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The Impact of Artificial Intelligence on Library Services Delivery in Academic Libraries in Nigeria

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Abstract

This study critically examines the current state of Artificial Intelligence (AI) adoption in Nigerian academic libraries, with particular focus on the tools in use, the extent of integration, the challenges faced, and the ethical implications of deploying AI-driven technologies. In the 21st century, academic libraries globally are shifting toward intelligent automation to enhance service delivery, improve user engagement, and streamline internal operations. In Nigeria, however, the uptake of AI remains limited, often due to financial constraints, lack of infrastructure, and inadequate technical expertise among library personnel. AI tools such as chatbots, Radio Frequency Identification (RFID), Online Public Access Catalogues (OPAC) with intelligent features, and predictive analytics are gradually being introduced in select institutions to support functions like virtual reference services, self-checkout systems, cataloguing, indexing, and user behavior analysis. These technologies have the potential to revolutionize how library users access information, while also enabling librarians to focus on more complex, value-added services. However, empirical evidence suggests that the implementation of AI in Nigerian libraries is often fragmented and lacks a strategic framework. Moreover, the ethical dimensions of AI use—such as data privacy, bias in algorithms, and concerns about job displacement—remain largely unaddressed in most institutions. This study highlights these concerns and emphasizes the need for libraries to adopt responsible AI practices guided by well-defined policies and professional standards. The paper concludes by proposing practical recommendations including capacity building for librarians, policy development, infrastructure improvement, and inter-institutional collaboration to foster sustainable and ethical AI integration across academic libraries in Nigeria.

Keywords: Artificial Intelligence, Academic Libraries, Library Innovation, AI Tools, Chatbots, RFID, Ethical Concerns, Librarian Skills, Digital Transformation, Library Policy, AI Infrastructure

Introduction

In recent years, Artificial Intelligence (AI) technologies have begun transforming library operations around the globe, and Nigerian academic libraries are gradually entering this digital frontier. Across the world, institutions are integrating tools such as chatbots, self-checkout systems, AI-enhanced cataloguing, natural language processing, and robotics to make services more efficient, responsive, and user-focused. In Nigeria, studies show this emerging shift, albeit modest and cautious.

Research by Abba (2024) reported that only a small number of university libraries across Africa including those in Nigeria have begun to adopt AI tools like chatbots, ChatGPT, LibKey, robots, RFID systems, and Grammarly to provide

services such as directional assistance, ready-reference support, virtual cataloguing guidance, self-checkout options, marketing support, statistical recommendations, and circulation management. However, adoption remains limited by financial constraints, lack of librarian training, and low awareness of AI capabilities.

Similarly, Wagwu et al. (2024) conducted a survey of librarians in South-South Nigeria and found a generally positive outlook toward AI-driven chatbots. Librarians recognised the potential for improved user experience, accessibility, and scalability in handling routine inquiries. Yet, challenges persist: insufficient infrastructure, resistance to change, lack of skilled personnel, and limited awareness.

Furthermore, Igbo et al. (2025) outlined broader enablers and obstacles to AI adoption in Nigerian academic libraries, highlighting the need for clear policy frameworks, adequate digital infrastructure, human capital development, quality benchmarking data, and security protocols. Key hurdles include high implementation costs, weak technical skills among staff, unstable power supplies, and concerns about job displacement.

Additionally, Akinola (2023) emphasised how AI tools like optical character recognition, automated metadata generation, and machine learning can enhance cataloguing and classification in academic libraries. Yet inadequate funding, unreliable power, and insufficient skilled personnel hamper these benefits, typically in the absence of a formal strategic plan for AI implementation.

This study therefore explores the current landscape of AI adoption within Nigerian academic libraries, consolidates recent empirical findings, and delves into implications for service delivery. By synthesising evidence across contexts, it offers a nuanced understanding of both the transformative potential and the structural limitations of AI integration in Nigerian Academic library services.

Literature Review

Igbo et al. (2025) identified key prerequisites for implementing AI in Nigerian academic libraries, including robust policy frameworks, adequate digital infrastructure, skilled human capital, quality data, and data security measures. They also highlight significant challenges such as high costs, insufficient technical skills and fear of job loss, unreliable power supplies, and poor infrastructure. Similarly, Adeleke et al. (2024) report that AI adoption in university libraries remains minimal and unplanned. Key obstacles include limited funding, inadequate infrastructure—particularly erratic power and Internet and a shortage of technical skills. They urge academic institutions to embed AI in their strategic planning.

Abba's empirical study (2025) explored AI adoption across 102 African university libraries, noting that only a handful have embraced tools like chatbots, ChatGPT, LibKey, robots, RFID, and Grammarly. These technologies are currently used for services like reference support, cataloguing assistance, self-checkouts, marketing, statistics generation, and circulation management. Adoption remains sparse, hindered by lack of funding, limited librarian training, and insufficient awareness of AI technologies. Oguntoye & Ajibare (2024) discuss how AI-powered services can promote diversity and inclusivity in Nigerian libraries. They emphasize enhancing infrastructure, digital literacy, policies, and cross-sectoral collaboration to ensure effective implementation of AI-enabled library services.

On the ethical front, Suleiman et al. (2024) explore AI's potential in automating indexing, retrieval, and user engagement in Nigerian university libraries. However, they raise critical concerns around data privacy, algorithmic bias, intellectual property rights, and disparities in access underscoring the need for ethical frameworks and inclusive implementation strategies. Achugbue (2025) focuses on AI competencies among librarians in South-South

Nigeria. The study reveals significant skill gaps in areas like automated cataloguing, digital resource management, AI-based user assistance, and predictive analytics. These gaps need to be addressed to leverage AI's benefits in service delivery and resource management. Emumejakpor et al. (2024) provide a literature review on AI's role in libraries for national development. They highlighted AI applications such as expert systems in acquisition, cataloguing, classification, reference services, and robotics, advocating for increased empirical studies to guide AI integration

Current Trends in AI Adoption by Academic Libraries in Nigeria

Tools in Use: Artificial Intelligence tools currently making inroads into Nigerian academic libraries include chatbots, ChatGPT-like applications, LibKey discovery systems, service robots, RFID technology, and AI-enhanced writing tools like Grammarly. These tools are being introduced primarily to automate basic services, enhance cataloguing, and provide 24/7 user support. For instance, chatbots help address frequently asked questions and offer instant navigation to library users, while RFID systems enable efficient inventory control and self-checkout services. LibKey improves access to digital journal content by offering intelligent linking. Grammarly is used to assist students and researchers with grammar, citation, and writing clarity. Despite their benefits, widespread deployment is still low due to cost, infrastructure, and lack of technical capacity. As Abba (2024) reports, these tools are most commonly found in pilot projects or institutions with international partnerships or stronger ICT foundations.

Regional Variations: There is notable regional variation in the adoption of AI technologies across Nigeria's academic libraries. In the North West region, for example, many libraries rely on simpler digital tools such as social media platforms (e.g., WhatsApp, Facebook), OPAC (Online Public Access Catalogue) systems with basic enhancements, search engine optimisation for digital repositories, and basic security scanning tools. Although these are not AI in the strictest sense, they form part of the broader shift toward intelligent service delivery. Full-scale AI applications like machine learning algorithms or autonomous recommendation systems remain largely absent. Libraries in this region face persistent challenges such as unreliable electricity, limited bandwidth, and low funding, which inhibit more advanced technological integration. Therefore, while there is interest in innovation, the transition is largely incremental and heavily dependent on external grants or collaborations (Wagwu et al., 2024).

Librarians' Skill Gaps: The successful implementation of AI tools in Nigerian academic libraries is closely tied to the skill levels of library staff. In South-South universities, recent studies have shown that while librarians are aware of AI trends, their practical capabilities in areas like predictive analytics, automated cataloguing, and AI-powered user interaction remain significantly underdeveloped. Librarians often lack formal training in machine learning, data science, and information retrieval algorithms critical components for deploying AI systems effectively. This skills gap hampers both the planning and operation of intelligent systems within libraries. Even where infrastructure exists, the inability to manage or troubleshoot AI tools results in underutilisation. Achugbue (2025) highlighted that only a small fraction of librarians in these regions possess intermediate-level competence in AI applications, with most requiring intensive professional development to bridge the knowledge divide.

Benefits of AI in Academic Library Services in Nigeria

Improved Efficiency: Artificial Intelligence has significantly enhanced the efficiency of core library operations, particularly in areas such as cataloguing, classification, and indexing. Traditional manual methods are often time-consuming and prone to human error. With AI integration, tasks such as metadata generation,

subject classification, and keyword indexing can be completed more accurately and at a much faster rate. Machine learning algorithms can analyse large datasets, recognise patterns in resource types, and automatically assign relevant descriptors. This reduces the workload on library staff and allows them to allocate time to more user-centered services. Idemudia and Makinde (2022) reported that AI-enabled systems have already begun transforming cataloguing in a number of Nigerian libraries, leading to improved turnaround time and consistency in records (CJOLIS). Likewise, studies from international contexts affirm that automated indexing enhances the discoverability of digital resources, especially in research-intensive libraries.

Enhanced User Interaction*:* AI-powered technologies such as chatbots, voice assistants, and intelligent help systems have created new opportunities for responsive and personalised user interactions in academic libraries. These systems are designed to mimic human conversation and provide users with immediate responses to common queries, such as locating resources, renewing borrowed items, or navigating databases. For instance, AI chatbots can function around the clock, thereby extending library services beyond traditional working hours. According to Abba (2024), many African libraries piloting chatbot technology observed improved user satisfaction due to faster and more consistent support. Additionally, AI-enhanced systems can adapt to user preferences and search histories, offering customised recommendations and content alerts, as noted by Abba (2024). These innovations contribute to a more interactive and user-friendly library environment.

Operational Innovation: AI is also reshaping back-end operations within academic libraries by introducing tools that promote greater operational efficiency and innovation. Notable among these are Radio Frequency Identification (RFID) systems, which enable self-checkout and automated book returns, thus reducing queues and freeing librarians from repetitive tasks. Other innovations include usage analytics powered by AI, which allow librarians to track user behaviour, resource utilisation, and service preferences to make data-driven decisions. Automated notifications such as reminders for due dates or new arrivals are also AI-enabled and ensure timely communication with users. These features not only streamline workflows but also optimise resource allocation and improve library management systems. According to Idemudia and Makinde (2022) academic libraries that implemented RFID systems reported a 40–60% improvement in circulation speed and resource tracking. Institutions using AI-driven analytics tools also saw measurable improvements in user engagement and strategic collection development.

Challenges to Adoption of AI in Academic Libraries in Nigeria

Funding Constraints: One of the most significant obstacles to AI adoption in Nigerian academic libraries is inadequate funding. AI technologies ranging from chatbots to RFID systems—require substantial investment in software, hardware, training, and maintenance. However, many libraries operate on tight budgets that barely cover routine operations. As a result, the high cost of acquiring and sustaining AI infrastructure limits its deployment. According to Igbo et al. (2025), only a few Nigerian institutions with international grants or private-sector support have managed to initiate AI projects. Similar findings by Adeleke et al. (2024) emphasised that the urgent need for dedicated ICT funding streams in library budgets. This constraint persists across regions, making funding a systemic issue.

Infrastructure Deficits*:* Nigerian academic libraries also struggle with inadequate infrastructure, which is a critical barrier to AI integration. Frequent power outages, unreliable Internet connections, and poor IT facilities hinder the seamless deployment of AI systems that require stable connectivity and consistent electricity. These conditions frustrate not only the implementation process but also the regular use and maintenance of intelligent systems. Wagwu

et al. (2024) noted that many libraries in Nigeria's North and rural areas faced with infrastructure challenges that render them digitally underdeveloped. African Journals Online (2023) and FIJLIS (2024) also emphasised that without basic infrastructure in place, libraries cannot effectively adopt or sustain digital innovations.

***Skills Shortfall**:* Many Nigerian librarians lack the advanced technical skills required to implement, manage, and troubleshoot AI systems. Although awareness of AI trends is increasing, there is a significant gap in expertise related to data science, algorithmic modelling, machine learning, and AI ethics. This limits librarians' ability to engage with AI beyond surface-level applications. Achugbue (2025) observed that only a small percentage of librarians in South-South Nigeria have any form of AI training. Studies from Taylor & Francis (2023) similarly highlighted that the absence of AI in most library science curricula, thereby limiting long-term skill development and system sustainability.

Ethical and Privacy Concerns: AI introduces complex ethical issues into library environments, especially in areas such as user privacy, data protection, algorithmic bias, and decision transparency. As libraries increasingly collect and analyse user data to personalise services, there is a risk of breaching confidentiality or introducing bias in service recommendations. Without strong ethical guidelines, these systems can inadvertently marginalise users or infringe on their rights. Suleiman et al. (2024) argue for the urgent development of national AI ethics policies for information services in Nigeria and emphasises the importance of ensuring inclusivity and fairness in AI design and deployment.

***Fear of Job Loss**:* There is growing apprehension among librarians that AI technologies may displace human labour or devalue their professional roles. As AI systems become more capable of handling reference queries, cataloguing, and user interactions, many fear that their expertise may no longer be needed. This fear leads to resistance to AI adoption and hampers institutional readiness. According to Igbo et al. (2025), such concerns are particularly pronounced among older staff and in libraries without clear guidelines for AI-human collaboration.

Recommendations

***Develop AI Policies & Strategic** Frameworks:* To ensure responsible and effective AI adoption, Nigerian academic libraries must establish clear institutional policies and strategic frameworks. These documents should guide ethical use, address algorithmic fairness, protect user data, and align AI tools with educational goals. Without such policies, deployments risk being ad hoc and potentially harmful. Recent studies advocate for proactive AI governance at both institutional and national levels.

Investment in AI Infrastructure: Sustainable AI integration depends heavily on the availability of reliable digital infrastructure. Libraries should prioritize improved internet bandwidth, stable electricity, cloud storage, and updated ICT facilities. These investments must be supported by increased funding allocations from parent institutions and government bodies. As highlighted by African Journals Online, (2024) without foundational infrastructure, AI tools cannot operate effectively or serve users consistently.

Build Capacity: Librarians must be equipped with hands-on skills in AI, including training in machine learning, natural language processing, and algorithmic decision-making. Regular workshops, online courses, and in-house mentorships are necessary to develop these competencies. Study by SAGE Journals (2024) shows that libraries with continuous professional development programs are more successful in deploying AI technologies effectively.

***Form Cross-sector Partnerships**:* Libraries should actively collaborate with organisations like NITDA, TETFund, private tech firms, NGOs, and research institutes to access funding,

technology, and training. Such partnerships provide technical support, facilitate pilot studies, and ensure broader stakeholder engagement. To support this, African Journals Online (2023) highlighted that AI deployment in Nigerian education is more effective when approached collaboratively.

Implement Ethical Oversight*:* AI deployment must include safeguards to protect privacy, ensure fairness, and prevent bias. Libraries should adopt ethical guidelines, set up internal review boards, and conduct regular audits to evaluate the fairness and transparency of AI systems. Ethical oversight is vital in maintaining public trust and protecting vulnerable users as indicated by IJID (2023).

Pilot AI Initiatives: Rather than immediately implementing large-scale systems, libraries should begin with low-risk pilot projects such as chatbots for answering user queries, AI-supported reference tools, or RFID-based checkout systems. These pilots allow institutions to test viability, measure outcomes, and adjust strategies before wider implementation (AJLAIS, 2025).

Engage Librarians Collaboratively: To reduce resistance and build institutional buy-in, librarians should be included from the onset of AI planning and implementation processes. Inclusive engagement helps allay fears of job displacement, boosts morale, and fosters a culture of innovation. Collaborative change management has proven essential in institutions with successful AI rollouts (Nigerbiblios, 2025; Taylor & Francis Online, 2024).

Conclusion

The current literature across diverse Nigerian academic library settings reflects a cautious but optimistic trajectory toward AI adoption. Initial efforts, including the deployment of chatbots, OPAC enhancements, and RFID systems, showcase the potential of AI to revolutionize service delivery. However, full-scale transformation is contingent upon overcoming persistent challenges such as inadequate infrastructure, limited funding, and insufficient staff training. Equally important is the need to address ethical concerns, ensure user data protection, and promote inclusive access. With strategic planning and sustained investment, AI can significantly enhance the relevance, responsiveness, and resilience of Nigerian academic libraries.

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