



LEVERAGING ARTIFICIAL INTELLIGENCE FOR 21ST-CENTURY INFORMATION SERVICE DELIVERY IN NIGERIAN UNIVERSITY LIBRARIES: CHALLENGES AND OPPORTUNITIES

Genevieve C. Opara¹; Anne A. Edem¹; Felix M. Eke¹; Judith Nse¹; Chidi Augustine Dike¹;

Chika Chinonso Ejiakor¹

¹University Library, Federal University of Technology, Owerri, Imo State, Nigeria

Corresponding author: Judith Nse

Email : nsejudith2004life@gmail.com

Abstract

Purpose: This paper examines how artificial intelligence (AI) can be leveraged to strengthen information service delivery in Nigerian university libraries, with particular attention to AI applications, librarians' AI literacy and readiness, institutional opportunities, implementation barriers, and strategies for responsible adoption.

Design/methodology/approach -The paper adopts a narrative literature review approach. Relevant literature on artificial intelligence, academic libraries, information service delivery, librarians' preparedness, AI literacy, technology adoption, and emerging library technologies was examined and synthesized. The review focuses particularly on studies addressing university and academic libraries, with emphasis on evidence relevant to the Nigerian context.

Findings- The review indicates that AI can support automated cataloguing and metadata-related work, intelligent information retrieval, virtual reference services, natural-language interaction, personalized information support, predictive analytics, and selected routine library operations. However, awareness of AI does not necessarily translate into practical competence or institutional readiness. Major barriers include inadequate funding, weak technological infrastructure, unstable electricity and internet connectivity, limited specialist skills, resistance to technological change, ethical concerns, data privacy risks, and inadequate institutional policy frameworks.

Practical implications - Nigerian university libraries should combine technological investment with continuous professional development, AI literacy programmes, reliable ICT infrastructure, clear ethical and data-governance policies, and collaboration among university management, library leadership, librarians, professional associations, and technology providers.

Originality/value - The paper consolidates recent literature to present an integrated view of AI-enabled information service delivery in Nigerian university libraries and emphasizes AI as a means of augmenting professional librarianship rather than replacing human judgement and expertise.

Keywords: Artificial intelligence; university libraries; information service delivery; AI literacy; librarians; Nigeria

Paper type: Narrative literature review



Introduction

The rapid development of digital technologies has transformed the manner in which university libraries operate. Academic libraries have gradually moved beyond dependence on conventional print collections towards digital databases, electronic resources, automated library systems, digitization programmes, online discovery services, and other technology-mediated forms of information provision. Artificial intelligence (AI) represents a further stage in this transformation because it introduces computational systems capable of supporting activities associated with learning, language processing, pattern recognition, prediction and decision support (Russell & Norvig, 2020; Shubha & Vaidya, 2023).

The relevance of AI to university libraries is closely related to changing expectations among students, researchers and other members of the academic community. Library users expect information services to be rapid, accessible, personalized and available through multiple digital channels. AI-enabled applications can assist with information discovery, automated processing, conversational interaction, recommendation, analytics and selected routine operations. These capabilities create opportunities for libraries to improve both the efficiency of internal workflows and the quality of services offered to users (Hussain, 2023; Zondi et al., 2024).

The emergence of AI also has implications for the professional role of librarians. Modern-day librarians are required to function as information specialists, trainers, researchers, digital-content managers, web managers, facilitators and evaluators of information resources. The introduction of AI adds another layer to these responsibilities because librarians need to understand the capabilities and limitations of AI systems, evaluate their outputs, protect users' interests and guide users in responsible information practices (Okunnu et al., 2022; Ajani et al., 2022).

Within Nigeria, however, the movement towards AI-enabled library services is occurring within an environment characterized by uneven technological capacity. Evidence from studies of Nigerian academic libraries points to challenges involving funding, infrastructure, staff competencies, training and institutional preparedness (Abayomi et al., 2021; Achugbue, 2024; Akhimien & Osawe, 2024). Consequently, the availability or awareness of AI tools should not be interpreted automatically as evidence of effective institutional adoption.

This paper therefore considers AI adoption from an integrated perspective. It examines the major applications of AI relevant to university libraries, the importance of AI literacy and librarians'



readiness, the opportunities associated with AI-enabled information services, the barriers to implementation, and strategies that can support responsible and sustainable adoption in Nigerian university libraries.

Statement of the Problem

University libraries are expected to provide timely, relevant and accessible information services that support teaching, learning and research. At the same time, the volume, variety and velocity of digital information have increased the complexity of information management and user support. AI offers tools that could help libraries manage some of these pressures through automation, intelligent retrieval, conversational services and data-informed decision-making. Yet the transition from conventional digital library systems to AI-supported services is not simply a matter of acquiring software. The central problem is the gap between the potential of AI and the capacity of Nigerian university libraries to implement it effectively.

Existing literature suggests that librarians may demonstrate awareness of AI without possessing the practical skills required for meaningful application. Libraries may also face inadequate funding, unreliable power supply, weak connectivity, limited ICT infrastructure, insufficient training and uncertainty about ethical and privacy requirements (Ajani et al., 2022; Hubert-Nwangwu & Ijantiku, 2023; Fagola & Egbebi, 2025). Without deliberate attention to these conditions, investments in AI may produce fragmented applications rather than sustainable improvements in information service delivery. There is therefore a need to synthesize the available literature and clarify the applications, opportunities, constraints and institutional measures required for effective AI integration in Nigerian university libraries.

Research Questions

1. What major AI applications can support information service delivery in Nigerian university libraries?
2. What does the literature indicate about librarians' AI literacy, preparedness and readiness for AI-supported service delivery?
3. What opportunities can AI provide for improving information service delivery in Nigerian university libraries?



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4. What major challenges and institutional strategies are associated with effective and responsible AI integration?

4. Methodology

This paper adopted a narrative literature review design. The approach was selected because the purpose was to synthesize and interpret existing literature on AI and university library services rather than to collect primary data from a defined population. Literature addressing AI applications, AI literacy, librarians' preparedness, technology adoption and information service delivery was examined, with particular attention to studies situated in Nigerian academic and university library contexts.

The review drew on the references available in the authors' working manuscript, including journal articles, scholarly publications and relevant professional literature. Sources were organized thematically around five areas: AI applications in libraries; AI literacy and librarians' readiness; opportunities for information service delivery; barriers to adoption; and strategies for sustainable implementation. Findings were synthesized narratively by comparing areas of convergence and identifying recurring implementation issues. Because the paper is a narrative review rather than a systematic review, it does not claim exhaustive retrieval or statistical aggregation of the literature.

Artificial Intelligence and Its Applications in University Libraries

Artificial intelligence is a broad field concerned with computational systems capable of performing tasks associated with aspects of human intelligence. These tasks may include learning from data, recognizing patterns, processing language, generating responses, making predictions and supporting decisions (Russell & Norvig, 2020). In library environments, the value of AI lies less in the technology as an end in itself and more in its ability to augment professional activities, improve workflows and create additional channels through which users can interact with information.

One important application is automated cataloguing and metadata generation. AI-supported systems can assist in identifying descriptive elements, extracting information from documents and recommending metadata. Such applications have the potential to reduce repetitive workloads and improve the speed with which newly acquired or digitized resources are made discoverable



(Adebayo & Akinwale, 2019; Garba & Yusuf, 2019). Human review remains important because metadata quality, consistency and contextual appropriateness require professional judgement.

Natural language processing provides another significant area of application. It enables systems to process and respond to human language and can support conversational interfaces, information extraction, summarization and question answering. In university libraries, these capabilities can be incorporated into virtual reference services and user-support platforms, allowing users to interact with library systems through more natural forms of communication (Hussain, 2023; Shubha & Vaidya, 2023).

Intelligent information retrieval is also relevant to academic libraries. AI can assist users in navigating large information environments by identifying relationships among documents, ranking potentially relevant materials and supporting more flexible search interactions. These functions can complement existing discovery tools and help users move beyond rigid keyword-based searching.

Predictive analytics represents a further application. By analysing historical service-use data, AI-supported systems may identify patterns in resource utilization, user enquiries and service demand. Such analysis can assist library managers in planning services and allocating resources. Nevertheless, the use of user data for predictive purposes must be governed by clear privacy, security and ethical requirements.

Robotics and intelligent physical systems can support selected operational activities such as stock verification, materials handling and other repetitive processes. The growing discussion of robotics in libraries indicates that AI-related technologies may extend beyond software into physical library environments (Sambo & Oyovwe-Tinuoye, 2023). Their adoption, however, depends heavily on institutional capacity, cost, maintenance and staff competencies.

AI may also support plagiarism detection, virtual assistance and other specialized information services. These applications demonstrate that AI has implications for both technical services and public-facing services. The appropriate objective is not to automate every professional activity, but to identify areas in which AI can reduce repetitive work, enhance access to information and support librarians in making better-informed professional decisions.

AI Literacy and Librarians' Readiness



AI literacy is central to successful adoption because the possession of an AI tool does not guarantee effective use. For librarians, AI literacy includes understanding basic AI concepts, recognizing appropriate and inappropriate applications, evaluating AI-generated outputs, identifying risks and limitations, and applying AI tools in ways that align with professional and ethical standards.

Research in Nigeria indicates a recurring distinction between awareness and practical competence. Abayomi et al. (2021) reported on awareness and perceptions of AI in Nigerian university libraries, while Ajani et al. (2022) examined librarians' awareness and readiness to integrate AI into library operations and services. More recent studies continue to emphasize the importance of practical skills, professional development and institutional support (Achugbue, 2024; Fagola & Egbebi, 2025; Yakubu, 2025).

Librarians' readiness should therefore be viewed at both individual and institutional levels. Individual readiness concerns knowledge, confidence, practical skills and willingness to learn. Institutional readiness includes infrastructure, funding, leadership support, policies, technical assistance and opportunities for professional development. A library may have staff who are willing to use AI but still be unable to implement sustainable services because the necessary institutional conditions are absent.

Continuous professional development is consequently essential. Training should move beyond general awareness and demonstrate how AI can be applied to actual library functions such as information retrieval, reference work, cataloguing, metadata creation, research support and user education. Practical workshops, peer learning, professional networks and partnerships with technology specialists can help librarians develop confidence and competence.

Opportunities Presented by Artificial Intelligence

The first major opportunity is improved user experience. AI-supported conversational systems can respond to routine enquiries, guide users to appropriate resources and provide basic assistance beyond conventional service hours. Such services may be especially useful when users need immediate guidance on library resources or procedures.

Second, AI can strengthen research support. Intelligent retrieval, natural-language interaction and recommendation mechanisms can help students and researchers navigate large bodies of



scholarly information. Librarians can use these capabilities alongside their professional expertise to help users formulate information needs, assess sources and use AI responsibly.

Third, AI can improve operational efficiency. Repetitive tasks in areas such as cataloguing, metadata processing and selected administrative activities may be partially automated. This may create opportunities for librarians to devote more time to activities requiring professional judgement, research support, information literacy instruction and direct engagement with users (Garba & Yusuf, 2019).

Fourth, AI can support data-informed management. Analysis of service-use patterns may help library managers identify changing user needs, evaluate service demand and plan resource allocation. This opportunity is valuable only when data are collected and processed responsibly and when managerial decisions remain subject to professional interpretation.

Finally, AI can expand accessibility and personalization. Conversational interfaces and intelligent retrieval can offer alternative ways of interacting with library resources. Personalized recommendations may also help users identify potentially relevant materials more efficiently. These benefits should be designed around inclusion and usability rather than assuming that all users have equal digital skills or access.

Challenges of AI Adoption in Nigerian University Libraries

Funding is a major constraint. Effective AI implementation involves more than purchasing software. Libraries may need compatible hardware, network capacity, storage, maintenance, security measures, licensing arrangements and staff development. Limited budgets can therefore restrict both initial adoption and long-term sustainability (Akhimien & Osawe, 2024).

Infrastructure presents another serious challenge. AI-enabled services depend on dependable electricity, internet connectivity, suitable hardware and reliable ICT support. Where these foundations are weak, AI applications may be interrupted, underutilized or difficult to maintain. Infrastructure constraints therefore need to be addressed alongside technology acquisition rather than after implementation.

Skills gaps also affect adoption. Librarians who have limited exposure to AI may find it difficult to evaluate tools, integrate them into workflows or identify risks associated with their use.



Evidence from recent Nigerian studies emphasizes the need for targeted training and continuous professional development (Achugbue, 2024; Omwanghe & Ogiamien, 2025; Yakubu, 2025).

Resistance to technological change can arise when staff are uncertain about new systems or fear that automation may reduce the value of existing roles. Such concerns should be addressed through communication, participation and training. AI adoption is more likely to succeed when librarians are involved in identifying appropriate applications and redesigning workflows.

Ethical, privacy and security issues require particular attention. AI systems may process user data, generate recommendations or produce outputs whose accuracy is uncertain. Libraries therefore need mechanisms for protecting personal information, evaluating AI-generated content, identifying bias and maintaining human oversight. Professional responsibility remains essential because inaccurate or biased AI outputs can affect users' access to information.

A further challenge is the absence of comprehensive institutional policies. Libraries require clear guidance on procurement, acceptable use, data protection, accountability, transparency, intellectual property, security and human oversight. Policy development should keep pace with technological change rather than waiting until problems arise.

Strategies for Effective AI Integration

First, university management should provide sustainable investment in ICT infrastructure. Reliable electricity, internet connectivity, adequate computing facilities and technical support are prerequisites for AI-enabled library services. Infrastructure planning should also include maintenance, cybersecurity and periodic upgrading.

Second, library management should establish continuous professional development programmes. Training should be practical, role-specific and progressive. Librarians should be supported to experiment with appropriate AI tools in controlled environments and to evaluate their usefulness before wider deployment.

Third, universities should develop institutional AI governance frameworks. Such frameworks should specify principles for privacy, data protection, transparency, accountability, security, intellectual property and human oversight. Library-specific guidelines can then translate these principles into operational procedures for staff and users.



Fourth, AI implementation should be guided by service needs rather than technology availability. Libraries should begin by identifying recurring service problems and then determine whether AI provides an appropriate solution. This approach reduces the risk of adopting fashionable technologies that do not address significant user or operational needs.

Fifth, collaboration should be strengthened. Partnerships among university management, library management, librarians, professional associations, ICT units, researchers and technology providers can facilitate knowledge sharing, training, technical support and the development of contextually appropriate solutions. Nigerian libraries can also benefit from shared learning and professional networks that document successful and unsuccessful AI initiatives.

Finally, implementation should be gradual and evaluative. Pilot projects can allow libraries to assess usability, cost, accuracy, user acceptance, staff workload and ethical implications before expanding a service. Evaluation should include both technological performance and professional outcomes.

Discussion of Findings

The literature reviewed presents AI adoption as a multidimensional institutional change rather than a simple technology-acquisition exercise. Across the reviewed studies, three interconnected issues are particularly prominent: the availability of AI applications, the capacity of librarians to use them, and the institutional conditions required for sustainable implementation.

The first finding reveals that AI has applications across both technical and public services. Automated metadata generation, intelligent retrieval, conversational support, predictive analytics and robotics demonstrate that AI can influence several stages of the information service process. This supports the broader view that AI can enhance library operations when applications are selected according to clearly defined service needs (Hussain, 2023; Zondi et al., 2024).

The second finding deals with the difference between awareness and readiness. Nigerian studies consistently point towards the importance of skills, training and institutional support. This means that increasing awareness campaigns alone will not necessarily lead to effective AI adoption. Professional development must provide opportunities for hands-on learning, critical evaluation and application to specific library functions (Ajani et al., 2022; Achugbue, 2024; Fagola & Egbebi, 2025).



The third finding reveals that infrastructure and governance are inseparable from AI adoption. Weak electricity supply, unreliable connectivity, limited funding and inadequate technical support can undermine otherwise promising applications. At the same time, ethical and privacy concerns mean that libraries need governance structures that protect users and preserve professional accountability. Thus, technological readiness, human capacity and institutional governance should be developed together.

The review also indicates that AI should not be framed primarily as a substitute for librarians. The strongest professional case for adoption is augmentation: AI can handle or support selected repetitive and computational tasks while librarians concentrate on judgement, contextual interpretation, research guidance, information literacy, ethical oversight and human interaction. This perspective can also help reduce resistance by presenting AI as a tool for strengthening professional practice.

Conclusion

Artificial intelligence offers Nigerian university libraries substantial opportunities to strengthen information service delivery. AI can be applied to a widerange of library functions including intelligent information searching, virtual reference services, automated metadata processing, predictive analysis, personalized user support and the automation selected routine tasks. Its potential applications include intelligent information retrieval, conversational reference support, automated metadata-related activities, predictive analytics, personalized information assistance and selected routine operations. The application of theses AI technologies can faster quicker access, enhance users' library experiences, increase operational effectiveness and support more responsive management of library services.

The review nevertheless shows that successful adoption depends on conditions that extend beyond technology acquisition. Funding limitations, weak infrastructure, unstable electricity and connectivity, skills gaps, resistance to change, ethical concerns, privacy risks and inadequate policy frameworks may constrain implementation. Awareness of AI among librarians is important, but it must be accompanied by practical competence and institutional readiness.

Nigerian university libraries should therefore adopt a coordinated approach that combines infrastructure development, continuous professional education, responsible governance,



sustainable funding, collaboration and phased implementation. AI should be positioned as a professional augmentation tool that complements rather than displaces librarians' expertise. When implemented responsibly, AI can help university libraries strengthen their contributions to teaching, learning, research and innovation in the 21st-century academic environment.

Recommendations

- University management should provide sustainable funding for AI-related infrastructure, software, maintenance, cybersecurity and staff development.
- University libraries should establish continuous AI literacy and practical training programmes for professional and relevant support staff.
- Library management should develop clear guidelines for responsible AI use, including privacy, data protection, transparency, accountability and human oversight.
- Libraries should identify service problems and user needs before selecting AI applications, ensuring that technology adoption is purpose-driven.
- AI implementation should begin with pilot projects that are evaluated for accuracy, usability, cost, user acceptance and professional implications.
- Professional associations and library schools should strengthen continuing education and curriculum content related to AI, data literacy and emerging information technologies.
- University libraries should collaborate with ICT units, researchers, technology providers and professional networks to share expertise and reduce implementation barriers.

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