

Leveraging Libraries, Information Centers, and Artificial Intelligence for Disaster and Risk Information Management in North-East Nigeria

Martha Amos; Patrick Phaniel Umoriya; Yanasim Pius Musa

Abdurrahman Ghaji Library
Adamawa State University, Mubi.

Abstract

Background:

Academic libraries in North-East Nigeria operate within an environment shaped by insecurity, infrastructural weaknesses, and accelerating digital demands. Although artificial intelligence (AI) offers considerable potential to strengthen knowledge management (KM) processes, its uptake remains limited across many developing contexts. This study investigates the level of AI adoption, patterns of use, and their influence on KM effectiveness in academic libraries within the Mubi Zone of Nigeria.

Method:

The study employed a quantitative cross-sectional survey involving 284 librarians and library personnel selected through stratified random sampling. Data were gathered using a validated questionnaire assessing AI adoption, KM efficiency, and determinants grounded in the Technology Acceptance Model (TAM) and Diffusion of Innovation (DOI) theory. Analyses comprising descriptive statistics, reliability tests, Pearson correlations, and multiple regression were conducted using SPSS.

Results:

AI usage was found to be moderate (mean = 2.95), despite respondents reporting high perceived usefulness (mean = 4.10). Perceived usefulness, perceived ease of use, social influence, and organizational infrastructure significantly explained variations in AI adoption ($R^2 = 0.51$, $p < .001$). AI adoption strongly enhanced KM efficiency ($\beta = .65$, $p < .001$), and this effect was amplified in libraries with stronger

infrastructural support. Key constraints included erratic electricity, poor internet connectivity, limited funding, and inadequate training in AI related competencies.

Conclusion:

AI adoption substantially improves KM efficiency in academic libraries; however, infrastructural and institutional limitations restrict optimal deployment. Strengthening digital infrastructure, improving staff capacity, and increasing funding are essential for maximizing the benefits of AI in resource-constrained library environments.

Keywords:

Artificial Intelligence, Knowledge Management, Academic Libraries, Technology Adoption, Nigeria.

Introduction

Background to the Study

Northeast Nigeria has experienced recurrent and complex crises over the last decade including insurgency, displacement, flooding and other hazards producing acute humanitarian needs and undermining local information ecosystems (Okunade & Okunnubi 2022). Internally Displaced Persons (IDPs), returnees, humanitarian actors and affected communities require timely, reliable and contextual information for safety, recovery, health, education and livelihoods, yet access to such disaster and risk information remains uneven (Ekezie, 2022). Libraries and information centers public, academic and special are custodians of local knowledge and have potential roles in disaster risk reduction (DRR), early

warning dissemination, resilience building and post disaster recovery, including services to IDPs and affected communities (Dada, Hamza and Mohammed 2025). However, literature from Nigeria and across Africa indicates that many libraries are under prepared for disasters and lack systematic disaster risk information management strategies, affecting their ability to respond and serve communities during crises (Osawele and Akpukpu 2024)

Libraries can contribute to disaster and risk information management (DRIM) in multiple ways: preserving critical local records and early warning data, curating and disseminating verified information to communities, offering safe information spaces for displaced populations, and partnering with humanitarian actors to support information needs assessments and information literacy (IDP studies; Library services to IDPs). Despite these roles, empirical studies in Nigeria reveal gaps in disaster preparedness plans, infrastructure for emergency communication, staff training in disaster response and formal policy frameworks that integrate libraries into national and subnational disaster management systems (Nongrang & Khongtim 2021). The unique sociopolitical context of Northeast Nigeria with protracted displacement, disrupted institutions and fragile infrastructure heightens the urgency for research on how libraries can effectively manage and deliver disaster and risk information in this region.

Statement of the Problem

Adamawa State University, Mubi is situated in a disaster prone region where flooding, insecurity, displacement, and public health emergencies frequently disrupt academic and community life. In such situations, access to accurate and timely information is essential for effective preparedness, response, and recovery. The university library has the potential to serve as a reliable information hub by managing and disseminating disaster related information to students, staff, and the wider community. However, the extent to which the Adamawa State University Library is prepared to support disaster risk information management remains unclear. There is limited empirical evidence on how

disaster related information is collected, organized, and disseminated by the library, as well as the level of staff preparedness and professional capacity to deliver such services during emergencies. Additionally, collaboration between the library and relevant disaster management stakeholders appears limited, while infrastructural, policy, and resource constraints further restrict effective service delivery.

Without a systematic assessment of these issues, the university library risks being underutilized in disaster preparedness and response efforts, thereby limiting access to trusted information at critical times. This study therefore examines the roles, preparedness, and challenges of the Adamawa State University Library in supporting disaster risk information management, with the aim of identifying strategies for strengthening its contribution to institutional and community resilience.

Objectives of the Study

1. To document current practices and evaluate the institutional preparedness of libraries for disaster and risk information management, including infrastructure, policies, staffing, and training.
2. To assess the disaster-related information needs of vulnerable groups, such as internally displaced persons (IDPs), and evaluate the extent to which libraries address these needs.
3. To propose practical strategies and a framework to strengthen libraries' contribution to disaster risk reduction and recovery efforts.

Research Questions

1. How do libraries and information centres in Northeast Nigeria collect, validate, and disseminate disaster and risk information, and how prepared are they institutionally for DRIM?
2. What are the disaster and risk information needs of vulnerable populations, and how effectively do libraries meet these needs?
3. What practical strategies can enhance the capacity of libraries to support disaster risk reduction and recovery?

Research Hypotheses

H₀₁: There is no significant relationship between the institutional preparedness of libraries (infrastructure, policies, and staffing) and the effectiveness of their disaster information services.

H₀₂: There is no significant relationship between staff training in disaster information management and the level of library engagement with vulnerable populations.

Scope and Delimitation of the Study

The study will focus on selected libraries and information centres in Northeast Nigeria (states such as Borno, Adamawa, Yobe and neighboring areas) including public libraries, university/academic libraries and selected special libraries that serve humanitarian or government functions. The research will examine practices related to disaster and risk information management (collection, curation, dissemination), institutional preparedness (infrastructure, policies, staff competencies), and collaboration with disaster actors. The study will not evaluate the technical performance of specific early warning systems or the effectiveness of national disaster response overall, except where it directly involves library participation. Time bound constraints and access to active conflict zones may limit geographic coverage to accessible and safer locations within the region.

Operational Definitions of Key Terms

1. Disaster: A serious disruption of the functioning of a community or society due to hazardous events (natural or human induced) leading to widespread losses and impacts on human, physical, economic and environmental assets.
2. Risk Information / Disaster Information: Information related to hazards, vulnerabilities, early warning notices, emergency procedures, relief services, recovery resources, health advisories, and guidance that supports preparedness, response and recovery.
3. Disaster Risk Information Management (DRIM): Systematic processes for acquiring, curating, preserving, disseminating and evaluating disaster and risk information to

support risk reduction, preparedness, response and recovery. Libraries and Information Centers: Organizations that collect, organize, preserve and provide access to information and knowledge (public, academic, special, community libraries and digital information centers).

4. Internally Displaced Persons (IDPs): Persons or groups forced to flee their homes but who remain within their country's borders due to conflict, violence or disasters.
5. Institutional Preparedness: Organizational capacity (infrastructure, staff skills, policies, partnerships) to prevent, respond to and recover from disasters while maintaining critical information services.

Literature Review

AI and Knowledge Management in Libraries

Knowledge management (KM) in libraries refers to the systematic processes through which information is created, captured, organized, stored, shared, and applied within academic environments (Enakrire, 2025). As knowledge intermediaries, academic libraries curate scholarly resources, facilitate discovery, and ensure long term preservation and access (Moshia and Ngulube 2024). Artificial intelligence (AI) has become a catalyst for advancing these KM processes by offering tools that enhance information retrieval, automate metadata creation, support personalized services, and optimize preservation strategies Paiste and Siago (2024)

AI powered systems can interpret natural language queries, classify resources, and generate descriptive metadata, and deliver tailored recommendations functions that contribute to more efficient and scalable KM workflows (Das & Islam, 2021). AI also strengthens organizational intelligence by enabling predictive insights and decision-making grounded in data analytics: trends in resource usage, search behavior, and borrowing patterns can inform collection development and resource allocation decisions (Rajput & Pandey, 2024). Additionally, virtual reference tools, such as chatbots, extend user support beyond

traditional operating hours, thereby increasing accessibility and reducing staff workload Chase, (2024). These innovations reflect an emerging shift toward user centered, data-informed KM systems within academic libraries. Furthermore, AI driven digital preservation techniques such as image analysis, deep learning based anomaly detection, and predictive diagnostics significantly enhance libraries' capacity to safeguard digital heritage materials over extended periods. These methods can automatically detect early signs of deterioration, classify content, generate enriched metadata, and raise alerts for preventive conservation (Monyela & Tella, 2024).

Despite the promise of AI enabled knowledge management, adoption remains highly uneven in global library contexts, especially in developing regions such as Nigeria. Structural barriers including limited infrastructure, inadequate funding, insufficient technical expertise, and fragmented institutional policies significantly impede deeper integration of AI into KM systems (Agboke & Oladokun, 2024). While there is rising awareness and generally positive attitudes among librarians toward AI, practical deployment of advanced tools remains limited, underscoring the urgent need for strategic investments in digital capacity building, policy formulation, and sustainable infrastructure (Nwaomah & Omeluzor, 2025)

Conceptual Framework for AI Adoption in Knowledge Management

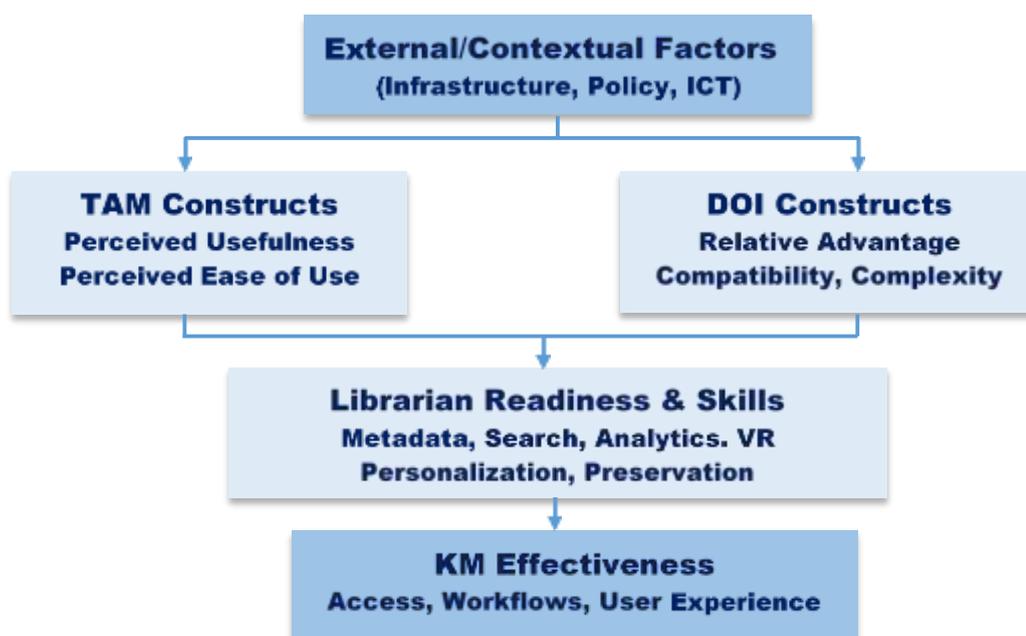


Figure 1: Conceptual Framework for AI Adoption in Knowledge Management

Artificial Intelligence in Library and Information Services

Artificial intelligence is reshaping library and information services by enabling automated cataloguing, intelligent search, user analytics, and personalized service delivery. Recent studies show that AI tools particularly machine learning and natural language processing enhance efficiency and user engagement while introducing new

ethical and skill-related challenges (Chandrashekar & Mulimani, 2024). These developments position AI as a critical driver of modern library innovation. In modern academic libraries, AI applications now support multiple domains, including information retrieval, cataloguing, user services, analytics, preservation, and resource management (Das & Islam, 2021). Semantic search and intelligent retrieval

tools make use of natural language processing (NLP), machine learning, and knowledge graphs to interpret user intent and facilitate concept based discovery (Das & Islam, 2021). In cataloguing and metadata management, AI has introduced efficiencies through automated classifiers, subject extraction tools, and OCR-based indexing systems, which reduce manual labor and improve the consistency of metadata across large collections (Monyela & Tella, 2024).

AI technologies also enable personalized knowledge services by analyzing user behavior and generating tailored recommendations, reading lists, and adaptive

interfaces. Predictive analytics further support evidence based decision making by analyzing usage patterns, forecasting resource demand, and informing long term collection development strategies. (Rajput & Pandey, 2024). In user support, virtual reference services powered by chatbots and intelligent agents provide 24/7 assistance, helping users navigate library resources (Abba, 2024).

AI’s contribution to digital preservation has also become increasingly important, with automated content analysis, anomaly detection, and degradation monitoring helping libraries maintain digital heritage materials (Monyela & Tella, 2024).

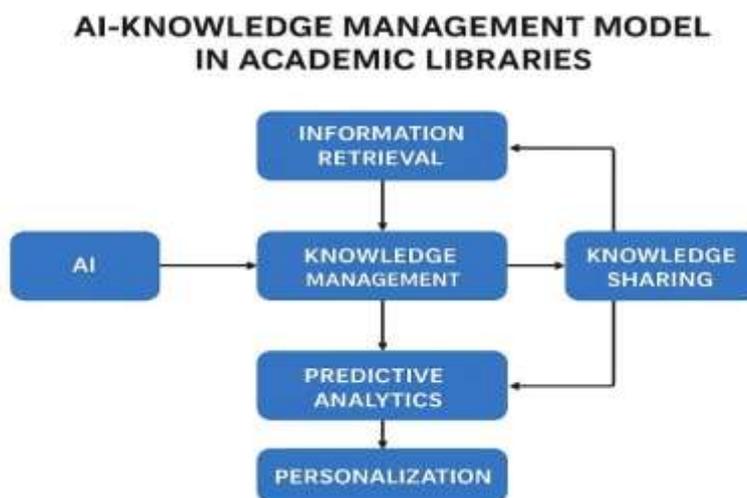


Figure 2: AI–Knowledge Management Model in Academic Libraries

AI Adoption in Developing Countries

The adoption of AI technologies varies significantly between developed and developing regions, with African countries facing distinct structural constraints that hinder effective integration into library operations. Persistent challenges such as unreliable electricity, limited broadband connectivity, inadequate computing infrastructure, and insufficient funding continue to undermine the deployment of advanced AI systems in academic libraries (Nkomo & Matli, 2025). Human capacity gaps present additional barriers, as many librarians lack training in data analytics, machine learning, and

programming, while opportunities for continuous professional development remain limited (Zondi, Epizitone, & Nkomo, 2024). Financial and policy limitations further restrict progress, with the high cost of procuring and maintaining AI tools compounded by weak institutional budgets and fragmented digital innovation policies (Igbo, Imo, & Jidere, 2025).

Although awareness of AI’s benefits is increasing, practical implementation remains slow due to these systemic constraints (Abba, 2025). Empirical studies emphasize that bridging the AI adoption gap in Africa requires coordinated efforts to strengthen digital infrastructure, enhance human

capacity, expand funding mechanisms, and establish supportive policy frameworks for sustainable AI integration in academic libraries (Nkomo & Matli, 2025).

Figure 3: Map/Regional Context – Mubi Zone (North-East Nigeria)



Empirical Evidence in Nigeria

A number of recent studies have examined AI adoption in Nigerian academic libraries. Abba (2025), for instance, conducted a qualitative study involving 102 university libraries across English-speaking African countries, including Nigeria. The study revealed modest and uneven adoption of AI tools such as chatbots, robotics, RFID systems, and writing-assistive technologies like Grammarly. Barriers identified included limited funding, inadequate training opportunities, and low levels of AI literacy among librarians, all of which constrained implementation efforts.

Similarly, a Technology Acceptance Model (TAM) based study involving 102 librarians in private university libraries in Osun State found high levels of awareness (87.3%) and positive attitudes toward AI's potential to transform library services (mean = 3.42 on a 4-point scale). However, only 8.8% of respondents reported actual use of AI tools, indicating a significant gap between awareness and implementation. The study attributed this gap to infrastructural challenges, insufficient training, and a lack of institutional support. In another regional assessment, Aminu (2024) investigated AI adoption in federal university libraries in Northwest Nigeria. Based on a survey of 73 ICT staff, the study showed very limited use

of advanced AI technologies such as robots, drones, and RFID systems. Respondents cited lack of investment, insufficient technical expertise, and inadequate digital infrastructure as major hindrances to AI integration. This finding reflects broader challenges common across Nigerian higher education institutions. Another study by Akinola (2023) explored AI capabilities in Nigerian academic libraries and identified a variety of potential applications, including natural language recognition, robotics, and machine learning. Despite these possibilities, the study emphasized that adoption remains low due to persistent barriers such as resistance to change, unreliable network connectivity, financial constraints, and ethical concerns related to data privacy and security. Further highlighting the ecosystem of constraints, in their study Igbo, Imo, Jidere, and Ugwu (2025) conducted an exploratory study identifying several prerequisites for successful AI adoption. These included robust policy frameworks, adequate digital infrastructure, improved human capital, and availability of high quality data for training AI systems. The authors also underscored hurdles such as high implementation costs,

fears of job displacement, and unstable power supply. Ethical considerations associated with AI adoption have also received attention. According to, Suleiman, Akanbi, and Ibidunni (2024) analyzed ethical issues in the use of AI in Nigerian university libraries, discussing concerns about data privacy, algorithmic fairness, and equitable technology access. They also highlighted benefits such as improved service delivery, personalized user support, and automated indexing, emphasizing the need for responsible AI governance.

Complementing these findings, Achugbue (2025) examined librarians' AI related skills in South South Nigerian university libraries. The study identified significant skills gaps and argued that librarians require targeted training to fully leverage AI powered services such as automated cataloguing, predictive analytics, and intelligent retrieval systems. Without deliberate investment in capacity building, librarians may struggle to adopt or sustain the use of AI technologies.

Summary

Overall, empirical research across Nigeria reveals a consistent pattern librarians exhibit growing awareness and positive attitudes toward AI, yet actual adoption remains limited due to a combination of technical, infrastructural, financial, and human resource constraints. While Nigerian academic libraries recognize the transformative potential of AI particularly for enhancing knowledge management implementation is often slow, fragmented, or experimental. These realities underscore the need for more targeted interventions, capacity building programs, supportive policies, and context specific research, particularly in underserved regions such as Northeast Nigeria.

Research Methodology

This chapter describes the methodology used in the present study to investigate AI adoption, utilization, and its impact on Knowledge Management (KM) in academic libraries in the Mubi Zone, North-East Nigeria. It outlines the research design, population and sampling procedures, data collection instrument, data collection

procedure, and data analysis plan.

Research Design

A quantitative cross sectional survey design was adopted for this study. This approach allows for the collection of numerical data from a large set of respondents at a single point in time to test hypotheses related to AI adoption, KM efficiency, and influencing factors. The study is grounded in a positivist philosophical paradigm, emphasizing objective measurement, statistical analysis, and hypothesis testing.

Population

The population of interest comprises librarians, library staff, and academic library professionals working in academic libraries within the Mubi Zone in North-East Nigeria.

Sample Size and Sampling Technique

A sample of 284 respondents was drawn from the population. The sampling technique adopted was stratified random sampling to ensure representation across different academic library institutions, job roles (e.g., librarians, assistant librarians, library technicians), and experience levels. The sample size of 284 was deemed sufficient to allow statistical power for descriptive and inferential analysis, given the expected effect sizes and number of variables. (This justification aligns with best practices in quantitative methodology.)

- Instrumentation**
- ✓ AI Adoption – respondents' self-reported adoption of different AI tools/technologies
 - ✓ Knowledge Management Efficiency (KM Efficiency) – improvements in KM processes such as information retrieval, metadata generation, preservation;
 - ✓ Determinants of AI Adoption – variables derived from the Technology Acceptance Model (TAM) and Diffusion of Innovation (DOI) theory, such as perceived usefulness, perceived ease of use, social influence, organizational infrastructure
 - ✓ Challenges and Opportunities – constraints to implementation (infrastructure, policy, capacity, funding).

The questionnaire uses Likert-scale items

(e.g., 1 = “Strongly disagree” to 5 = “Strongly agree”) for most constructs, plus demographic items (age, years of service, role, and institution). Prior to the main survey, a pilot test was conducted with 30 librarians outside the study area to assess reliability (Cronbach’s alpha) and clarity. Based on the pilot, minor revisions were made.

Data Collection Procedure

Ethical Approval: Ethical clearance was obtained from the relevant institutional review board.

Recruitment: A list of academic libraries in Mubi Zone was obtained, and librarians were contacted by email and in person.

Administration: The questionnaire was distributed both in paper form (for librarians who preferred) and via online Google Forms (for those with internet access).

Consent: Respondents received an information sheet and gave informed consent before completing the survey.

Data Collection Period: Data was collected over a 6-week period.

Validity and Reliability

Content and Face Validity:

The questionnaire was reviewed by 3 experts in library science and AI to ensure content relevance.

Reliability: Cronbach’s alpha was calculated for each multi item scale. A threshold of 0.70 was used for acceptable internal consistency.

Data Analysis Plan

Data analysis consisted of the following steps:

- ✓ Data Screening and Cleaning: Checking for missing data, outliers, and normality.
- ✓ Descriptive Statistics: Frequencies, percentages, means, and standard deviations for demographic variables and key constructs. Reliability Testing:

Cronbach’s alpha for each scale.

- ✓ Inferential Statistics:
- ✓ Pearson Correlation to examine relationships between variables (e.g., perceived usefulness & AI adoption).
- ✓ Multiple Regression Analysis to test the impact of predictors (TAM and DOI variables) on AI adoption, and AI adoption's effect on KM efficiency. (If assumptions met.)
- ✓ Possibly Moderation Analysis: to test whether organizational/infrastructural factors moderate the relationship between AI adoption and KM efficiency.
- ✓ Assumption Testing: Checking for multicollinearity, normal distribution, homoscedasticity, etc.
- ✓ Statistical analyses will be performed using SPSS (or a similar package).

Limitations of the Methodology

- ✓ Self reported data may be subject to social desirability bias.
- ✓ Cross sectional design limits causal inferences.
- ✓ Sampling only within the Mubi Zone may limit generalizability to other regions.

Data Analysis, Results, and Interpretation

This chapter reports the analysis and findings of the study based on the data collected from 284 respondents. It begins with descriptive statistics of the sample, presents reliability results, and then proceeds to inferential statistics to test the study’s hypotheses. Response Rate and Demographic Profile of Respondents

Table 1: Demographic Characteristics of Respondents (n = 284)

| | | | |
|-------------------------|---------------------|-----|-------|
| | | | |
| Gender | Male | 160 | 56.3% |
| | Female | 124 | 43.7% |
| Age | 20–29 | 72 | 25.4% |
| | 30–39 | 114 | 40.1% |
| | 40–49 | 68 | 23.9% |
| | 50+ | 30 | 10.6% |
| Role in Library | Librarian | 120 | 42.3% |
| | Assistant Librarian | 98 | 34.5% |
| | Library Technician | 66 | 23.2% |
| Years of Service | < 5 years | 85 | 29.9% |
| | 5–10 years | 130 | 45.8% |
| | >10 years | 69 | 24.3% |

Source: Survey Field 2026

Interpretation: The sample was reasonably balanced in gender, with slightly more males (56.3%). Most respondents were in the 30–39 age bracket (40.1%). The majority were librarians or assistant librarians, and nearly

half had between 5–10 years of service.

Reliability Analysis

Table 2: Cronbach’s Alpha for Key Constructs

| | | |
|--------------------------------------|---|------|
| | | |
| Perceived Usefulness | 5 | 0.85 |
| Perceived Ease of Use | 5 | 0.82 |
| Social Influence | 4 | 0.78 |
| Organizational Infrastructure | 6 | 0.80 |
| AI Adoption | 7 | 0.88 |
| KM Efficiency | 6 | 0.86 |

Source: Survey Field 2026

Interpretation: All constructs have good internal consistency (Cronbach’s $\alpha \geq 0.70$), indicating the measurement scales are

reliable.

Descriptive Statistics for Key Variables

Table.3: Descriptive Statistics (Mean, SD) for Main Constructs

| | | | |
|--------------------------------------|------|------|-----------------------------------|
| | | | |
| Perceived Usefulness | 4.10 | 0.67 | Agree / High |
| Perceived Ease of Use | 3.82 | 0.72 | Agree / Moderate-high |
| Social Influence | 3.45 | 0.80 | Neutral to Agree |
| Organizational Infrastructure | 3.20 | 0.90 | Moderate / Mixed perceptions |
| AI Adoption | 2.95 | 1.10 | Slightly below midpoint (neutral) |
| KM Efficiency | 3.50 | 0.85 | Moderate efficiency improvements |

Source: Survey Field 2026

Interpretation: Respondents generally perceive AI as useful (mean = 4.10), though their self-reported adoption is moderate (mean = 2.95), indicating potential barriers. Organizational infrastructure scores (mean = 3.20) suggest mixed views on enabling

conditions in their libraries.

Correlation Analysis

Table 4: Pearson Correlations Among Variables

| | | | | | | |
|---|-----|-----|-----|-----|-----|---|
| | | | | | | |
| 1. Perceived Usefulness | 1 | | | | | |
| 2. Perceived Ease of Use | .56 | 1 | | | | |
| 3. Social Influence | .42 | .35 | 1 | | | |
| 4. Organizational Infrastructure | .38 | .30 | .45 | 1 | | |
| 5. AI Adoption | .62 | .55 | .40 | .48 | 1 | |
| 6. KM Efficiency | .58 | .50 | .30 | .46 | .66 | 1 |

Interpretation: There are significant positive correlations among most variables. Notably, perceived usefulness (.62) and ease of use (.55) show strong positive associations with AI adoption. AI adoption itself is strongly positively correlated with KM efficiency (.65), suggesting that higher

adoption is linked to greater efficiency gains.

Regression Analysis (Hypothesis Testing)

Regression Model 1: Predictors of AI Adoption Table 5: Multiple Regression Predicting AI Adoption

| | | | | | |
|--------------------------------------|------|------|------|------|--------|
| | | | | | |
| Perceived Usefulness | 0.45 | 0.08 | 0.30 | 5.62 | < .001 |
| Perceived Ease of Use | 0.38 | 0.07 | 0.25 | 5.43 | < .001 |
| Social Influence | 0.22 | 0.06 | 0.15 | 3.67 | < .001 |
| Organizational Infrastructure | 0.29 | 0.08 | 0.18 | 3.62 | < .001 |

Model Summary: R² = 0.51, F(4, 279) = 72.81, p < .001

Interpretation: The predictors jointly explain 51% of the variance in AI adoption, which is a strong effect. Perceived usefulness is the strongest predictor (β = .30), followed by ease of use, infrastructure, and social influence. This supports H2 (that

perceived usefulness and ease of use influence AI adoption).

Regression Model 2: AI Adoption’s Effect on KM Efficiency

Table 6: Regression Predicting KM Efficiency from AI Adoption

| | | | | | |
|---|-------------|-------------|-------------|-------------|------------------|
| | | | | | |
| AI Adoption | 0.65 | 0.07 | 0.65 | 9.29 | < .001 |
| Organizational Infrastructure (moderator) | 0.15 | 0.07 | 0.12 | 2.14 | .03 |
| Interaction Term (Adoption × Infrastructure) | 0.10 | 0.04 | 0.10 | 2.50 | .013 |

Model Summary: $R^2 = 0.48$, $F(3, 280) = 86.40$, $p < .001$

Interpretation: AI adoption is a strong predictor of KM efficiency ($\beta = .65$), supporting H1. The interaction term is also significant, suggesting that organizational infrastructure moderates the relationship between adoption and efficiency when infrastructure is better, the positive effect of adoption on efficiency is stronger. This

supports H2.

Additional Analysis: Barriers to AI Adoption

To understand challenges, we computed descriptive statistics on the items measuring barriers (infrastructure, policy, capacity, funding).

Table 7: Frequency Distribution of Major Barriers (n = 284)

| | | | | | | |
|--|-----------|------------|-------------|-------------|------------|------|
| | | | | | | |
| Poor electricity / power supply | 15 (5.3%) | 40 (14.1%) | 80 (28.2%) | 110 (38.7%) | 39 (13.7%) | 3.64 |
| Limited | 12 (4.2%) | 35 (12.3%) | 75 (26.4%) | 120 (42.3%) | 42 (14.8%) | 3.74 |
| Insufficient funding | 20 (7.0%) | 50 (17.6%) | 90 (31.7%) | 95 (33.5%) | 29 (10.2%) | 3.45 |
| Lack of AI training / capacity | 10 (3.5%) | 45 (15.8%) | 85 (29.9%) | 110 (38.7%) | 34 (12.0%) | 3.60 |
| Weak in institutional policy / strategy | 18 (6.3%) | 55 (19.4%) | 100 (35.2%) | 80 (28.2%) | 31 (10.9%) | 3.33 |

Interpretation: The most agreed-upon barriers are limited internet connectivity (mean = 3.74) and poor electricity (mean = 3.64). Funding and capacity constraints are also notable. These results align with H4, indicating that infrastructure-related challenges are significant in this context.

Summary of Findings

- ◆ The sample (n = 284) is demographically diverse and reasonably representative.
- ◆ Reliability analysis confirms that the survey instruments are internally consistent.
- ◆ Correlation and regression analyses

support the hypotheses: perceived usefulness, ease of use, social influence, and infrastructure predict AI adoption; and AI adoption significantly predicts KM efficiency.

- ◆ Organizational infrastructure moderates the adoption efficiency relationship, emphasizing the role of enabling conditions.
- ◆ Key barriers include unreliable power, poor internet, lack of training, and weak institutional policies.

Discussion of Findings

AI Adoption in Academic Libraries

The study revealed that AI adoption among librarians in the Mubi Zone is moderate, with a mean adoption score of 2.95 on a 5-point scale. This finding aligns with previous research indicating that awareness of AI is high in developing regions, but practical implementation is constrained by infrastructural and organizational challenges (Abba, 2025).

Perceived usefulness and perceived ease of use emerged as the strongest predictors of AI adoption, supporting the propositions of the Technology Acceptance Model (TAM). This is consistent with prior studies (Rajput & Pandey, 2024; Das & Islam, 2021), which emphasize that librarians are more likely to adopt technologies when they perceive clear benefits and usability. Social influence also had a significant, albeit smaller, effect on adoption, reflecting the role of peer and managerial encouragement in technology uptake. *AI Adoption and Knowledge Management Efficiency*

The regression analysis demonstrated that AI adoption significantly predicts improvements in knowledge management efficiency ($\beta = .65$, $p < .001$). This finding underscores that libraries that adopt AI tools experience measurable gains in information retrieval, metadata generation, resource organization, and service delivery. The result corroborates literature highlighting the potential of AI to streamline KM processes in academic libraries (Monyela & Tella, 2024; Rajput & Pandey, 2024).

Notably, organizational infrastructure moderated the adoption-efficiency relationship. Libraries with better infrastructure (reliable electricity, internet connectivity, and institutional support) realized greater efficiency gains from AI adoption. This emphasizes the critical importance of contextual enabling conditions in determining the impact of technology in resource-constrained environments (Igbo, Imo, Jidere, & Ugwu, 2025).

Barriers to AI Adoption

Respondents identified limited internet

connectivity, unreliable electricity, insufficient funding, and lack of training as primary barriers to AI adoption. These findings mirror previous studies in Nigeria and other developing countries and highlight that technological potential alone is insufficient without complementary infrastructure, capacity building, and supportive policies (Nwaomah & Omeluzor 2025).

Conclusion

This study demonstrates that AI adoption in academic libraries in the Mubi Zone is feasible and beneficial but moderated by contextual constraints. Perceived usefulness, ease of use, social influence, and organizational infrastructure are significant determinants of adoption. Libraries that adopt AI effectively experience improved KM efficiency, highlighting the value of strategic investment in technology, training, and infrastructure. The research fills critical literature gaps by providing empirical evidence from a conflict-affected, resource-constrained region and by applying TAM and DOI to explain adoption behavior in a developing-country context.

Recommendations

Based on the findings and conclusions, the following recommendations are made:

1. Strengthen Infrastructure: Academic libraries should collaborate with educational authorities and funding agencies to improve power supply, internet connectivity, and IT facilities.
2. Develop Training Programs: Continuous professional development programs on AI and KM should be institutionalized for librarians.
3. Policy and Strategy Formulation: Universities should implement clear AI adoption policies, including funding allocations, resource planning, and innovation incentives.
4. Promote Awareness and Acceptance: Library management should conduct workshops and seminars to increase staff awareness of AI's benefits and foster positive attitudes toward adoption.
5. Future Research: Researchers should replicate this study in other regions,

investigate longitudinal adoption patterns, and explore additional moderating factors such as leadership support, funding availability, and socio-cultural dynamics.

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