resist. Cordell (2024) argued that user education and change management must happen before adoption, otherwise the system will be underutilized even after purchase.

Impact of Cloud-Based Library Management Systems on Library Operations in Nigerian

The introduction of Cloud-Based Library Management Systems, CLMS, has changed the way academic libraries in Nigeria carry out their day-to-day activities. Traditionally, library operations were manual, slow, and dependent on physical presence. With cloud technology, many of these processes have become faster, more accurate, and more accessible. However, the extent of this impact depends on how well the system is implemented and sustained. One of the most visible impacts is on technical services such as acquisition and cataloging. Before cloud adoption, librarians spent hours creating original catalog records and manually processing new books. Okeji and Nwosu (2020) reported that with cloud LMS, librarians can now copy and import bibliographic records directly from global databases like WorldCat and Library of Congress. This has reduced cataloging time by over 50% in some university libraries. It has also improved the accuracy and standardization of records, which makes materials easier to find.

Cloud systems automate charging and discharging, overdue notices, and reservation of materials. Ifidon and Nwoko (2021) observed that in libraries using cloud LMS, students can log in from their hostels or homes to check book availability, place holds, and renew loans without visiting the library. During the COVID-19 lockdown, this feature kept library services running when physical

access was impossible. Eze and Chukwu (2023) added that automated SMS and email alerts have reduced the number of lost books and improved loan return rates. Because cloud LMS are web-based, the OPAC is available 24/7. Nwosu and Okafor (2022) noted that this has increased the number of library visits, both physical and virtual. Students no longer need to be in the library to search the catalogue. Furthermore, cloud platforms make it easier for libraries to join consortia and share resources. Tella (2020) explained that some Nigerian universities are now using cloud systems to participate in inter-library loan schemes, giving students access to materials beyond their own institution. Despite these positive impacts of **Cloud-Based Library Management Systems** that the benefits are not automatic. Where internet and power are unstable, the impact is limited because users cannot access the system consistently. Also, without proper training, staff may only use 20% of the system's features.

Challenges of Implementing Cloud-Based Library Management Systems

One of the most persistent challenges is ICT infrastructure deficit. Cloud-based systems depend entirely on stable internet connectivity and constant power supply. In Nigeria, this remains a major problem. Tella (2020) observed that many state and private universities experience frequent internet downtime and low bandwidth, which makes it difficult for users to access the library portal in real time. Similarly, Adeyemi (2021) noted that despite migrating to the cloud, libraries still spend heavily on generators and inverters because the vendor's server may be online, but the library's computers are off due to power failure. In essence, the library is paying for a system it cannot consistently access. Implementing a cloud LMS is not just about paying annual subscription fees. Libraries also need to upgrade computers, expand bandwidth, train staff and provide alternative power sources. Baro & Edewor (2019) reported that most Nigerian academic libraries

operate on lean budgets that barely cover journal subscriptions, let alone cloud subscriptions and ICT upgrades.

Because of this, many libraries opt for the cheapest vendor without considering service quality, which later results in poor support and system failures. Eze & Chukwu (2023) found that many librarians and IT staff in Nigerian universities lack the requisite skills to manage and troubleshoot cloud platforms. Training programs are either not provided or are poorly attended. Beyond skills, there is also resistance. Ifidon & Nwoko (2021) explained that some senior library staff see automation as a threat to their jobs and therefore sabotage the implementation process. This attitude slows down adoption and reduces the effectiveness of the system. Since data is stored on servers outside the library, often outside Nigeria, librarians worry about who owns the data and what happens in case of a breach. Babafemi and Adedibu (2017) warned that without clear contractual agreements, libraries risk vendor lock-in where migrating data to another vendor becomes almost impossible. Okeji and Nwosu (2020) added that poor technical support from foreign vendors leaves Nigerian libraries stranded whenever there is a system issue, leading to prolonged downtime.

Strategies for Successful Implementation of Cloud-Based Library Management Systems

While the challenges of implementing Cloud-Based Library Management Systems, CLMS, in Nigerian academic libraries are real, literature shows that they are not insurmountable. The first and most important strategy is investment in robust ICT infrastructure. Since cloud systems are internet-dependent, libraries cannot succeed without stable connectivity and power. Tella (2020) recommended that university management should partner with ISPs to provide dedicated bandwidth for the library, and also invest in solar power, inverters, and standby generators. Nwosu

& Okafor (2022) added that libraries should adopt hybrid access models that allow limited offline functions, so that users can still search the OPAC even when internet is down. Closely linked to infrastructure is adequate funding and strategic budgeting.

Cloud LMS require annual subscriptions, hardware upgrades, and continuous training. To address this, Adeyemi (2021) suggested that libraries should lobby TetFund and NUC for special intervention grants specifically for library automation. Okeji & Nwosu (2020) also proposed a consortium model where several universities pool resources to negotiate better subscription rates with vendors. By sharing costs, smaller institutions can access premium cloud services they could not afford alone. To tackle the problem of human capacity and resistance to change, literature emphasizes continuous training and staff involvement. Eze & Chukwu (2023) argued that libraries should organize regular in-house workshops, certification programs, and peer mentoring on cloud LMS use. Ifidon & Nwoko (2021) noted that involving library staff in the vendor selection and implementation process reduces resistance because they feel a sense of ownership. When staff understand that automation is meant to reduce manual work and not replace jobs, they become champions of the system rather than obstacles. Finally, there is need for policy development and collaboration. Cordell (2024) stated that Nigeria needs a national framework for cloud adoption in higher education. The Nigerian Library Association, NLA, in partnership with NITDA and NUC, should draft guidelines on procurement, security, and standards for cloud LMS. Aguolu and Aguolu (2021) added that at the institutional level, universities should develop their own ICT and cloud policies to guide implementation while waiting for a national policy. Collaboration between libraries, IT departments, and vendors is also key to successful rollout.

Methodology

This study adopted the descriptive survey research design. This is a method used to collect information by asking questions from a group of people about their opinions, attitudes, practices, or characteristics regarding a particular issue at a specific point in time (Aina, 2019). The researcher gathered data from 90 professional librarians and IT staff across three purposively selected institutions: Spiritan University Nneochi (Abia State), Federal University of Technology Akure (Ondo State), and Adekunle Ajasin University Akungba (Ondo State). The target population comprised 250 librarians and IT staff from these universities, from which a sample size of 90 respondents was determined using Taro Yamane's formula at a 5% error margin. Primary data were collected through a validated, 24-item structured questionnaire patterned after a 4-point Likert scale (Strongly Agree=4, Agree=3, Disagree=2, strongly Disagree=1). The questionnaire focused on adoption, impact, challenges, and user satisfaction of cloud-based LMS. The instrument was subjected to face and content validity by experts, and a reliability coefficient of 0.83 was obtained using Cronbach Alpha. Quantitative data were analyzed using descriptive statistics such as frequency, percentages, mean and standard deviation with the aid of SPSS version 26. Data were analysis using descriptive statistics mean, frequency, percentage, and standard deviation, with a decision mean benchmark of 2.50 (items ≥ 2.50 accepted as significant). The results were presented in tables. Each table was followed by interpretation and discussion of findings in line with the research questions. Ethical considerations, including informed consent and confidentiality, were strictly observed throughout the study to ensure the credibility and integrity of results.

Results

This section presented the results of data analysis in tables in line with the research questions earlier formulated to guide the study.

Research Question One

What are the main factors influencing the adoption of cloud-based library management systems in Nigerian academic libraries?

Table 1: Factors Influencing Adoption of Cloud-Based LMS in Nigerian Academic Libraries

Mean ratings of responses on factors influencing the adoption of cloud-based LMS in Nigerian academic libraries.

S/N	Factors Influencing Adoption	SA	A	D	SD	$\bar{x}$	Remarks
1	Availability of reliable ICT infrastructure (internet connectivity and bandwidth) influences our library's adoption of cloud-based LMS.	45	32	8	5	3.3	Accepted
2	Adequate financial resources and institutional funding support the adoption of cloud-based LMS.	38	35	12	5	3.1	Accepted
3	Librarians' technical competence and ICT skills facilitate the implementation of cloud-based LMS.	42	30	10	8	3.2	Accepted
4	Strong institutional leadership support and management commitment encourage cloud-based LMS adoption.	40	33	11	6	3.1	Accepted
5	Perceived benefits such as cost efficiency, scalability, and remote access drive willingness to adopt cloud-based LMS.	48	28	9	5	3.3	Accepted
6	Concerns about data security, privacy, and vendor reliability hinder the adoption of cloud-based LMS.	36	28	9	5	3.0	Accepted

Table one shows that the availability of reliable ICT infrastructure ranked highest among factors influencing adoption, with a mean score of 3.3. This indicates that respondents strongly agree that without stable internet connectivity and bandwidth, libraries cannot even consider moving to the cloud. This finding is supported by Ogundeji & Abioye (2021), who observed that many state and private universities in Nigeria struggle with frequent internet downtime and low bandwidth, which directly affects access to cloud portals. It also aligns with Babafemi and Adedibu (2017), who noted that infrastructure readiness determines whether adoption is feasible. In the Nigerian context, a library may be willing to adopt, but if the internet drops every few minutes, the system becomes useless. So, infrastructure is not just a factor; it is the foundation. Respondents agreed, with a mean of 3.3, that libraries adopt cloud LMS when they see clear advantages such as reduced downtime,

remote access, and lower costs of maintaining servers. This corroborates Nwosu and Okafor (2022), who found that many Nigerian libraries migrated to the cloud because they were tired of server crashes caused by power failures. The COVID-19 experience also reinforced this, as Corpuz, (2020) noted, with libraries with cloud OPAC able to serve students remotely while physical libraries were shut. Once management sees that cloud systems can keep services running during emergencies, the perceived value goes up and adoption becomes more likely. The study also found that librarians' technical competence, with a mean of 3.2, influences adoption. This means libraries are more likely to adopt when staff have the skills to manage and troubleshoot cloud platforms. This is consistent with Owolabi, Idowu, & Okocha (2019), who reported that a lack of ICT skills slows down implementation. Cordell (2024) added that change management and user education must come before adoption. If staff fear the technology or feel it will replace them, they resist. But when they are trained and involved, they become advocates.

Research Question Two

How do cloud-based LMS impact library operations and services in Nigerian academic libraries?

Table 2: Impact of Cloud-Based LMS on Library Operations and Services

Mean ratings of responses on the impact of cloud-based LMS on library operations and services in Nigerian academic libraries.

S/N	Impact on Library Operations and Services	VHE	HE	LE	VLE	$\bar{x}$	Remarks
7	Cloud-based LMS has improved accessibility to library resources anytime and anywhere.	53	25	8	5	3.4	Accepted
8	Cloud-based LMS has enhanced collaboration and resource sharing among libraries.	38	34	12	6	3.1	Accepted
9	Cloud-based LMS has reduced the workload on library IT staff through automated updates and maintenance.	44	30	10	6	3.2	Accepted

10	Cloud-based LMS has improved the speed and efficiency of cataloging and circulation processes.	40	32	13	5	3.1	Accepted
11	Cloud-based LMS has facilitated better data management and reporting capabilities.	46	28	10	6	3.3	Accepted
12	Cloud-based LMS has enabled seamless integration with other digital library services and platforms.	35	35	14	6	3.0	Accepted

The findings of this study show that cloud-based Library Management Systems have brought noticeable changes to how academic libraries in Nigeria carry out their daily work. The shift from manual, on-premise systems to cloud platforms is not just a technical upgrade. It has redefined the speed, accuracy, and reach of library services. One of the strongest impacts observed is on access to information and resource sharing, with a mean score of 3.4. This means respondents strongly agree that cloud LMS have made library resources more accessible. Because the OPAC is web-based, students and staff can search the catalogue, check book availability, and renew loans from their hostels or homes, 24/7. This finding supports Nwosu and Okafor (2022) who reported increased virtual visits after cloud adoption. In terms of circulation and user services, the impact is clear. Automation of charging, discharging, overdue notices, and reservations has reduced queues and human error. Ifidon and Nwoko (2021) observed that automated SMS and email alerts have improved loan return rates and reduced lost books. Students no longer need to come to the circulation desk for every little thing. This frees staff to focus on user engagement rather than routine transactions. Respondents indicated that cataloging is now faster because librarians can import bibliographic records directly from global databases instead of creating everything from scratch. This aligns with Okeji and Nwosu (2020) who noted that cloud systems cut cataloging time by over 50% in some Nigerian university libraries.

Research Question Three

What are the challenges and benefits of implementing cloud-based LMS in Nigerian academic libraries?

Table 3: Challenges of Implementing Cloud-Based LMS

Mean ratings of responses on challenges of implementing cloud-based LMS

S/N	Challenges of Implementation	SA	A	D	SD	$\bar{x}$	Remarks
13	Unreliable internet connectivity and frequent power outages disrupt cloud-based LMS operations.	50	28	7	5	3.4	Accepted
14	High subscription costs and recurring vendor fees strain library budgets.	32	36	15	7	3.0	Accepted
15	Inadequate staff training on cloud technologies limits effective utilization of cloud-based LMS.	45	30	9	6	3.3	Accepted
16	Data security concerns and fear of data breaches create hesitation toward cloud adoption.	42	32	11	5	3.2	Accepted
17	Dependence on external vendors for system maintenance and technical support creates vulnerability.	38	33	13	6	3.1	Accepted
18	Lack of clear national ICT policies and regulatory frameworks for cloud computing hinders adoption.	35	35	14	6	3.0	Accepted

The results of this study show that while cloud-based Library Management Systems offer many benefits, their implementation in Nigerian academic libraries is not without serious hurdles. The most pressing challenge identified is unreliable ICT infrastructure, with a mean score of 3.4. Respondents strongly agreed that poor internet connectivity, low bandwidth, and frequent power outages make it difficult to access cloud systems consistently. This supports Tella (2020) who observed that many libraries pay for cloud subscriptions but still spend heavily on generators because their computers are off due to power failure. Baro & Edewor (2019) also noted that without stable internet, the promise of 24/7 access becomes meaningless. In Nigeria, the vendor's server may be online, but if the library has no light or network, users cannot access anything. So infrastructure remains the biggest barrier. Data security and vendor dependence also emerged as a significant concern with a mean of 3.2. Since data is stored off-site, often outside Nigeria, librarians worry about data ownership, breaches, and what happens if the vendor shuts down. Babafemi and Adedibu (2017) warned about vendor lock-in where migrating data becomes almost

impossible without clear contractual agreement. This fear makes some management teams hesitant to fully commit.

Research Question Four

What strategies can Nigerian academic libraries employ to ensure successful implementation of cloud-based LMS?

Table 4: Strategies for Successful Implementation of Cloud-Based LMS

Mean ratings of responses on strategies for successful implementation of cloud-based LMS in Nigerian academic libraries.

S/N	Implementation Strategies	SA	A	D	SD	$\bar{x}$	Remarks
19	Academic libraries should partner with internet service providers for dedicated library bandwidth.	52	26	7	5	3.4	Accepted
20	Academic libraries should seek TetFund and NUC grants.	48	30	7	5	3.4	Accepted
21	Academic libraries should organize regular capacity building and workshops.	45	32	8	5	3.3	Accepted
22	Academic libraries should adopt cloud vendors with strong encryption.	44	31	10	5	3.2	Accepted
23	Academic libraries should develop in-house hybrid support model.	42	33	10	5	3.1	Accepted
24	Advocate for a national cloud computing policy framework for academic libraries through NLA.	40	35	10	5	3.1	Accepted

From table 4 the results of this study show that respondents strongly agree that the challenges of cloud adoption can be overcome with deliberate and context-specific strategies. The data suggests that successful implementation is not about buying the software alone. Respondents agreed that without stable internet and alternative power, cloud systems cannot work. This supports Tella (2020) who recommended that university management should partner with ISPs for dedicated bandwidth and invest in solar, inverters, and generators. Nwosu and Okafor (2022) also suggested hybrid access models that allow limited offline functions like OPAC search when the internet is

down. In the Nigerian context, this makes sense because you cannot depend 100% on public power. Libraries must create their own backup to keep services running. The findings show that libraries need to plan for annual subscriptions, hardware upgrades, and training. This agrees with Adeyemi (2021) who advised libraries to lobby TetFund and NUC for special intervention grants for library automation. Okeji and Nwosu (2020) also proposed the consortium model, where several universities pool resources to negotiate better rates with vendors. This is especially helpful for state and private universities that cannot afford premium subscriptions alone. Sharing cost makes cloud adoption realistic. Respondents agreed that libraries should only contract ISO-certified vendors with clear SLAs on data ownership, backup, and breach notification. Anunobi and Nwabueze (2017) further suggested that institutions should develop internal data protection policies and insist on data portability clauses. This protects the library and makes migration easier if needed.

Conclusion and recommendations

This study investigated the effectiveness of cloud-based library management systems in Nigerian academic libraries. Based on the research findings of this study, conclusions are drawn as follows: The adoption of cloud-based LMS in Nigerian academic libraries is driven by both technological readiness and institutional priorities. The most critical factors are the availability of reliable ICT infrastructure, and cost benefits. Cloud systems have made libraries faster, more accessible, and more efficient. However, the full impact is still limited by the same infrastructural problems that exist in the environment. The biggest obstacles to implementing cloud LMS are unreliable internet and power supply, inadequate funding, concerns about data security. These challenges show that

the problem is not just about technology. It is about the environment in which the technology is being used. Successful implementation requires a deliberate approach. Key strategies include investing in robust ICT infrastructure and alternative power sources, and securing adequate funding through TetFund grants and consortium purchasing. When these strategies are applied together, Nigerian academic libraries can overcome the barriers and fully benefit from cloud technology.

References

- Adeyemi, B. M. (2021). Challenges of ICT adoption in Nigerian academic libraries. *Library Philosophy and Practice*, 2021(4567), 1–15.
- Aguolu C.C. and Aguolu I.E. (2002). Libraries and Information Management in Nigeria: Seminal Essays on Themes and Problems
- Aina, L. O. (2019). *Library and information science text for Africa (3rd ed.)*. Ibadan: Third World Information Services.
- Anunobi, C. V., & Nwabueze, A. U. (2017). Cloud computing in Nigerian academic libraries: Prospects and challenges. *International Journal of Library and Information Science*, 9(5), 44–52. doi.org
- Babafemi, A. A., & Adedibu, L. O. (2017). Data security and cloud computing in Nigerian libraries. *Journal of Applied Information Science and Technology*, 10(2), 112–120.
- Baro, E. E., & Edewor, N. (2019). Cloud computing in Nigerian university libraries: Challenges and strategies. *The Electronic Library*, 37(2), 340–357. <https://doi.org/10.1108/EL-09-2018-0192>
- Cordell, R. M. (2024). Information literacy and technology in academic libraries: A global perspective. *College & Research Libraries*, 85(1), 12–29. doi.org
- Corpuz, D. (2020). Library resources and functional effectiveness of an academic library: meeting the challenges of the digital age. *Humanities & Social Sciences Reviews* 8(4):238-245
- Ekere, F. C. (2017). *Administration of academic libraries: A book of readings*. Enugu: EL 'Demark Publishers.

- Eze, J. U., & Chukwu, C. O. (2023). User satisfaction with cloud-based library services in selected universities in Anambra State, Nigeria. *Nigerian Library and Information Science Review*, 41(1), 67–84.
- Ifidon, E. I., & Nwoko, A. C. (2021). Impact of library automation on staff productivity in Nigerian university libraries. *Gateway Library Journal*, 24(1), 45–58.
- Iwari, H. E., & Hamzat, S. A. (2017). Internet based learning management systems in Nigerian tertiary institutions. *Library Philosophy and Practice*, 1583.
- Nwaogu, H. E. (2021). Hybrid library automation in Nigerian universities: Issues and prospects. *International Journal of Library and Information Science Studies*, 7(3), 23–35.
- Nwosu, M. C., & Okafor, V. N. (2022). Evaluating the impact of cloud-based library management systems in South-East Nigerian academic libraries. *Journal of Library and Information Science*, 12(2), 88–102.
- Ogundeji, K. O., & Abioye, A. A. (2021). Awareness and adoption of cloud computing technologies in university libraries in Nigeria. *International Journal of Library and Information Science*, 13(2), 28–36. <https://doi.org/10.5897/IJLIS2020.0945>
- Okeji, C. C., & Nwosu, C. O. (2020). Cloud computing adoption in Nigerian academic libraries: Benefits and challenges. *Library Hi Tech News*, 37(8), 12–17.
- Owolabi, S. E., Idowu, O. A., & Okocha, F. O. (2019). Cloud computing adoption in Nigerian academic libraries: A survey of librarians' perception. *Library Hi Tech News*, 36(8), 9–13. <https://doi.org/10.1108/LHTN-03-2019-0021>
- Senyo, P.K., Effah, J., & Addae, E. (2016). Preliminary examination of organizational cloud computing adoption in Ghana: Examining the mixed feelings. *International Journal of Information Management*, 36(3).

Appendix

Research Question One

What are the main factors influencing the adoption of cloud-based library management systems in Nigerian academic libraries?

S/NO	Factors Influencing Adoption	SA	A	D	SD
1.	Availability of reliable ICT infrastructure (internet connectivity and bandwidth) influences our library's adoption of cloud-based LMS				
2.	Adequate financial resources and institutional funding support the adoption of cloud-based LMS				
3.	Librarians' technical competence and ICT skills facilitate the implementation of cloud-based LMS				
4.	Strong institutional leadership support and management commitment encourage cloud-based LMS adoption				
5.	Perceived benefits such as cost efficiency, scalability, and remote access drive willingness to adopt cloud-based LMS				
6.	Concerns about data security, privacy, and vendor reliability hinder the adoption of cloud-based LMS				

Research Question Two: How do cloud-based LMS impact library operations and services in Nigerian academic libraries?

s/no	Impact of Cloud-Based LMS on Library Operations and Services	VH	HE	HE	HE
	Cloud-based LMS has improved accessibility to library resources anytime and anywhere				
	Cloud-based LMS has enhanced collaboration and resource sharing among libraries				
2.	Cloud-based LMS has reduced the workload on library IT staff through automated updates and maintenance				
3.	Cloud-based LMS has improved the speed and efficiency of cataloging and circulation processes				
4.	Cloud-based LMS has facilitated better data management and reporting capabilities				
5.	Cloud-based LMS has enabled seamless integration with other digital library services and platforms				

Research Question Three: What are the challenges and benefits of implementing cloud-based LMS in Nigerian academic libraries?

S/NO	Challenges of Implementation	SA	A	SD	D
1.	Unreliable internet connectivity and frequent power outages disrupt cloud-based LMS operations.				
2.	High subscription costs and recurring vendor fees strain library budgets				
3.	Inadequate staff training on cloud technologies limits effective utilization of cloud-based LMS				
4.	Data security concerns and fear of data breaches create hesitation toward cloud adoption				
5.	Dependence on external vendors for system maintenance and technical support creates vulnerability				

Research Question Four: What strategies can Nigerian academic libraries employ to ensure successful implementation of cloud-based LMS?

S/NO	Strategies for Successful Implementation of Cloud-Based LMS	SA	A	SD	D
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1.	Academic libraries should partner with internet service providers for dedicated library bandwidth.				
2.	Academic libraries should seek TetFund and NUC grants				
3.	Academic libraries should organize regular capacity building and workshops				
4.	Academic libraries should adopt cloud vendors with strong encryption				
5.	Academic libraries should develop in-house hybrid support model				
6.	Advocate for a national cloud computing policy framework for academic libraries through NLA				