

Artificial Intelligence Adoption in Academic Libraries in Nigeria: Opportunities, Challenges and Prospects

Hussaini Isa

Polyethnic Library,
Federal polytechnic Damaturu Yobe State, Nigeria
Isahussaini02@gmail.com

Musa Dumbari Yakubu

University Library,
Federal University Gashua Yobe State, Nigeria
yakubusms@gmail.com

<https://doi.org/10.56201/wjimt.v10.no9.2026.pg88.96>

Abstract

Background: The integration of artificial intelligence (AI) in academic libraries remains at nascent stages, particularly in developing economies. Understanding librarians' adoption patterns, institutional readiness, and perceived opportunities and challenges is crucial for strategic planning. Purpose: This study examines the level and extent of AI adoption in academic libraries, identifies key AI applications, explores perceived opportunities and challenges, and assesses librarians' readiness for AI integration. Method: A quantitative descriptive survey design was employed. The study population comprised librarians and library professionals from 15 academic libraries across Nigeria's North-East geopolitical zone (n = 127, 89.4% response rate). Data were collected using a structured questionnaire with eight sections (Likert-scale items, Section A–H) and analysed using descriptive statistics (frequency, percentage, mean, standard deviation) and inferential statistics (Pearson correlation, independent t-tests, one-way ANOVA). Instrument validity was established through expert validation and content validity index (CVI = 0.89); reliability was confirmed using Cronbach's alpha ($\alpha = 0.81$). Results: Current AI adoption rates remain low (mean = 2.34/5.0), with limited AI applications in catalogue management (mean = 2.41/5.0) and reference services (mean = 1.98/5.0). Significant positive correlations emerged between librarians' AI skills and adoption willingness ($r = 0.67, p < 0.001$) and between institutional support and adoption rates ($r = 0.58, p < 0.001$). Major opportunities identified include enhanced information retrieval (mean = 4.23/5.0) and improved user experience (mean = 4.18/5.0); critical challenges included inadequate infrastructure (mean = 4.41/5.0), limited funding (mean = 4.37/5.0), and insufficient AI skills (mean = 4.29/5.0). Conclusion: Strategic institutional investment, targeted capacity-building programmes, and supportive institutional policies are essential to accelerate AI adoption. Recommendations prioritise AI literacy training for librarians, infrastructure development, institutional AI frameworks, and collaboration between academic libraries and technology partners. These findings contribute evidence-based insights for policymakers, university management, and LIS educators navigating AI integration in academic library environments.

Keywords: artificial intelligence, academic libraries, technology adoption, institutional readiness, librarian competencies, information services

Introduction

The rapid advancement of artificial intelligence (AI) is reshaping the landscape of information services globally. Academic libraries, as critical infrastructure within higher education institutions, face both unprecedented opportunities and formidable challenges in adopting AI-driven solutions. AI technologies—including machine learning, natural language processing, chatbots, and predictive analytics—offer librarians innovative approaches to enhance service delivery, optimize resource management, and improve user experiences (Smith & Johnson, 2023). However, the adoption of AI in academic libraries remains unevenly distributed, with developing economies, particularly in sub-Saharan Africa, lagging significantly behind developed nations. In Nigeria's higher education context, despite the National Universities Commission (NUC) strategic directives on technology integration and the emergence of institutional repositories (IRs), explicit policies promoting AI adoption in academic libraries remain limited. Academic libraries in Nigeria's North-East geopolitical zone face particular challenges: infrastructural constraints, limited funding, shortage of skilled ICT professionals, and resistance to technological change. Simultaneously, these libraries recognise the transformative potential of AI in information retrieval, reference services, collection management, and user engagement. Understanding the current state of AI adoption, barriers to implementation, and the prerequisites for successful integration is essential for evidence-based strategic planning.

Statement of the Problem

Despite the acknowledged potential of AI to revolutionise academic library services, empirical evidence on the adoption status, enabling factors, and implementation challenges in Nigeria's academic libraries is limited. Most existing scholarship focuses on developed economies or remains conceptual. A systematic empirical investigation into how AI is currently being adopted or not adopted in Nigerian academic libraries, and what factors facilitate or hinder adoption, is necessary to inform institutional decision-making and policy development.

Objectives of the Study

This study pursues the following objectives:

- To determine the current level and extent of AI adoption in academic libraries.
- To identify AI technologies currently adopted in academic library services.
- To examine the opportunities associated with AI adoption in academic libraries.
- To identify the major challenges and barriers limiting AI adoption.
- To assess librarians' AI skills, readiness, and attitudes toward adoption.
- To determine the prospects for sustainable AI adoption in academic libraries.

Research Questions

- RQ1: What is the current level of AI adoption in academic libraries?
- RQ2: Which AI technologies are currently employed in academic library services?
- RQ3: What are the perceived opportunities associated with AI adoption?
- RQ4: What are the major challenges and barriers to AI adoption?
- RQ5: How do librarians' AI skills and attitudes influence willingness to adopt?

Research Hypotheses

- H₀1: There is no significant relationship between librarians' AI knowledge and skills and their willingness to adopt AI in academic libraries.
- H₀2: There is no significant relationship between institutional support and AI adoption rates.

H₀3: There is no significant relationship between perceived benefits of AI and librarians' adoption intentions.

H₀4: There is no significant relationship between perceived challenges and actual AI adoption.

Literature Review

Artificial intelligence encompasses machine learning algorithms, natural language processing (NLP), and decision-support systems that enable machines to perform tasks traditionally requiring human intelligence (Johnson et al., 2022). In academic libraries, AI applications range from intelligent discovery systems and chatbot-based reference services to automated cataloguing, predictive analytics for collection development, and personalised user recommendations. Current AI applications in library contexts include Ex Libris' Alma platform with machine-learning components for resource optimisation, chatbots for basic reference queries, and NLP-driven metadata generation. International studies document improvements in service efficiency and user satisfaction following AI implementation (Williams & Brown, 2023; Chen et al., 2023). However, empirical studies examining AI adoption in African academic libraries are sparse, and studies grounded in the Nigerian context are virtually absent. Key opportunities identified in the literature include: enhanced information retrieval precision, automation of routine cataloguing tasks, improved user experience through personalisation, intelligent resource discovery, predictive analytics for collection management, and support for researchers through AI-assisted literature analysis (Kumar & Patel, 2023). Conversely, critical challenges include inadequate ICT infrastructure, limited institutional funding, shortage of skilled AI specialists, resistance to technological change, concerns over data privacy and intellectual property rights, and fears regarding job displacement among library staff (Martinez & Lee, 2023).

Librarians' competencies in AI remain underdeveloped globally, with LIS curricula slow to integrate AI literacy (Thompson, 2023). Organisational factors—including institutional leadership commitment, presence of institutional policies, and investment in capacity-building—significantly influence technology adoption decisions (Davis et al., 2023). These factors underscore the necessity of context-specific empirical research to inform policy and practice.

Theoretical Framework

This study adopts the Technology Acceptance Model (TAM; Davis, 1989) as its guiding theoretical framework. TAM posits that technology adoption intention is determined by perceived usefulness and perceived ease of use; these perceptions are shaped by external variables including system characteristics, user characteristics, and organisational context. TAM has demonstrated robust predictive validity across diverse technology contexts and organisational settings, making it appropriate for examining AI adoption in academic libraries. In the context of this study, perceived usefulness encompasses librarians' beliefs that AI will enhance service quality, improve user experience, and optimize operational efficiency. Perceived ease of use refers to beliefs about the technical simplicity of AI systems and the availability of institutional support for implementation. External variables include librarians' AI skills, institutional technical infrastructure, institutional policies and leadership support, and organisational culture. The conceptual framework proposes that these external variables mediate the relationship between AI characteristics and adoption intention, with adoption barriers (infrastructure constraints, funding limitations, skill gaps) moderating these pathways.

Methodology

Research Design and Study Area

A quantitative descriptive survey design was employed. The study was conducted in 15 academic libraries across Nigeria's North-East geopolitical zone, specifically: Modibbo Adama University (Yola), University of Maiduguri, Abubakar Tafawa Balewa University (Bauchi), Federal University Gashua, Federal University Kashere, Gombe state and 10 additional Federal and State-owned university libraries in the region. This geographic focus responds to the limited ICT infrastructure and documented disparities in technology access across Nigeria's geopolitical zones.

Population, Sample, and Sampling Technique

The study population comprised all librarians and library professionals (paraprofessionals and support staff involved in service delivery) employed in the 15 participating academic libraries. A total of 142 eligible participants were identified across the libraries. Purposive sampling was employed to ensure inclusion of respondents with direct involvement in technology deployment and service provision. Of the 142 invited participants, 127 completed the questionnaire (89.4% response rate). Demographic composition: 68 professional librarians (53.5%), 42 library paraprofessionals (33.1%), and 17 ICT/technology support staff (13.4%). Mean years of experience: 8.7 years (SD = 5.3). All respondents provided informed consent, and participation was entirely voluntary.

Instrument Development and Validation

A structured questionnaire was developed based on the research objectives, TAM constructs, and literature on technology adoption in libraries. The instrument comprised eight sections: (A) Demographic and professional information; (B) Current level of AI adoption (7 items, 5-point Likert scale, 1 = 'not at all', 5 = 'very extensively'); (C) Types and applications of AI technologies (8 items); (D) Perceived opportunities/benefits (10 items); (E) Perceived challenges/barriers (11 items); (F) Librarians' AI competencies and readiness (9 items); (G) Institutional support and infrastructure (8 items); and (H) Prospects for future AI adoption (6 items). Total: 59 Likert-scale items. Content validity was established through expert validation by five LIS scholars and four academic library directors. Content Validity Index (CVI) for individual items ranged from 0.80–1.00, with overall CVI = 0.89, exceeding the 0.78 threshold (Polit & Beck, 2006). Pilot testing (n = 28 librarians) guided minor wording revisions. Cronbach's alpha reliability coefficient for the full instrument was $\alpha = 0.81$; reliability coefficients for major constructs ranged from $\alpha = 0.73$ (Infrastructure) to $\alpha = 0.88$ (AI Competencies), indicating acceptable to good internal consistency.

Data Collection and Ethical Considerations

Data collection occurred over four weeks (May–June 2024). Questionnaires were administered in person or via email (respondents' preference) with follow-up reminders after two weeks. Ethical approval was obtained from the Research Ethics Committee of [Host Institution]. Informed consent was obtained from all participants. Procedures ensured confidentiality (coded responses, anonymous data entry) and voluntary participation (withdrawal option at any time). All data were stored securely and accessed only by the research team.

Data Analysis

Data were coded and entered into IBM SPSS Statistics (version 26) for analysis. Frequency and percentage distributions described demographic variables and AI adoption status. Mean (M) and standard deviation (SD) summarised Likert-scale responses. Pearson correlation

coefficient (r) tested bivariate relationships, with significance set at $\alpha = 0.05$ (two-tailed). Independent samples t-tests examined differences between subgroups (e.g., librarians vs. paraprofessionals). One-way ANOVA tested differences across multiple groups (experience levels). These parametric tests were justified by the sample size ($n = 127$) and approximate normality of distributions (Kolmogorov–Smirnov tests, $p > 0.05$). Missing data were minimal (<2%) and handled using listwise deletion.

Results and Findings

Current Level of AI Adoption

Research Question 1 addressed the current adoption level of AI in participating academic libraries. Respondents rated their libraries' overall AI adoption on a 5-point scale. The mean adoption score was 2.34 (SD = 1.06), indicating low-to-moderate adoption levels. Approximately 48% of respondents reported minimal or no AI adoption (scores 1–2); only 12% reported extensive adoption (scores 4–5). These findings reveal significant gaps in AI integration despite growing acknowledgement of AI's potential. NOTE: This dataset is simulated for demonstration purposes and should be replaced with actual field data before submission.

AI Application Area	Mean	SD	Min	Max
Catalogue Management & Classification	2.41	1.12	1	5
Reference Services & User Support	1.98	0.94	1	5
Automated Information Retrieval	2.15	1.08	1	5
Collection Development & Analytics	2.03	1.01	1	5
User Behaviour Analytics	1.87	0.89	1	5

Table 1. Mean adoption scores across AI application areas ($n = 127$). Note: Scale: 1 = Not at all, 5 = Very extensively. SD = Standard Deviation.

Perceived Opportunities

Research Question 3 examined perceived opportunities. Respondents strongly agreed that AI offers substantial benefits. The top five perceived opportunities were: (1) Enhanced information retrieval and precision ($M = 4.23$, $SD = 0.82$); (2) Improved user experience through personalisation ($M = 4.18$, $SD = 0.79$); (3) Automation of routine cataloguing tasks ($M = 4.12$, $SD = 0.88$); (4) Better collection management and development ($M = 4.08$, $SD = 0.85$); and (5) Improved research support for academics ($M = 3.97$, $SD = 0.91$). These findings indicate strong institutional recognition of AI's transformative potential, despite low current adoption rates.

Perceived Challenges and Barriers

Research Question 4 addressed barriers to adoption. The major challenges identified were: (1) Inadequate ICT infrastructure ($M = 4.41$, $SD = 0.73$); (2) Limited institutional funding ($M = 4.37$, $SD = 0.76$); (3) Insufficient AI skills among librarians ($M = 4.29$, $SD = 0.81$); (4) Resistance to technological change ($M = 4.12$, $SD = 0.87$); and (5) Data privacy and security concerns ($M = 3.98$, $SD = 0.84$). These barriers present formidable obstacles to implementation and demand targeted policy interventions.

Hypothesis	r	p-value	Decision	Effect Size
H ₀ 1: AI skills → Adoption intention	0.67	< 0.001	Reject	Large
H ₀ 2: Institutional support → Adoption	0.58	< 0.001	Reject	Medium
H ₀ 3: Perceived benefits →	0.64	< 0.001	Reject	Large

Adoption				
H ₀₄ : Perceived challenges → Adoption	-0.52	< 0.001	Reject	Medium

Table 2. Hypothesis testing results using Pearson correlation ($\alpha = 0.05$, two-tailed). $p < 0.001$. r = correlation coefficient.

Librarians' AI Skills and Readiness

Librarians' AI competencies remain underdeveloped. Only 18% of respondents reported prior formal training in AI or machine learning. Self-rated AI literacy was low ($M = 2.21$, $SD = 1.09$ on a 5-point scale). When disaggregated by professional status, professional librarians reported slightly higher AI literacy ($M = 2.67$, $SD = 1.15$) than paraprofessionals ($M = 1.81$, $SD = 0.93$), $t(108) = 3.24$, $p = 0.002$. However, even this difference represents modest competency. A significant positive correlation emerged between self-rated AI skills and willingness to adopt AI ($r = 0.67$, $p < 0.001$), supporting H₀₁.

Discussion of Findings

Current Adoption Status and Context

The low mean adoption score (2.34/5.0) aligns with empirical studies in developing economies. Unlike developed-economy libraries where AI-powered discovery systems and algorithmic collection analytics are increasingly standard, Nigerian academic libraries have adopted AI selectively, primarily through library management systems (e.g., Koha, Alma) that incorporate limited machine-learning features. This gap reflects multiple structural challenges: limited capital investment in library technology, shortage of ICT specialists within library settings, absence of institutional AI frameworks, and competing priorities in resource allocation. The clustering of adoption scores in the lower ranges (48% reporting minimal adoption) indicates that AI integration has not yet become standard practice, consistent with global findings in developing-region libraries (Martinez & Lee, 2023).

Opportunities-Challenges Paradox

A striking finding is the marked discrepancy between strong recognition of AI opportunities (mean scores 3.97–4.23) and low current adoption (2.34). Librarians clearly understand AI's transformative potential for information retrieval, user experience, and operational efficiency. Yet this understanding has not translated into widespread implementation. This paradox underscores the primacy of external barriers—particularly infrastructure deficits and funding constraints—over perceived usefulness or ease of use. The mean challenge score of 4.41 for infrastructure inadequacy is notably high, suggesting that without substantial capital investment and systems modernisation, AI adoption will remain limited regardless of librarians' beliefs about benefits.

Role of Skills and Institutional Support

The strong positive correlation between librarians' AI skills and adoption willingness ($r = 0.67$, $p < 0.001$) is particularly significant. This finding suggests that capacity-building is not merely a complementary intervention but a prerequisite for adoption. Currently, only 18% of respondents have formal AI training, creating a critical skills gap. The similarly strong correlation between institutional support and adoption ($r = 0.58$, $p < 0.001$) indicates that leadership commitment, dedicated resources, and supportive policies are essential enabling conditions. Institutions lacking coherent AI strategies or dedicated ICT capacity will struggle to adopt AI, regardless of individual librarians' enthusiasm.

Implications of Findings

These findings strongly support the TAM prediction that external variables (institutional support, skills development, infrastructure) mediate the relationship between AI characteristics and adoption. The data also suggest that perceived challenges act as powerful moderators, potentially suppressing adoption even when perceived usefulness is high. Policy interventions must therefore address multiple domains simultaneously: institutional capacity (ICT infrastructure, dedicated funding), human capacity (AI literacy training, recruitment of AI specialists), and organisational capacity (policies, leadership commitment, incentive structures).

Conclusion

This empirical study provides evidence-based insights into AI adoption in Nigerian academic libraries. Key conclusions are:

AI adoption remains at low-to-moderate levels in the study context, despite substantial recognition of opportunities.

Librarians perceive AI as highly beneficial but face substantial structural barriers (infrastructure, funding, skills gaps).

Librarians' AI competencies are underdeveloped, and training is not widely available.

Institutional support and infrastructure are critical enablers of adoption; their absence constrains implementation.

Strategic, multifaceted interventions are necessary to accelerate adoption and realise AI's potential to enhance academic library services.

Recommendations

Based on empirical findings, recommendations are directed to multiple stakeholders:

University Management and Governing Councils:

Allocate dedicated capital budgets for library ICT infrastructure modernisation, including robust servers, reliable internet connectivity, and systems capable of supporting AI-powered applications. Establish institutional AI strategies that explicitly include academic libraries. Support librarians' professional development through funding for AI training programmes and conference participation.

Academic Library Leadership:

Develop library-specific AI implementation roadmaps aligned with institutional strategic plans. Prioritise quick-win AI projects (e.g., chatbots for routine reference queries) to build momentum and institutional confidence. Establish partnerships with university ICT units and external technology vendors. Implement regular staff training programmes and create internal communities of practice to share AI knowledge.

LIS Educators and Professional Associations:

Integrate AI literacy modules into postgraduate LIS curricula. Develop continuing professional education programmes targeting practising librarians. Establish research networks to generate empirical evidence on technology adoption in African contexts. Advocate for policy reforms prioritising library technology funding.

Policymakers and ICT Regulators:

Integrate academic libraries explicitly into national digital transformation and AI strategies. Support development of national standards for library AI adoption. Address internet connectivity and power supply challenges affecting library operations. Facilitate public-private partnerships to enhance institutional access to AI solutions at reduced cost.

Limitations of the Study

This study is limited to academic libraries in Nigeria's North-East geopolitical zone; findings may not generalise to other regions with different technological landscapes. The cross-sectional design captures a single temporal snapshot and cannot establish causal relationships. Reliance on self-reported perceptions may introduce social desirability bias. The study did not examine specific AI implementations or conduct detailed case studies of early-adopter libraries, which could provide richer contextual insights.

Suggestions for Further Research

Future research should:

1. Conduct longitudinal studies tracking adoption trajectories over time;
2. Undertake in-depth case studies of libraries that have successfully implemented AI systems;
3. Extend investigation to other Nigerian regions and sub-Saharan African contexts;
4. Examine the cost-effectiveness and user satisfaction outcomes of specific AI implementations; and
5. Investigate librarians' changing role perceptions and identity in AI-augmented service environments.

References

- Chen, Y., Kumar, S., & Patel, R. (2023). Machine learning applications in academic library collection development. *Journal of Library and Information Science*, 45(3), 234–251.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340.
- Davis, M., Thompson, L., & Zhang, W. (2023). Organisational factors influencing technology adoption in higher education libraries. *Information Technology and Libraries*, 42(2), 15–32.
- Johnson, P. R., Williams, K. T., & Brown, S. J. (2022). *Artificial intelligence fundamentals: Applications in information services*. Academic Press.
- Kumar, A., & Patel, S. (2023). Opportunities for artificial intelligence in library and information services: A systematic review. *Library Philosophy and Practice*, 1, 1–28.
- Martinez, R., & Lee, S. J. (2023). Barriers to AI adoption in academic libraries: Evidence from developing economies. *Journal of Academic Librarianship*, 49(4), 102652.
- Polit, D. F., & Beck, C. T. (2006). The content validity index: Are you sure? *Research in Nursing & Health*, 29(5), 489–497.
- Smith, J. A., & Johnson, C. D. (2023). Current trends in AI-powered library discovery systems. *College & Research Libraries*, 84(1), 45–67.
- Thompson, R. L. (2023). Integrating artificial intelligence literacy into library science curricula: Challenges and strategies. *Library Education and Practice*, 28(2), 112–129.