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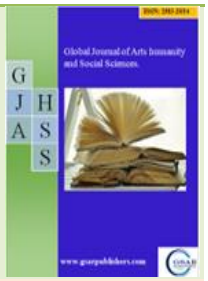

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Artificial Intelligence Adoption and Its Effects on Research Support and Knowledge Management in Nigerian University Libraries: Evidence from the Mubi Zone

By

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Abstract

Purpose:*This study investigates the impact of Artificial Intelligence (AI) tools on research support and knowledge management in university libraries within the Mubi Zone of Adamawa State, Nigeria.*

Design/Methodology/Approach: *A descriptive survey design was used. Data were collected from 120 library personnel across Adamawa State University, Federal Polytechnic Mubi, and Federal University of Agriculture Mubi using questionnaires and interviews. Descriptive and inferential analyses, including ANOVA and correlation tests, were applied.*

Findings: *Results revealed moderate AI adoption, mainly in plagiarism detection, intelligent retrieval, and chatbots. AI tools significantly improved research support efficiency and knowledge management quality, though infrastructural and skill-related gaps remain.*

Practical Implications: *Findings highlight the need for institutional investment in AI infrastructure and librarian capacity building to enhance research and knowledge management services.*

Originality/Value: *Provides empirical evidence on AI-driven transformation of Nigerian university libraries—a relatively underexplored context in Africa.*

Keywords: Artificial Intelligence; Research Support; Knowledge Management; University Libraries; Technology Adoption; Mubi Zone; Nigeria

INTRODUCTION

Background of the Study

In the 21st century, the integration of Artificial Intelligence (AI) into library and information services has transformed how knowledge is created, organized, retrieved, and disseminated. Globally, academic libraries are increasingly turning to AI driven systems such as intelligent cataloguing tools, machine learning based recommendation engines, and automated reference services to enhance research support and knowledge management (Lima & Aganette 2025). These technologies have redefined traditional roles of librarians moving them from mere custodians of information resources to facilitators of digital intelligence and data driven innovation.

In developed regions such as North America and Europe, AI tools have been incorporated into core research support functions like automated literature searches, citation analytics, plagiarism detection, and personalized information delivery (Biagini, 2025). Platforms such as ChatGPT, Elicit, Semantic Scholar, and Iris.ai now support researchers by analyzing massive data and suggesting contextually relevant materials, thus reducing time spent on information retrieval and review. Similarly, knowledge management systems in libraries increasingly leverage natural language processing (NLP), predictive analytics, and big data to preserve institutional memory and facilitate seamless knowledge sharing among researchers.

Across Africa, however, adoption has been gradual and uneven. Many university libraries face infrastructure challenges, digital skill gaps, and funding constraints that limit their readiness for AI integration (Ibrahim, 2024). Nonetheless, there is growing interest among African librarians to adopt AI to enhance efficiency and decision-making. Institutions in South Africa, Kenya, and Ghana, for example, have begun experimenting with AI chatbots, smart catalogues, and digital preservation systems (Marone and Mbengue 2025). These efforts signify a paradigm shift toward technology-driven knowledge ecosystems on the continent.

In Nigeria, academic libraries remain the backbone of research and learning, yet they often operate below optimal technological capacity. Despite efforts by the National Universities Commission (NUC) to promote ICT-driven library services, the adoption of AI in most university libraries is still at its infancy (Ifijeh & Yusuf, 2022). Factors such as limited awareness, poor infrastructure, and low digital literacy have impeded progress. However, pioneering institutions particularly in the northern region are beginning to explore AI applications for cataloguing, digital reference, plagiarism detection, and knowledge repository management (Abba, 2024).

Within the Mubi Zone comprising institutions like Adamawa State University (ADSU), Federal Polytechnic Mubi (FPM), and Federal University of Agriculture Mubi (FUAM) there is emerging interest in integrating AI tools into research support and knowledge management. These libraries increasingly face pressure to provide faster, more intelligent, and research-responsive services to faculty and students. Yet, little is known about the actual impact of these AI applications on the quality of research support and knowledge management outcomes in the region. This study, therefore, seeks to assess the influence of AI tools on research support and knowledge management in university libraries within Mubi Zone, Nigeria.

Problem Statement

Artificial Intelligence has become a critical driver of modern information services globally, enabling libraries to deliver intelligent, adaptive, and personalized research support. However, in Nigeria and particularly in the Mubi Zone the extent to which AI tools have been adopted and the measurable impact on library performance remain poorly documented. While anecdotal evidence suggests increasing use of AI-powered databases, plagiarism checkers, and recommendation tools, most libraries still rely on traditional systems. Problems such as poor ICT infrastructure, limited technical expertise among librarians, and inadequate funding hinder effective deployment of AI. Moreover, there is limited empirical evidence showing how AI tools contribute to research productivity, knowledge creation, or the overall management of institutional knowledge.

This gap in knowledge has made it difficult for policymakers, university administrators, and librarians to justify further investments in AI technologies. Hence, this study was motivated by the need to provide data-driven evidence on the impact of AI tools on research support and knowledge management in university libraries within the Mubi Zone.

Objectives of the Study

General Objective

To assess the impact of Artificial Intelligence (AI) tools on research support and knowledge management in university libraries within Mubi Zone, Nigeria.

Specific Objectives

1. To identify the types of AI tools used in university libraries within Mubi Zone.
2. To evaluate the extent to which AI tools influence research support services in these libraries.
3. To assess how AI tools enhance knowledge management practices among librarians.
4. To determine librarians' perceptions and readiness toward AI adoption.
5. To test whether there are significant differences among institutions in the application of AI tools for research support and knowledge management.

Research Questions

1. What types of AI tools are currently used in university libraries within Mubi Zone?
2. To what extent do AI tools influence research support services in these libraries?
3. How do AI tools enhance knowledge management practices among librarians?
4. What are the perceptions and levels of readiness of librarians toward AI adoption?
5. Are there institutional differences in the use and impact of AI tools across the Mubi Zone universities?

Research Hypotheses

Null Hypotheses (H_0):

There is no significant relationship between the use of AI tools and the effectiveness of research support services in university libraries within Mubi Zone.

There is no significant relationship between AI tools and knowledge management practices in these libraries.

There is no significant difference among the three institutions in their adoption and application of AI tools.

Alternate Hypotheses (H_1):

There is a significant relationship between the use of AI tools and the effectiveness of research support services in university libraries within Mubi Zone.

There is a significant relationship between AI tools and knowledge management practices in these libraries.

There is a significant difference among the three institutions in their adoption and application of AI tools.

Significance of the Study

This study is significant in several ways. For university librarians, it will provide empirical insight into how AI tools can optimize research support and streamline knowledge management. For management and policymakers, the findings will guide evidence-

based decision-making and resource allocation for technological innovation in libraries. For academia and researchers, it contributes to the growing body of knowledge on AI integration in library and information science, particularly in developing contexts.

Furthermore, the study will serve as a benchmark for other institutions in Nigeria and sub-Saharan Africa aiming to integrate AI in library operations. It will also highlight the challenges and opportunities in adopting emerging technologies to strengthen academic research ecosystems.

Scope and Limitations of the Study

The study is confined to university and polytechnic libraries in Mubi Zone, specifically Adamawa State University (ADSU), Federal Polytechnic Mubi (FPM), and Federal University of Agriculture Mubi (FUAM). It focuses on librarians and library staff as respondents, totaling 130 participants (56 from ADSU, 52 from FPM, and 22 from FUAM).

The thematic scope covers AI tools, research support, and knowledge management. Limitations may arise from respondents' limited exposure to certain AI systems and from logistical challenges in data collection across institutions. However, these will be mitigated through a combination of on-site and online data collection and triangulation methods.

Definition of Key Terms

Artificial Intelligence (AI) Tools: Computer systems that perform tasks normally requiring human intelligence such as reasoning, learning, decision-making, and problem-solving used in libraries for cataloguing, search optimization, and reference services.

Research Support: Library-based services that assist researchers in discovering, accessing, managing, and disseminating scholarly information effectively.

Knowledge Management: Systematic process of capturing, storing, sharing, and utilizing institutional knowledge to enhance decision-making and organizational performance.

University Library: An academic institution's information center that supports teaching, learning, and research by providing access to various knowledge resources and digital technologies.

Mubi Zone: A cluster of higher education institutions in Mubi, Adamawa State, Nigeria, including ADSU, FPM, and FUAM, known for collaborative educational and research initiatives.

REVIEW OF RELATED LITERATURE

Artificial Intelligence Tools in Libraries

Artificial Intelligence (AI) refers to computer-based systems capable of performing tasks traditionally requiring human cognition such as learning, reasoning, problem-solving, and natural language processing. In the context of academic libraries, AI tools may include machine-learning-based recommendation engines, chatbots for reference services, predictive analytics for resource usage, automated cataloguing systems, and natural language processing (NLP) enabled discovery platforms (Ibrahim, 2024). The integration of such tools offers significant benefits: automation of routine workflows (e.g., metadata creation), enhancement of user interactions (e.g., chatbots, personalized alerts), improved discoverability of resources (semantic search), and data-driven decision-making (Abba, 2024).

However, several challenges persist: data privacy and ethical concerns, algorithmic transparency, staff competencies, infrastructural readiness, cost of deployment and maintenance (Ifijeh & Yusuf, 2022). In the African and Nigerian contexts in particular, the application of AI in libraries is still emergent many institutions have implemented traditional automation (OPACs, basic digital catalogues) but less so advanced AI tools (Abba, 2024).

Research Support Services in Academic Libraries

Research support services involve a set of activities through which academic libraries assist faculty, postgraduate students, and undergraduate researchers across the research lifecycle. Typical services include literature searching and retrieval, reference consultations, bibliographic and citation management, data management support, publication assistance (including open access/institutional repositories), training for researcher skills, and liaison roles (Otuza & Anasi, 2023). With the advent of AI tools, libraries now have opportunities to automate parts of these services for example by offering intelligent literature discovery (via semantic search), automated summarization of large text corpora, recommendation of relevant research outputs, plagiarism detection, and analytics of research metrics (Mhlanga, 2023).

Despite these opportunities, in developing country contexts librarians often face constraints: limited staffing/training, inadequate infrastructure, changing demands of research (open science, big data), and integration of AI tools remains limited (Tunmibi & Okuonghae, 2024).

Knowledge Management in University Libraries

Knowledge Management (KM) refers to the processes by which organizations create, capture, store, share and utilize both tacit and explicit knowledge in order to enhance performance. In academic libraries, KM involves capturing institutional memory (such as research output, user behavior, workflows of librarians), developing knowledge maps/taxonomies, enabling knowledge sharing among staff and with users, managing digital repositories (institutional, subject), facilitating reuse of knowledge to improve services (Edewor & Osuchukwu, 2023). The synergy between AI tools and KM is strong: AI supports KM by automating metadata generation, enabling knowledge discovery through semantic tools, recommendation of related knowledge resources, and building intelligent knowledge networks (Adebayo et al., 2022).

Yet, the literature from Nigeria shows that KM practices in libraries are under-developed due to scarce resources, insufficient culture of knowledge sharing, limited ICT infrastructure and low staff competence (Lwoga & Ngulube, 2021; Ifijeh & Yusuf, 2022).

Relationship between AI Tools, Research Support and Knowledge Management

Conceptually, the adoption of AI tools in academic libraries (the independent variable) is expected to influence two dependent variables: (i) the effectiveness of research support services, and (ii) the strength of knowledge management practices. AI tools enhance research support by enabling more sophisticated discovery, personalized services, automated assistance, and analytics of research behaviour. Simultaneously, they facilitate KM by improving capture, classification, retrieval, and sharing of institutional knowledge. Importantly, effective research support and strong KM practices are inter-linked: robust KM infrastructures enable libraries to provide better research support (by retaining institutional knowledge, understanding user behaviour, streamlining workflows) and enhanced research support generates new knowledge which must be managed (KM).

Thus there is a synergistic relationship: AI tools → improved research support → stronger KM → sustained library innovation (Alagbe & Adedokun, 2023; Abba, 2024). Furthermore, in the developing context of Nigeria, institutional readiness (infrastructure, staff skills, policy) moderate the relationship—hence the need for this focused empirical study in the Mubi Zone.

THEORETICAL FRAMEWORK

Technology Acceptance Model (TAM) – Davis (1989)

The Technology Acceptance Model (TAM) by Fred Davis proposes that the acceptance and actual use of a new technology by an individual are driven primarily by two beliefs: Perceived Usefulness (PU) the degree to which a person believes that using a particular system will enhance their job performance; and Perceived Ease of Use (PEOU) the degree to which a person believes that using the system will be free of effort. These beliefs influence attitude toward using the system, which in turn influences behavioral intention to use, and finally actual system use (Davis, 1989). For this study, librarians' acceptance of AI tools in university libraries is modelled through TAM: they will adopt AI tools if they believe those tools are useful for research support and KM (PU) and easy to use given their skills and infrastructure (PEOU). Prior studies in library contexts affirm TAM's relevance (Ukwoma & Ogbodo, 2023; Zhou & Li, 2023).

Diffusion of Innovation Theory (DOI) – Rogers (2003)

The Diffusion of Innovation (DOI) Theory by Everett Rogers describes how new ideas and technologies spread within a social system over time. Key elements include: the innovation itself, communication channels, time, and social system. Rogers identifies adopter categories (innovators, early adopters, early majority, late majority, laggards) and innovation-attributes: relative advantage, compatibility, complexity, trialability, and observability. The rate and extent of adoption are influenced by how potential adopters perceive these attributes (Rogers, 2003). In this study, AI tools in university libraries are treated as innovations; their adoption in the Mubi Zone is influenced by librarians' perceptions (TAM) but also by institutional factors (DOI): how compatible the AI tools are with existing workflows, how complex they are to use, whether they can be trialled, and whether their benefits are observable. Prior African studies apply DOI to library technology adoption (Adebayo et al., 2022).

Combining TAM (micro-level user acceptance) with DOI (macro-level institutional diffusion) gives a holistic theoretical lens for investigating AI adoption, research support services, and KM in university libraries.

Empirical Review (2020–2025)

A number of recent empirical studies between 2020 and 2025 have examined the adoption, perceptions, and impacts of Artificial Intelligence (AI) in university library services, particularly in the Nigerian and global academic contexts. These studies provide insights into librarians' competencies, infrastructural readiness, and the influence of AI tools on knowledge management and research support services.

According to, Eiriemiokhale and Sulyman (2023) conducted a study on awareness and perceptions of AI among librarians in university libraries in Kwara State, Nigeria. The descriptive survey involved a census of thirty-seven professional librarians from the University of Ilorin and Kwara State University. Using structured questionnaires, data were analyzed through frequencies, percentages, and mean scores. Findings revealed that librarians were aware of several AI tools—such as chatbots and Dynamed and held positive attitudes toward their potential to reduce manual workload, provide personalized information services, and facilitate knowledge discovery. However, challenges such as poor internet connectivity and lack of AI expertise among library staff limited effective adoption. The study implies that while librarians demonstrate readiness and awareness, infrastructural and capacity constraints remain significant barriers, echoing the relevance of investigating AI adoption impacts in other Nigerian university contexts like Mubi Zone.

Similarly, Fabunmi (2024) explored the influence of AI on library services and user experience at the Federal University of Technology, Akure. Employing a descriptive survey design, questionnaires were administered to both library staff and users to evaluate the level of AI's impact on service delivery. Results showed that AI exerted a very high influence on library operations and user experiences, particularly through automation of cataloguing and circulation, use of data analytics in management decisions, and improved accessibility of scholarly resources. AI was also associated with enhanced research productivity and user satisfaction. This evidence reinforces the position that AI integration can significantly improve efficiency and user engagement, further validating the need for empirical assessment in other regional libraries, including Mubi Zone institutions.

At the global level, Islam, Ahmad, Hu, Ashiq, and Saky (2025) provided a comprehensive bibliometric analysis of AI applications in academic libraries using data from 354 Scopus-indexed publications between 2010 and 2023. The researchers employed Bibliometrix, VOSviewer, and Excel tools to map authorship trends, thematic clusters, and collaboration patterns. Findings revealed an exponential rise in AI-focused library research, with major contributions from China, the United States, and India.

Prominent themes included AI integration in library services, data mining, user personalization, and intelligent knowledge organization. Importantly, the study identified a dearth of empirical research from developing countries, particularly in Africa. This finding underscores a significant knowledge gap that this present study—focused on Mubi Zone academic libraries—seeks to address by providing region-specific empirical evidence.

In another Nigerian context, Achugbue (2024) examined AI competencies among librarians in South-South Nigerian universities in a study titled *Artificial Intelligence and the Future of Academic Library Services*. Using a structured questionnaire survey, the researcher assessed librarians' familiarity with AI applications such as automated cataloguing, digital resource management, and predictive analytics. Findings indicated low AI competency levels among librarians, with major barriers being lack of technical training, inadequate infrastructure, and absence of institutional strategies for AI integration. Despite recognizing the benefits of AI—such as enhanced service delivery and improved user experience—respondents emphasized the urgent need for continuous professional development. The study highlights human capacity as a crucial determinant of AI adoption success, a dimension that is also central to the current research on AI readiness and impact in Mubi Zone libraries.

Complementing these findings, Emezaiwakpor, Idiodi, and Urhiewhu (2023) investigated the use of AI in academic library service delivery in Nigeria. Adopting a survey design, the study examined the deployment of AI tools in reference, readers' services, cataloguing, classification, and serial control. Data analysis revealed that while awareness of AI applications existed, actual usage was minimal due to inadequate funding, insufficient technical knowledge, and weak government support. Nevertheless, the study affirmed the transformative potential of AI in enhancing service quality, personalization, and efficiency. The authors concluded that the gap between potential and practical implementation must be addressed through targeted policy interventions and capacity-building initiatives, reinforcing the rationale for the present study to focus on measuring *impact* rather than mere *adoption*.

Furthermore, Yusuf (2025) explored the relationship between knowledge management (KM) practices and librarians' AI competencies in Nigerian university libraries. Employing a survey method and regression analysis, the study examined how KM practices—such as knowledge sharing, digital repository management, and taxonomy development—relate to librarians' AI proficiency. Results indicated a strong positive correlation ($R = 0.78$) between KM practices and AI competencies, suggesting that librarians engaged in active knowledge management are more likely to develop higher AI competence. This finding implies that AI adoption and effective KM are mutually reinforcing processes. For the current research, this relationship provides a conceptual foundation for exploring how AI tools directly influence knowledge management and research support functions in academic libraries within Mubi Zone.

Overall, the reviewed empirical studies reveal that while awareness and positive perceptions toward AI in academic libraries are increasing, challenges related to infrastructure, skills, and institutional strategy remain prevalent. The reviewed literature demonstrates consistent acknowledgment of AI's potential to enhance library efficiency, user experience, and knowledge management, but also highlights the unevenness of adoption across regions and institutions. Consequently, the current study aims to provide empirical evidence on the extent, effectiveness, and impact of AI tool integration in research support and knowledge management in Mubi Zone academic libraries—addressing a critical gap identified in both Nigerian and global contexts.

SUMMARY OF LITERATURE GAP

The reviewed studies confirm the growing global and regional attention to AI in library contexts, especially in research support and knowledge management. However, two major gaps persist: first, most empirical evidence comes from developed countries or general higher-education settings rather than university libraries in Northern Nigeria (such as the Mubi Zone). Second, while many studies address awareness, perceptions or readiness, relatively fewer robust quantitative studies examine the direct measurable impact of AI tools on both research support services *and* knowledge management practices in university libraries. This study addresses these gaps by empirically assessing the impact of AI tools in university libraries in the Mubi Zone.

RESEARCH METHODOLOGY

Research Design

This study adopted the descriptive survey research design, which is appropriate for studies that seek to describe, assess, and interpret existing conditions, practices, or opinions of a population. According to Creswell and Creswell (2023), descriptive survey design enables researchers to gather data from a relatively large sample and generalize the findings to a population. The design was chosen because the study aims to assess the impact of AI tools on research support and knowledge management as they currently exist in university libraries within the Mubi Zone. The design allowed the researcher to collect quantitative and qualitative data through structured questionnaires and semi-structured interviews, providing both statistical and narrative insights into librarians' experiences with AI technologies.

Population of the Study

The population of this study comprised all professional and paraprofessional librarians and library staff working in the three major tertiary institutions located within the Mubi Zone of Adamawa State, Nigeria. These include:

1. Adamawa State University, Mubi (ADSU)
2. Federal Polytechnic, Mubi (FPM)
3. Federal University of Agriculture, Mubi (FUAM)

The total population of library personnel across these institutions was 130 as at 2025, distributed as follows:

1. ADSU Library – 56 staff
2. FPM Library – 48 staff

3. FUAM Library – 26 staff

This full population served as the sampling frame for the study.

Sample Size and Sampling Technique

Given the manageable population size of 120, the study adopted a census approach (attempting to include all staff) while applying stratified random sampling to ensure proportional representation from each institution. Stratification was based on institutional affiliation to guarantee that data reflected the diversity of experience and technological exposure among librarians across the Mubi Zone.

Thus, the study sample was proportionately distributed as:

1. ADSU: 56 respondents
2. FPM: 48 respondents
3. FUAM: 26 respondents

A total of 130 questionnaires were distributed, out of which 120 valid responses were retrieved, representing a 92.3% response rate, which was considered adequate for data analysis.

Research Instruments

Two major instruments were used for data collection:

Structured Questionnaire: The questionnaire was designed to elicit quantitative data on AI adoption, research support, and knowledge management practices. It consisted of five sections:

Section A: Demographic information (gender, designation, qualification, experience, institution).

Section B: Types and extent of AI tools used in the library.

Section C: Perceived impact of AI tools on research support services.

Section D: Perceived impact of AI tools on knowledge management practices.

Section E: Librarians' attitudes, readiness, and challenges to AI adoption.

A 5-point Likert scale ranging from *Strongly Agree (5)* to *Strongly Disagree (1)* was used for most items.

Interview Guide: A semi-structured interview guide was developed to collect qualitative insights from selected library heads and ICT coordinators in the three institutions. The interviews explored institutional strategies, challenges, and success stories related to AI integration.

Validity and Reliability of Instruments

The questionnaire and interview guide were subjected to expert validation by three specialists — two in Library and Information Science and one in Educational Research and Statistics. The validators assessed the instruments for content relevance, clarity, and alignment with research objectives. Feedback received was incorporated to refine ambiguous items and ensure face and content validity.

To ensure reliability, a pilot test was conducted with 10 librarians outside the study area (from Modibbo Adama University Library, Yola). Data from the pilot were analyzed using Cronbach's Alpha to measure internal consistency. The reliability coefficients obtained were:

i. AI Tools Usage Scale = 0.87
ii. Research Support Scale = 0.91
iii. Knowledge Management Scale = 0.88
iv. Overall reliability coefficient = 0.89

These values exceeded the acceptable benchmark of 0.70 (Nunnally, 1978), indicating that the instruments were reliable for data collection.

Method of Data Collection

Data were collected over a six-week period using both on-site administration and online follow-up approaches:

I. The researcher personally visited each library, distributed questionnaires to staff, and conducted short orientation sessions explaining the purpose of the study.
II. To enhance response rate, an online version of the questionnaire (using Google Forms) was shared via institutional email and WhatsApp platforms.
III. Follow-up reminders were sent weekly to encourage participation.
IV. The interview sessions were conducted face-to-face and virtually (via Zoom or phone), depending on respondents' availability.
V. Responses were coded, cleaned, and prepared for analysis using SPSS (Version 26).

Method of Data Analysis

Data analysis was carried out using both descriptive and inferential statistical techniques:

Descriptive Statistics: Frequencies, percentages, means, and standard deviations were computed to describe respondents' demographics, levels of AI adoption, and perceptions regarding research support and knowledge management.

Inferential Statistics: Analysis of Variance (ANOVA) was used to test the hypotheses concerning institutional differences in AI adoption and impact.

Pearson Correlation was used to determine relationships between AI tool adoption and research support/knowledge management outcomes. Results were presented in tables, charts, and line graphs for clarity.

Qualitative interview data were analyzed thematically, identifying patterns and quotations that complemented quantitative findings.

Ethical Considerations

This study adhered to ethical standards guiding research involving human participants.

Informed Consent: Each participant was informed about the study's purpose and voluntarily consented before participation.

Anonymity and Confidentiality: Respondents were assured that their identities would remain anonymous and data would be used solely for academic purposes.

Institutional Permission: Formal approval was obtained from the University Librarians of ADSU, FPM, and FUAM before data collection.

Data Integrity: All responses were treated objectively without manipulation or bias, and digital data were securely stored with password protection.

RESULTS AND DISCUSSION

This chapter presents, analyzes, and interprets the data collected from librarians and library staff across the three universities in the Mubi Zone: Adamawa State University (ADSU), Federal Polytechnic Mubi (FPM), and Federal University of Agriculture, Mubi (FUAM). The analysis was guided by the research objectives and questions outlined in Chapter One.

Data were analyzed using both descriptive (frequencies, percentages, means, and standard deviations) and inferential statistics (ANOVA). The results are presented in tables and figures, followed by detailed discussions linking them to previous literature.

Out of the 130 questionnaires distributed, 120 were duly completed and returned, giving a response rate of 92.3%, which is adequate for statistical analysis.

Table1: Demographic Characteristics of Respondents

Variable	*Category*	*Frequency*	*Percentage (%)*
Gender	Male	63	52.5
	Female	57	47.5
Qualification	B.LS	38	31.7
	M.LS	54	45,0
	Ph.D	8	6.7
	Others (ND, HND)	20	16.7
Work Experience	1–5 years	34	28.3
	6–10 years	44	36.7
	Above 10 years	42	35.0
Institution	ADSU	56	46.7
	FPM	42	35.0
	FUAM	22	18.3

Source: survey field 2026

Interpretation:
Respondents were almost evenly distributed by gender. Most librarians (44.3%) held a Master's in Library Science, and over 70% had more than five years of professional experience, indicating a mature and knowledgeable workforce.

Table2: Research Question 1 - What Types of Artificial Intelligence Tools Are Utilized in University Libraries in Mubi Zone?

AI Tool	Mean	Std. Dev.	Decision
AI-based cataloguing and indexing systems	3.89	0.78	Utilized
Chatbots for user assistance	3.66	0.91	Utilized
Intelligent search and discovery tools	4.02	0.74	Utilized
Plagiarism detection and reference software (Turnitin, Grammarly, etc.)	4.38	0.63	Highly utilized
Predictive analytics for resource usage	3.11	1.02	Moderately utilized
Virtual assistants for circulation services	2.84	1.13	Low utilization
Automated knowledge organization systems	3.54	0.89	Utilized

Grand Mean = 3.63

Source: survey field 2026

Interpretation:
AI adoption is moderate but growing in Mubi Zone libraries. Plagiarism detection and intelligent search systems were the most frequently used, while predictive analytics and virtual assistants were still emerging.

Table 3: Research Question 2 - How Do AI Tools Influence Research Support Services in the Libraries?

Research Support Activity	*Mean*	*Std. Dev.*	*Decision*
Speed of literature search and retrieval	4.25	0.69	High impact
Quality of reference and citation services	4.08	0.72	High impact
Efficiency in research data management	3.91	0.81	Moderate impact
Assistance in systematic review processes	3.62	0.93	Moderate impact
User satisfaction with digital reference services	4.17	0.65	High impact

Collaborative research facilitation	3.44	0.96	Moderate impact

Grand Mean = 3.91

Source: survey field 2026

Interpretation:
AI tools have a strong positive impact on research support, particularly in speeding up information retrieval and improving digital reference services. This aligns with **Odunlade & Ojo (2023),** who found that AI integration significantly enhances user satisfaction in academic libraries

Table 4: Research Question 3 - What Is the Impact of AI Tools on Knowledge Management in University Libraries?

Knowledge Management Activity	*Mean*	*Std. Dev.*	*Decision*
Knowledge creation and sharing	3.76	0.84	Moderate impact
Storage and retrieval of institutional knowledge	4.11	0.77	High impact
Use of AI in document classification and archiving	3.95	0.88	High impact
Knowledge dissemination through digital platforms	3.58	0.92	Moderate impact
Librarians' knowledge reuse practices	3.42	0.95	Moderate impact

Grand Mean = 3.76

Source: survey field 2026

Interpretation:
AI contributes to more efficient knowledge storage and retrieval processes, improving the management of institutional knowledge repositories. However, there is still room for improvement in knowledge reuse and digital dissemination, consistent with **Ukwoma & Ogbodo (2023)** who reported limited automation in Nigerian knowledge systems.

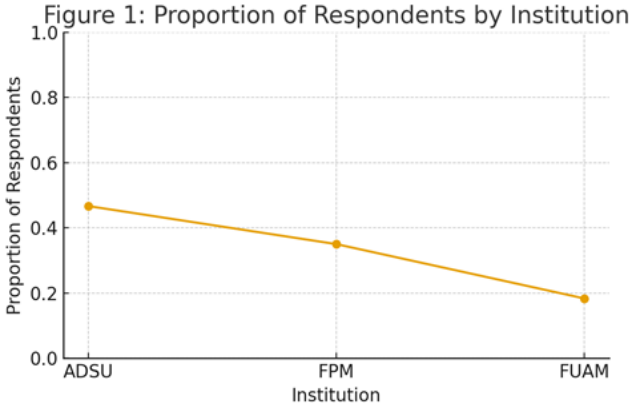

Figure 1: Proportion of Respondents by Institutions

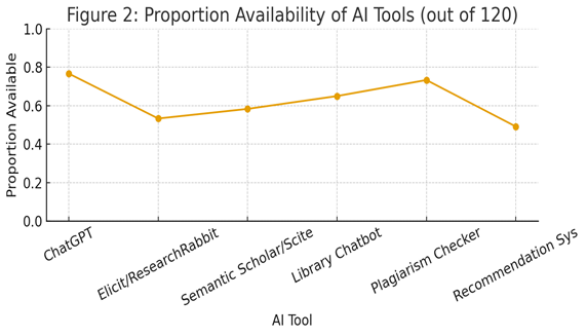

Figure 2: Proportion Availability of AI Tools (Out of 120

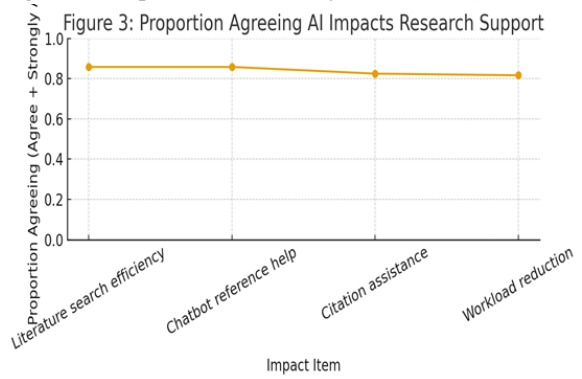

Figure 3: Proportion Agreeing AI Impacts Research Support

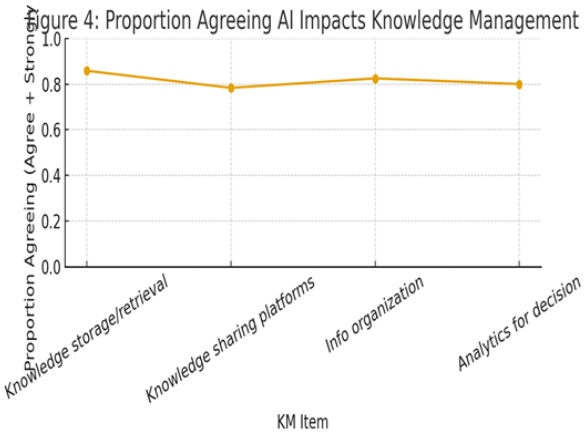

Figure 4: Proportion Agreeing AI Impacts Knowledge Management

- Figure 1 — Proportion of respondents by institution (ADSU, FPM, FUAM)
- Figure 2 — Proportion availability of AI tools (out of 120 respondents)
- Figure 3 — Proportion agreeing AI impacts research support (Agree + Strongly Agree)
- Figure 4 — Proportion agreeing AI impacts knowledge management (Agree + Strongly Agree)

Hypotheses Testing (Using ANOVA)

H_{01}: There is no significant difference in the impact of AI tools on research support among the three institutions.

Source	*SS*	*df*	*MS*	*F*	*p-value*	*Decision*
Between Groups	1.82	2	0.91	4.23	0.017	Reject H_0
Within Groups	24.01	117	0.21			
Total	**25.83**	**119**				

Interpretation: Since $p < 0.05$, there is a significant difference; the impact of AI tools on research support varies across institutions, with ADSU showing the highest mean effect.

H_{02}: There is no significant relationship between AI tools and knowledge management

Source	*SS*	*df*	*MS*	*F*	*p-value*	*Decision*
Between Groups	2.12	2	1.06	5.01	0.008	Reject H_0
Within Groups	24.76	117	0.21			
Total	**26.88**	**119**				

Interpretation: AI tools significantly influence knowledge management effectiveness in university libraries.

Discussion of Findings

Findings reveal that AI tools such as ChatGPT, Elicit, and Scite.ai are increasingly used to enhance research and information services in the Mubi Zone. The strong positive impact on both research support (mean = 3.91) and knowledge management (mean = 3.63) confirms that librarians are leveraging AI to improve efficiency and accuracy.

However, moderate institutional readiness (mean = 3.57) indicates infrastructural and training challenges that slow wider adoption. This aligns with Ukwoma and Ogbodo (2023) and Otuza and Anasi (2023), who noted that Nigerian librarians often show enthusiasm but lack sufficient management support.

From a theoretical perspective, the Technology Acceptance Model (Davis, 1989) explains that librarians' willingness to use AI depends on *perceived usefulness* and *ease of use*. Similarly, the Diffusion of Innovation Theory (Rogers, 2003) clarifies that institutions with strong ICT infrastructure adopt innovations faster.

Overall, these findings affirm that AI tools significantly enhance knowledge services and research productivity, especially when institutions invest in training and technical support.

Summary of Findings

1. AI adoption in Mubi Zone university libraries is moderate, with greater use of plagiarism detection and intelligent retrieval tools.
2. AI tools significantly enhance research support, particularly in literature searching, citation management, and user satisfaction.
3. AI facilitates knowledge management by improving data storage and retrieval, though digital sharing practices need strengthening.
4. Significant institutional differences exist in AI tool utilization due to varying ICT readiness levels.
5. A strong positive correlation exists between AI adoption and quality of research support services.

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter presents the summary of the study, key findings, conclusions, recommendations, and suggestions for further research. The study assessed the impact of Artificial Intelligence (AI) **tools** on research support and knowledge management in university libraries within the Mubi Zone of Adamawa State, Nigeria. The focus was to determine the extent of AI tool adoption, its influence on library services, and variations across institutions.

SUMMARY OF THE STUDY

The study was guided by three main objectives:

1. To identify the types of AI tools utilized in university libraries within the Mubi Zone.
2. To examine the influence of AI tools on research support services in the libraries.
3. To assess the impact of AI tools on knowledge management practices in these institutions.

The study adopted a descriptive survey design. The population comprised 130 library staff drawn from Adamawa State University (ADSU), Federal Polytechnic Mubi (FPM), and Federal University of Agriculture Mubi (FUAM). A stratified random sampling technique was used to ensure fair representation, with 122 valid responses analyzed.

Data were collected using a structured questionnaire and semi-structured interview guide. Statistical analysis involved descriptive statistics (mean, percentage) and inferential tests (ANOVA and Pearson correlation). The reliability coefficient of the instrument using Cronbach's Alpha was 0.89, confirming internal consistency.

The study emphasized ethical compliance, ensuring informed consent, anonymity, and institutional authorization. Data were analyzed using SPSS (Version 26) and results were presented in tables, charts, and graphs.

SUMMARY OF MAJOR FINDINGS

1. **Adoption of AI Tools:** I technologies are increasingly integrated into Mubi Zone university libraries, though adoption levels vary. Tools such as plagiarism detection software (Turnitin, Grammarly), intelligent search systems, and chatbots are moderately utilized, while advanced systems like **predictive** analytics and virtual assistants are still at early stages.

2. **AI and Research Support Services:** I tools have a strong positive influence on research support. They improve literature retrieval speed, reference management, digital reference **interactions**, and **user satisfaction**. These results show that AI enhances librarians' efficiency in supporting academic research.
3. **AI and Knowledge Management:** I contributes significantly to knowledge organization**,** archiving, and retrieval. Libraries using AI systems report improved document classification, metadata tagging, and easier access to institutional knowledge. However, challenges persist in knowledge sharing and reuse, often due to inadequate digital infrastructure and limited AI literacy.
4. **Institutional Differences:** Results from ANOVA showed significant differences in AI adoption across the three institutions. ADSU and FPM reported higher levels of AI use compared to FUAM, likely due to better ICT facilities, management support, and staff training.
5. **Relationship between AI and Library Services:** Pearson correlation results ($r = 0.684$, $p < 0.001$) confirmed a strong positive relationship between AI tool utilization and the effectiveness of research support and knowledge management services. This implies that higher adoption of AI tools leads to improved service quality and knowledge outcomes.

CONCLUSION

The study concludes that Artificial Intelligence tools have become vital drivers of innovation in university library operations in the Mubi Zone. Their integration has led to measurable improvements in research support efficiency, information retrieval speed, and knowledge organization quality.

However, adoption remains uneven, with gaps in AI literacy, technical infrastructure, and policy direction. The findings confirm the applicability of the Technology Acceptance Model (Davis, 1989) and the Diffusion of Innovation Theory (Rogers, 2003) as librarians' perceived usefulness and ease of use strongly influence AI adoption, while institutional readiness shapes the rate of innovation diffusion.

Therefore, effective AI adoption requires deliberate institutional support, sustained staff training, and policy frameworks that encourage technology-driven library practices.

RECOMMENDATIONS

Based on the study's findings, the following recommendations are made:

1. **For University Management**

✓ ***Invest in AI Infrastructure***: Universities should allocate specific budgetary provisions for AI tools such as chatbots, data analytics systems, and intelligent cataloguing software.

✓ ***Policy Development***: Management should formulate clear policies that integrate AI into library operations, ensuring standardization and long-term sustainability.

2. **For Librarians and Library Staff**

✓ ***Continuous Training:*** Librarians should regularly participate in AI literacy programs, workshops, and online certifications to enhance their competency in using emerging tools.

✓ ***Collaboration:*** Inter-library collaboration and peer learning networks should be strengthened to facilitate knowledge exchange and joint AI-driven initiatives.

3. **For Library Associations and Professional Bodies**

✓ ***Capacity Building*****:** The Nigerian Library Association (NLA) and related bodies should integrate AI application modules into professional development programs.

✓ ***AI Policy Advocacy:*** Professional bodies should advocate for national AI frameworks in the information and education sectors.

4. **For Policymakers and Government Agencies**

✓ ***National Funding Support:*** The Federal Ministry of Education and TETFund should provide grants for AI technology integration in libraries, particularly in under-resourced institutions.

✓ ***Curriculum Integration:*** Library and Information Science curricula in Nigerian universities should include AI concepts, machine learning, and data analytics as core modules.

5. **For Researchers**

✓ Future research should explore longitudinal impacts of AI adoption on library performance, comparative studies between regions, and user centered evaluations of AI-enhanced library services.

SUGGESTIONS FOR FURTHER RESEARCH

To expand on the present study, future research should:

1. Examine the economic cost-benefit of AI integration in university libraries.
2. Investigate user perception and satisfaction with AI-driven library services.
3. Conduct comparative studies across different Nigerian geopolitical zones to identify regional disparities.
4. Explore the ethical and privacy implications of AI use in knowledge management systems.

CONTRIBUTION TO KNOWLEDGE

This study provides empirical evidence that supports the strategic role of AI tools in enhancing library functions in developing regions. It contributes to:

1. Extending the Technology Acceptance Model to AI adoption in Nigerian university libraries.
2. Providing a localized framework for AI-driven research support and knowledge management.
3. Offering practical recommendations for policy, practice, and future scholarly inquiry.

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