



Remodeling Library Services through Artificial Intelligence

Adeyemi Adewale Akinola & Adeniyi Michael Omotade

Abstract:

Library services through Artificial Intelligence (AI) have brought a major change to information delivery systems in the digital era. The study examines how AI remodel library services through its application to four main areas which include Improved User Experience, improved services, data analysis, and AI literacy. The study used qualitative methods for comparative analysis of ten key studies from Africa, Asia and European Countries which were published between 2020 and 2025. The study reveals that chatbots in academic libraries greatly improved service delivery by providing users with real-time assistance. Also, librarians' perceived AI as a tool to improve library services. The study proves that AI enhances user satisfaction through service design but noted the need for structured support and policies. The study concludes that while AI possesses the ability to transform library services, its success depends on institutional readiness and inclusive implementation.

To cite this article:

Akinola, A. A. & Omotade, A. M. (2026). Remodeling Library Services through Artificial Intelligence. *International Journal of Librarianship*, 11(1), 87-106.
<https://doi.org/10.23974/ijol.2026.vol11.1.528>

To submit your article to this journal:

Go to <https://ojs.calajol.org/index.php/ijol/about/submissions>

Remodeling Library Services through Artificial Intelligence

Adeyemi Adewale Akinola, Adeniyi Michael Omotade

Mountain Top University, Nigeria

ABSTRACT

Library services through Artificial Intelligence (AI) have brought a major change to information delivery systems in the digital era. The study examines how AI remodel library services through its application to four main areas which include Improved User Experience, improved services, data analysis, and AI literacy. The study used qualitative methods for comparative analysis of ten key studies from Africa, Asia and European Countries which were published between 2020 and 2025. The study reveals that chatbots in academic libraries greatly improved service delivery by providing users with real-time assistance. Also, librarians' perceived AI as a tool to improve library services. The study proves that AI enhances user satisfaction through service design but noted the need for structured support and policies. The study concludes that while AI possesses the ability to transform library services, its success depends on institutional readiness and inclusive implementation.

Keywords: Artificial Intelligence, Library Services, Information accessibility, Information Technology

INTRODUCTION

Libraries serve as knowledge repositories which enable users to access information resources and services that help them learn, conduct research and engage with their community. Traditional libraries face a growing challenge to maintain their relevance because technology advances at a fast pace while information delivery systems continue to evolve. The integration of artificial intelligence (AI) systems into various industries during recent years has proven to boost operational efficiency while improving user experiences and advancing innovation. AI-powered solutions including machine learning algorithms, natural language processing and data analytics provide libraries with new opportunities to improve their operations, user engagement and digital age competitiveness. AI technology enables libraries to use automated systems for regular operations, personal service delivery, data analysis and digital collection management as well as

improved search capabilities. Yuan (2021) demonstrated through research that machine learning and natural language processing technologies enable AI systems to perform automated library tasks which include cataloguing, indexing and recommendation system operations. These tools enable librarians to improve their work processes while saving resources and providing users with more accurate library search results.

AI-powered virtual assistants provide customized help to library users by answering their questions, suggesting suitable resources and helping them with their research tasks. The study of Massis (2018) shows that AI applications in libraries create an interactive and user-friendly environment for library users. AI systems can examine user behaviour and preferences which enables libraries to develop customized services and collections to meet the specific needs of their community. AI data analytics and predictive modeling allows libraries to achieve user understanding which leads to improved service delivery. AI technology implementation in library services transform both operational methods and user interaction methods of libraries. AI solutions enable libraries to maintain their operational efficiency, service quality and digital period relevance. This research aims to add knowledge to the study of technological influence through its analysis of how artificial intelligence creates accessible and responsive library environments for diverse user groups.

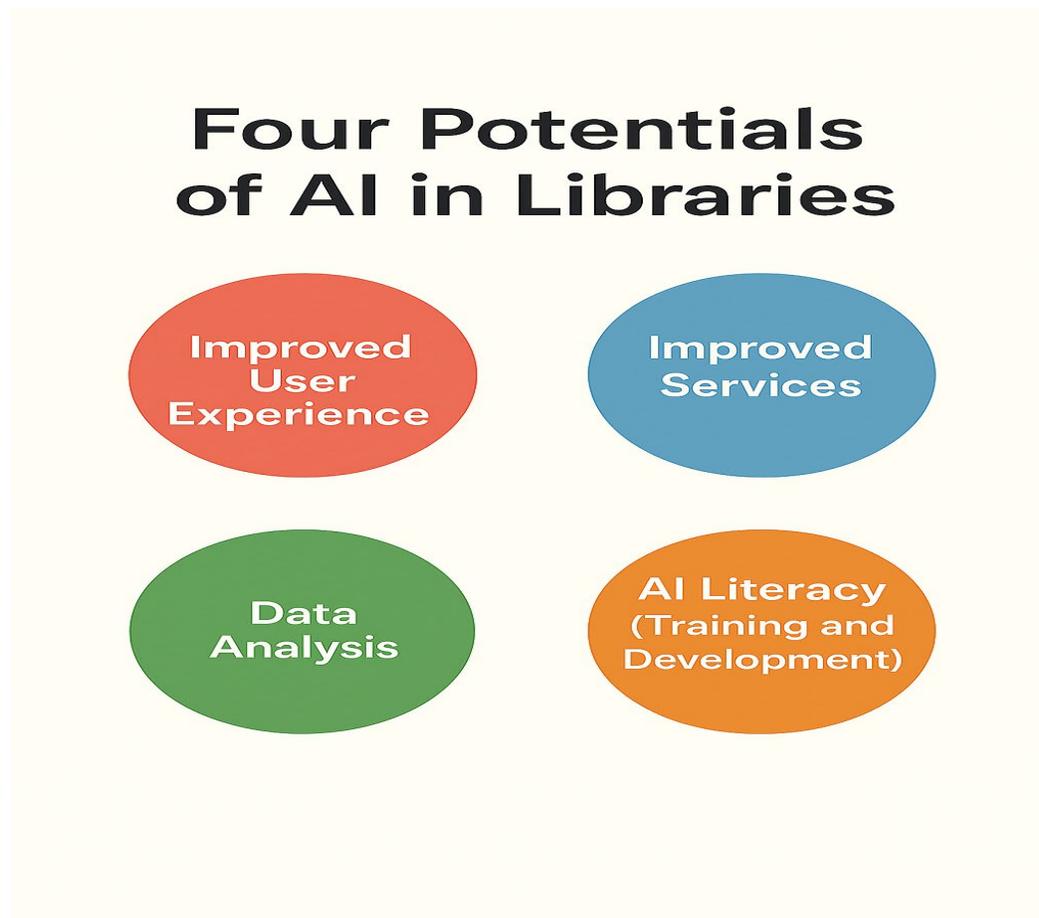
AI Model and Applications in Libraries

Figure 1: Four Potentials of Ai in Libraries

Improved User Experience

AI technologies have brought major changes to user interactions with library systems. Machine learning recommendation systems generate personalized content suggestions through user reading behaviour and individual preference analysis. Natural Language Processing (NLP) improves search results by grasping query context and AI chatbots provide users with immediate 24/7 assistance. The technologies create interactive library environments which support accessibility and inclusivity for different user groups.

Personalized Recommendations and Engagement

The integration of AI technology into libraries brings about a complete transformation of their traditional operations because it enables fast information retrieval, customized recommendations and automated resource management. Machine learning operates as a specialized field of AI which

drives this transformation forward. According to LeCun, Bengio, and Hinton (2015), machine learning algorithms perform essential functions for image recognition, natural language processing and pattern detection. The library employs machine learning to track user preferences, reading behaviours and loan records to generate tailored recommendations which increase user activity and satisfaction. This line of argument buttresses the study of Harris and Turner (2020) which shows that AI recommendation systems help users find resources more effectively while increasing their involvement.

Natural Language Processing and Chatbots

Natural Language Processing (NLP) technology enables library systems to improve their search functions through its capabilities. The process of textual data analysis by NLP algorithms leads to automated content tagging and metadata quality which results in improved search accuracy and performance. The research conducted by Choi and Song (2019) shows that NLP-based search functions create user experiences when implemented in library systems. AI-powered chatbots and virtual assistants deliver instant answers to research questions, resource navigation and common question support which results in better user experiences. The systems operate continuously to provide users with uninterrupted service which results in user satisfaction. According to Stinson and Le Rouge (2022) academic libraries have successfully integrated AI chatbots to improve user support services and operational efficiency.

Improved Services

The implementation of AI systems has completely changed fundamental library operations which include cataloguing, indexing and retrieval processes. AI-powered automation tools produce metadata through automated processes that also perform classification and error detection which results in improved accuracy and decreased human involvement. The system delivers users current and most pertinent information through its combination of intelligent search capabilities with instant indexing. The combination of robotic process automation with AI-based workflow management systems has enhanced circulation operations to achieve better turnaround times and superior service performance.

AI for Cataloguing and Indexing

AI technology exists primarily to support automation and information retrieval operations through Yewno Discovery which began operations in 2016 to provide users with visualized data concepts that exceed the capabilities of standard library catalog systems (Gramatica and Pickering, 2017). AI technologies execute cataloguing and indexing operations through automation which results in improved accuracy of metadata generation. The use of advanced tools leads to better information resource organization and retrieval performance because it enables uninterrupted access to library

collections. The technologies perform automated metadata extraction operations which process information from books and articles and multimedia materials.

AI tools identify key metadata from digital content through optical character recognition (OCR) and machine learning which recognizes authors, titles, publication dates and subject categories. The automated system reduces the need for human involvement in metadata creation while improving both the consistency and quality of catalogue records (Rahman, Zakaria & Ahmad, 2021). AI technology uses metadata extraction to automatically generate subject headings categories and classifications from resource content for analysis. AI interprets document context and meaning to classify materials correctly through predefined taxonomies or classification schemes. The automated system improves indexing operations while users can find materials faster through the improved search functionality (Chen & Lee, 2020). The combination of natural language processing (NLP) and semantic analysis improves search functions through search relevance, related material suggestions and precise search result delivery.

The analysis of textual data semantics by AI systems enables users to experience improved interaction through precise and swift information resource discovery (Bouaamri, Otiike & Hajdu, 2024). AI quality control systems detect errors, inconsistencies and missing metadata in catalogue records. AI employs data validation algorithms and pattern recognition techniques to detect and correct errors which maintains both the accuracy and completeness of cataloguing information. AI cataloguing systems evolve through the development of data integrity maintenance methods and library record quality improvement systems according to David-West and Ig-worlu (2023). These systems learn from user data and feedback while analyzing information to improve their adaptability to new content types and changing user requirements. The system becomes more effective at cataloguing and indexing through its iterative learning process which produces enhanced metadata management accuracy and relevance. AI technology assists libraries with cataloguing and indexing operations which results in better metadata management efficiency and accuracy and accessibility.

AI Search Automation and Retrieval

People need to search for information swiftly because the amount of available data keeps expanding rapidly during this digital era. Libraries face ongoing challenges to help users find their needed materials at the right time because they serve as information centres. Modern library systems need to develop their search and retrieval capabilities into fundamental operating systems because of their essential importance. Artificial Intelligence (AI) technologies have emerged as powerful tools in this domain, improving accuracy, relevance, and efficiency in library search systems (Krizhevsky, Sutskever & Hinton, 2012). The library benefits from automation because it improves routine tasks including cataloguing and indexing and user assistance which leads to better productivity through reduced manual work (Tella, 2020).

AI-powered intelligent search systems in libraries now perform better information retrieval because they use machine learning to study how users interact with content, what they search for and what they need (Krizhevsky, Sutskever & Hinton, 2012). The algorithms learn from user interactions to improve their search results accuracy through better personalized recommendations. AI systems use semantic search to perform more advanced operations than keyword matching because they understand both the words and the full meaning of search requests (He, Lee, Lewis, & Zettlemoyer, 2017). AI improves search results through natural language processing and semantic analysis which makes library resources easier to find by producing more relevant and contextually appropriate results.

Building on these advancements, real-time search and content indexing powered by AI ensure that users have access to the most up-to-date materials (Huang, 2020). AI-powered library search engines maintain current content through continuous indexing of new books and journal articles and digital archives which delivers fresh and applicable search results for improved knowledge management and user access.

Data Analysis

AI gives libraries advanced data analysis tools which help make intelligent choices. The predictive models examine circulation patterns and user actions to determine which materials to add to collections and how to distribute resources effectively. The emergence of AI technology brings about significant challenges for protecting personal information and keeping digital systems secure. This explain best practices for risk management through data encryption and regulatory compliance and explainable AI systems which build user trust by offering transparency

Predictive Analytics and Decision-Making

AI systems enhance user experiences through their automated systems which manage resource classification, metadata enrichment and indexing processes in cataloguing workflows. The automated cataloguing tools create operational efficiency while minimizing mistakes and making library materials more discoverable. According to Lippincott (2021), AI-driven automation enhances accuracy in resource categorization, enabling libraries to manage vast collections more effectively. Libraries achieve operational efficiency through predictive analytics which enables data-based decisions about collection development, acquisition, deselection and resource distribution. AI systems analyze circulation patterns and user behaviour to determine which resources will be in demand thus helping libraries develop their collections more effectively. The 2019 OCLC Research report highlights predictive analytics functions which organizations use to enhance decision-making processes and create user-focused collection strategies.

Addressing Security and Privacy Issues Related to AI in Libraries

Libraries encounter a major obstacle because AI systems have multiple security vulnerabilities which allow unauthorized users to access data, make unauthorized changes to AI algorithms and steal user information (Soofi et al. 2023). The protection of user data, defense against cyber threats and adversarial attacks on AI models become essential for library administrators and IT professionals because of these risks. AI systems generate multiple security dangers which merge with privacy problems because of the need to gather data and build user profiles while users stay unaware about their personal information processing (Senthilkumar, 2024). To address these concerns, libraries must prioritize practices like obtaining user consent, anonymizing data, and ensuring compliance with regulations such as the General Data Protection Regulation (GDPR), which helps maintain privacy and transparency.

The implementation of best practices in libraries requires encryption protocols for data transmission and regular security audits and user education about data privacy rights. The establishment of data ethics culture within libraries supports these initiatives and protects privacy rights according to Khan Gupta Sinhababu and Chakravarty (2024). The process of working with cybersecurity experts, data protection officers and legal professionals stands as a vital requirement for libraries to understand security and privacy laws in their most basic form. The fundamental principles guide real-world methods to protect AI systems in libraries through three main approaches which involve multi-factor authentication for library systems, secure AI model training methods and explainable AI frameworks that enable transparent decision-making processes. Libraries establish data retention and deletion policies which create a shield for protecting data privacy rights while maintaining proper AI system operation.

The solution to these security and privacy issues needs staff members in libraries to work together with IT specialists, cybersecurity professionals and all relevant stakeholders. Libraries achieve their main goal through collaborative work by creating secure systems which maintain ongoing threat monitoring and fast incident response. The protection of user privacy and AI service integrity in libraries depends on a complete system which uses proactive threat detection and continuous system monitoring according to Vlachokyriakos et al. (2024).

AI Literacy (Training and Development)

Artificial intelligence provides benefits yet its deployment in libraries faces obstacles because of different awareness levels, skill deficiencies and infrastructure restrictions. The studies presented in the manuscript show that librarians hold various views about AI technology because some support its efficiency but others worry about job losses and ethical problems. The results show that organizations need to develop ongoing professional development programs and make strategic investments and establish policies which support AI literacy. The success of sustainable library

service innovation depends on librarians and library leaders to acquire both AI knowledge and practical tools for effective implementation.

Asemi and Asemi (2018) state that recommender systems represent the most advanced AI technology used in Library and Information Science (LIS) but natural language processing technology remains less advanced. The study demonstrates that AI recommendation systems enhance user satisfaction but further research into natural language processing technology will improve information retrieval accuracy and accessibility. According to Johnson (2018), AI technology affects how people search for information which leads libraries to back open-source AI projects. The statistics show libraries need to develop AI technology through strategic planning instead of short-term reaction because they must stay relevant in the digital age.

Library management (Țundrea, Turcuț & Fotea 2020) demonstrates how AI functions to enhance book reservation systems, user preference analysis and acquisition planning. Research shows that AI-based remodeling systems improve library performance but require user adaptation and ethical management. Libraries encounter conflicting effects when artificial intelligence systems operate because they create both positive and negative effects. The study reveals that academic librarians from Nigeria understand AI systems help their work but they fear losing their jobs so they need training and educational programs. The research established that librarians understand AI systems enhance their work duties and user contentment but they need to obtain extra training because they must maintain their professional expertise in AI-based library operations. Li (2021) shows that AI helps libraries protect their networks by using predictive analytics to build better data protection systems. The research presents an AI-based preventive mechanism that enhances real-time security assessment and predictive accuracy, ensuring the safety of library networks. The system provides real-time security assessment and predictive capabilities which enhance library network safety through AI technology.

AI impacts security systems and intelligent service systems operate separately from each other. University libraries benefit from AI-based data analysis which allows for both improved retrieval systems and better information access according to Li (2021). The research he conducted demonstrated that AI models which operate through the Internet of Things perform better than traditional library systems because they provide superior resource management capabilities. Han (2021) shows that digital libraries have evolved into intelligent systems which use metadata to help users make better choices. Han believes that AI integration with human expertise produces two main results: first it reduces work volume and second it enhances data collection and library management systems. The research by Liu Song and Li (2021) shows that AI system development requires technology-task fit models to match user requirements because this enables libraries to adapt their services effectively. Their research revealed that AI technology features determine user adoption of smart libraries so libraries need to integrate AI systems into their present service offerings. Kong (2021) shows how AI technology enables text classification and reading support

which creates better digital library experiences. Kong developed a Rough-RBFNN neural network model which improves text classification performance and digital resource reading experience.

The technological progress continues to face obstacles because infrastructure needs improvement and staff require additional training (Frag, Mahfouz & Alhajri, 2021). The research conducted in Saudi academic libraries revealed that most library staff members did not understand AI applications which prevented them from using AI in their work. Echedom and Okuonghae (2021) recommend that governments should work together with library management to solve these problems. The authors state that African libraries need strategic partnerships and policy development to achieve AI integration because their infrastructure and training systems require major improvements. AI-driven innovation in libraries requires strategic policies to work together with professional development programs which produce sustainable growth and better service delivery

Pence (2022) examines the transformative potential of AI in libraries, identifying key applications such as remote access, data analysis, and advanced research assistance. The research shows that AI allows libraries to become virtual knowledge centers which helps librarians dedicate their time to specialized research assistance. The statement shows how AI has enabled libraries to develop new services which extend beyond their basic operational framework. Through their examination of 126 papers Gasparini and Kautonen (2022) discovered contrasting opinions about AI adoption in libraries. The librarians who use AI recognize its ability to boost operational efficiency yet they face ethical problems with AI fairness and human impact. The research demonstrates that design methods help organizations solve AI problems by creating systems that unite technology with human abilities.

Huang (2022) explores AI implementation in Taiwanese university libraries, using quantitative research to assess librarians' perspectives. The research results demonstrate that people who view AI positively tend to have better knowledge about it and actively participate in AI-related activities within their organizations. The main obstacles to AI adoption continue to be financial limitations and technological barriers which indicate organizations must strategically allocate resources for AI implementation. Harisanty, Anna, Putri, Firdaus, and Noor Azizi (2022) studied how academic library leaders in Indonesia understand and view artificial intelligence. The results indicate enthusiasm for AI's potential benefits, including improved circulation, resource classification, and research support. The implementation of AI faces obstacles because of restricted budgets and ambiguous policies and insufficient leadership direction which shows the requirement for well-defined policy structures.

Thalaya and Puritat (2022) conducted research to evaluate how AI improves library services through practical use and found that AI-assisted user responses deliver enhanced operational efficiency and better user satisfaction outcomes. The satisfaction levels of nursing students and instructors reached their peak because AI technology delivers better library

management systems and user interfaces. Harisanty, Anna, Putri, Firdaus and Noor Azizi (2023) conducted additional research to analyze AI applications in library administration and cataloguing and information literacy development. The research demonstrates that AI systems handle basic tasks but requires extra studies to solve deployment problems for smooth integration into library operations. Hussain (2023) analyzes AI capabilities and difficulties in library services through content analysis. AI technology shows promise for improving library operations according to the research results yet organizations need to handle budget restrictions and staff training needs and organizational resistance to change. The research demonstrates that AI adoption needs both training programs and cost-effective AI solutions

Xu (2023) provides a detailed analysis of six AI technologies relevant to libraries, including OCR, data mining, and machine learning. The research shows these technologies transform libraries into digital spaces which improve access, operational efficiency and service performance but reveals continuing difficulties with technology adoption. Nugroho, Anna and Ismail (2023) examine AI applications in library services during the COVID-19 outbreak to show how digital repository support and open-access initiatives function as vital resources. The research shows that AI-based repository services serve as essential tools to protect libraries from the future and meet changing digital user requirements. Through their research Lin et al. (2023) demonstrate how AI-powered recommendation systems function to boost user participation in digital reading promotion activities. AI technology enables libraries to generate individualized reading recommendations through user preference tracking which leads to improved service delivery and community interaction

METHOD

This study adopted a qualitative research design supported by literature synthesis and comparative evaluation of existing studies to explore the integration of Artificial Intelligence (AI) in remodeling library services. The study was structured to investigate not only the transformative potential of AI but also the real-world implications and contextual barriers surrounding its adoption in library environments. The study used ten (10) secondary data sources selected from Africa, Asia, and European countries. Selected data primarily focused on academic journal articles, institutional case studies, policy documents, conference proceedings, and industry reports published between 2020 and 2025. To enrich the study and ground it in real-world contexts, a comparative analysis of key empirical and conceptual studies was conducted. Selected works were compared based on: Geographic location, Scope of AI application, Research methodology, Outcomes and limitations, and Challenges.

RESULTS AND DISCUSSION

Conceptual and Comparative Analysis of Key Studies on Remodeling Library Services through AI

S/N	Study	Focus/ Scope	AI Tools/ Technologies	Findings	Challenges Identified	Recommendations/ Future Directions
1	Eager, Whittle, Smit, Cacciaguerra, & Lale-Demoz (2020)	Awareness and attitudes of France library leaders toward AI	Chatbots, automation tools	Positive attitudes, but limited strategic implementation	Skill gaps, insufficient infrastructure	Capacity building, AI strategy development
2	Tella, (2023)	Application of AI in academic libraries	Chatbots, recommender systems	Boosts efficiency, better user engagement	Data privacy, staff retraining	Policy and ethical guidelines for AI
3	Fruehauf, Beman-Cavallaro, & Schmidt, (2024)	Opportunities and implications of AI in LIS	NLP, machine learning, digital assistants	AI can revolutionize LIS services	Budget constraints, lack of collaboration	Joint research initiatives, staff retooling
4	Hossain, Biswas, Khan, & Khan (2024)	AI readiness in South Asian libraries	Predictive analytics, automation	Interest exists, but readiness is low	Resistance to change, infrastructure	Government grants, professional training

5	Kalbande, Yuvaraj, Verma, Suradkar, & Chavan (2024)	Trends and user perception of AI in Indian libraries	AI-based search, data analytics	Encourages personalization, evidence-based services	Policy gaps, tech illiteracy	AI inclusion in LIS curriculum
6	Oyetola, Oladokun, Maxwell & Akor (2023)	AI adoption in Nigerian academic libraries	Basic automation, intelligent systems	Adoption is slow, but awareness is growing	Low ICT skills, poor funding	Stakeholder partnerships, ICT development
7	Kausha & Yadav (2022)	Chatbots in academic libraries	Chatbots, virtual reference	Improves response time and user satisfaction	Maintenance, user acceptance	Continued testing, user-centered design
8	Shah, Naeem, Bhatti, Khan & Wang (2024)	Impact of data analytics and AI in libraries	Predictive analytics, machine learning	Supports strategic collection development	Ethics, skill gap	Institutional AI policy, staff workshops
9	Jha (2023)	Role of AI in modernizing library services	Smart systems, AI-enabled classification	AI boosts cataloguing and knowledge discovery	Infrastructural and financial barriers	Investment in AI tools and cloud platforms

10	Zheng, Chen, Park, Xu & Huang (2025)	AI-driven digital libraries in China	AI for metadata generation, user behavior prediction	Improves digital access and personalization	Language barriers, standardization	Multilingual AI tools, cross-platform integration
----	--------------------------------------	--------------------------------------	------------------------------------------------------	---------------------------------------------	------------------------------------	---------------------------------------------------

Source: Author's construct, 2025

The table on comparative analysis of key studies on remodeling library services through AI shows the analysis of ten studies conducted between 2020 and 2025.

Academic libraries gained better service delivery through chatbots which provided users with immediate assistance which resulted in improved satisfaction and reduced waiting times according to Kaushal and Yadav (2022). Tella (2023) demonstrated that AI-based reference services which include chatbots and virtual agents enable library users to access information through more intuitive and user-friendly channels. Zheng et al. (2025) conducted their research by examining how people without AI knowledge interact with AI systems within library settings. The research demonstrates that AI systems enhance user experience but poor interface design combined with insufficient guidance causes users to experience confusion and lose confidence when operating these tools. The results demonstrate that non-technical users require AI systems which focus on human needs as their main design principle. Fruehauf et al. (2024) demonstrated that libraries which proactively address user concerns about generative AI through structured guidance and tools and educational resources achieve better user experience results.

Jha (2023) identified AI technology as having the ability to automate repetitive tasks that include cataloguing and classification work and basic reference question response. The automated systems enable librarians to dedicate their time towards advanced responsibilities which include teaching information literacy and supporting research consultations. Eager et al. (2020) demonstrated that AI implementation improves public service efficiency when organizations establish proper ethical and regulatory frameworks. The research conducted by Oyetola et al. (2023) showed that Nigerian librarians view AI as a tool for library modernization but face challenges because of poor infrastructure. Kalbande et al. (2024) similarly emphasized that AI improves user satisfaction through better service design but noted the need for structured support and policies. Fruehauf et al. (2024) explained that libraries now work with academic departments to provide AI-related workshops and consultations and instructional content which helps them serve the changing needs of academic users.

Shah et al. (2024) demonstrated that academic libraries achieve usage pattern analysis and resource distribution knowledge and user interest understanding through big data analytics.

Libraries have developed the ability to analyze large datasets which helps them improve their collection management and predict user behavior and evaluate service effectiveness. Eager et al. (2020) stated that public sector service delivery gets enhanced through AI-based data tools which make libraries benefit from data-based decision-making processes. The authors mention that organizations need proper data governance and privacy protection and organizational preparedness to achieve successful implementation.

Hossain et al. (2024) conducted a comprehensive survey among South Asian LIS students and revealed that varying levels of AI literacy were influenced by country, gender, and educational background. The research findings show that educational programs need to be restructured and specific training must be established to address these learning requirements. The research conducted by Fruehauf et al. (2024) shows librarians create AI literacy programs to address faculty concerns about generative AI. The team developed resources through interdisciplinary work which help faculty and students achieve responsible and successful AI tool usage. Oyetola et al. (2023) identified Indian and Nigerian librarians lack AI skills which means professional development stands as the essential factor for effective AI adoption. Tella (2023) states that librarians need ongoing education to handle AI-based reference services because they require knowledge about implementing and operating these systems

The comparison of ten main studies indicates that artificial intelligence brings core transformations to how library services operate in different environments. Libraries achieve better user experience and service operations through chatbots and big data analytics and generative AI tools and automated workflows which also help them make data-driven decisions. The implementation of AI requires organizations to have both suitable technology and established systems and trained personnel and established ethical standards and regulatory frameworks. The developed world progresses through planned implementation and team-based work but developing nations struggle with inadequate infrastructure and insufficient funding and unskilled workforce. The research findings show that libraries will meet their future roles through artificial intelligence but this requires specific investments in AI education and policy creation and stakeholder participation.

CONCLUSION

The remodeling of library services through Artificial Intelligence (AI) marks a fundamental change in how libraries provide value to their users within the digital data-driven society of today. The research established that AI functions as a core system which transforms current library operations through changes to user interface, resource discovery and cataloguing and decision

making systems. AI technology has transformed libraries into flexible spaces which serve users through personalized recommendation systems, intelligent search tools, automated cataloguing and predictive analytics. AI systems operate at libraries to create better operational systems which expand library services to reach new audiences. The implementation of this system needs organizations to prepare themselves through staff training, ethical planning, strategic plans, professional development and institutional readiness. Digital literacy gaps together with data privacy concerns and infrastructure issues and policy restrictions need to be resolved for sustainable and fair technology implementation.

The study conclusion show that different libraries around the world exist at different stages of AI implementation while they all work together to improve their services. The combination of AI literacy investments, inclusive policy development and stakeholder cooperation will enable libraries to achieve complete AI service transformation benefits. They establish themselves as modern institutions by adapting to changing user requirements while protecting their core values of free access, equal participation and knowledge distribution. Artificial intelligence-based library service remodeling stands as a strategic transformation of library operations for the modern era beyond its role as a technological advancement.

References

- Abayomi, O. K., Adenekan, F. N., Abayomi, A., Olateju, Ajayi, T. A., & Aderonke, A. O. (2020). Awareness and Perception of the Artificial Intelligence in the Management of University Libraries in Nigeria. *Journal of Interlibrary Loan, Document Delivery & Electronic Reserve*, 29(1–2), 13–28. <https://doi.org/10.1080/1072303X.2021.1918602>.
- Asemi, A., & Asemi, A. (2018). Artificial Intelligence (AI) application in Library Systems in Iran: A taxonomy study. *Library Philosophy and Practice (e-Journal)*. <https://digitalcommons.unl.edu/libphilprac/1840>.
- Bibliotec Universitat Oberta de Catalunya (2024). Visions of the future: four ways in which generative AI could be integrated into libraries. <https://biblioteca.uoc.edu/en/news/news/Visions-of-the-future-four-ways-in-which-generative-AI-could-be-integrated-into-libraries>.
- Bouaamri, A., Otike, F., & Hajdu, A. (2024). *Semantic Technologies: a Transformative Approach in Public Libraries* (No. 13231). EasyChair.
- Chen, L., & Lee, K. H. (2020). Enhancing library services with artificial intelligence: A review of current developments and applications. *Library Hi Tech*, 38(1), 7-22.

- Choi, Y., & Song, J. (2019). *Enhancing the search functionality of library systems using NLP*. Wiley.
- David-West, B. T., & Ig-worlu, M. O. (2023). AI-driven future: strategies and skills development for Nigerian librarians. *Gateway Information Journal*, 24(1 & 2), 20-32.
- Eager, J., Whittle, M., Smit, J., Cacciaguerra, G., & Lale-Demoz, E. (2020). *Opportunities of artificial intelligence*. Strasbourg, France: European Parliament.
- Echedom, A. U., & Okuonghae, O. (2021). Transforming academic library operations in Africa with artificial intelligence: Opportunities and challenges: A review paper. *New Review of Academic Librarianship*, 27(2), 243–255. <https://doi.org/10.1080/13614533.2021.1906715>.
- Farag, H., Mahfouz, S., & Alhajri, S. (2021). Artificial Intelligence Investing in Academic Libraries: Reality and Challenges. *Library Philosophy and Practice (e-Journal)*. <https://digitalcommons.unl.edu/libphilprac/5309>.
- Fruehauf, E., Beman-Cavallaro, A., & Schmidt, L. (2024). Developing a foundation for the informational needs of generative AI users through the means of established interdisciplinary relationships. *The Journal of Academic Librarianship*, 50(3), 102876.
- Gasparini, A. A., & Kautonen, H. (2022). Understanding Artificial Intelligence in Research Libraries: An Extensive Literature Review. *LIBER Quarterly: The Journal of European Research Libraries*, 32(1), 1–36. <https://doi.org/10.53377/lq.10934>.
- Gramatica, R. & Pickering, R. (2017). Start-up story: Yewno: an AI-driven path to a knowledge-based future. *Insights*, 30 (2).
- Han, K. (2021). Research and Exploration of Metadata in Artificial Intelligence Digital Library. *Journal of Physics: Conference Series*, 1915(2), 022061. <https://doi.org/10.1088/1742-6596/1915/2/022061>.
- Harisanty, D., Anna, N. E. V., Putri, T. E., Firdaus, A. A., & Noor Azizi, N. A. (2022). Leaders, practitioners and scientists' awareness of artificial intelligence in libraries: A pilot study. *Library Hi Tech*, ahead-of-print (ahead-of-print). <https://doi.org/10.1108/LHT-10-2021-0356>.
- Harisanty, D., Anna, N. E. V., Putri, T. E., Firdaus, A. A., & Noor Azizi, N. A. (2023). Is adopting artificial intelligence in libraries urgency or a buzzword? A systematic literature review. *Journal of Information Science*, 01655515221141034. <https://doi.org/10.1177/01655515221141034>.

- Harris, R., & Turner, P. (2020). Artificial intelligence and the transformation of library services. *Library Trends*, 69(2), 292-313.
- He, L., Lee, K., Lewis, M., & Zettlemoyer, L. (2017). Deep semantic role labelling: What works and what's next. In *Proceedings of the 55th Annual Meeting of the Association for Computational Linguistics (Volume 1: Long Papers)* (pp. 473-483).
- Hossain, Z., Biswas, M. S., Khan, N. A., & Khan, G. (2024). Artificial intelligence literacy among South Asian library and information science students: Socio-demographic influences and educational implications. *IFLA Journal*, 03400352251331468.
- Huang, Y.-H. (2022). Exploring the implementation of artificial intelligence applications among academic libraries in Taiwan. *Library Hi Tech*, ahead-of-print (ahead-ofprint). <https://doi.org/10.1108/LHT-03-2022-0159>.
- Huang, Z. (2020). Real-Time Content Indexing and Search with AI Technologies. *IEEE Transactions on Knowledge and Data Engineering*. DOI: 10.1109/TKDE.2020.3016016.
- Hussain, A. (2023). Use of artificial intelligence in the library services: Prospects and challenges. *Library Hi Tech News*, 40(2), 15–17. <https://doi.org/10.1108/LHTN-11-2022-0125>.
- Jha, S. K. (2023). Application of artificial intelligence in libraries and information centers services: prospects and challenges. *Library hi tech news*, 40(7), 1-5.
- Johnson, B. (2018). Libraries in the Age of Artificial Intelligence. *Computers in Libraries*. <https://www.infotoday.com/cilmag/jan18/Johnson--Libraries-in-the-Age-of-Artificial-Intelligence.shtml>.
- Kalbande, D., Yuvaraj, M., Verma, M. K., A, S., Suradkar, P., & Chavan, S. (2024). Exploring the integration of artificial intelligence in academic libraries: a study on librarians' perspectives in India. *Open Information Science*, 8(1), 20240006.
- Kaushal, V., & Yadav, R. (2022). The role of chatbots in academic libraries: An experience-based perspective. *Journal of the Australian Library and Information Association*, 71(3), 215-232.
- Khan, R., Gupta, N., Sinhababu, A., & Chakravarty, R. (2024). Impact of Conversational and Generative AI Systems on Libraries: A Use Case Large Language Model (LLM). *Science & Technology Libraries*, 1-15.

- Kong, J. (2021). Application and Research of Artificial Intelligence in Digital Library. In M. Atiquzzaman, N. Yen, & Z. Xu (Eds.), *Big Data Analytics for Cyber-Physical System in Smart City* (pp. 318–325). Springer. https://doi.org/10.1007/978-981-33-4572-0_47.
- Krizhevsky, A., Sutskever, I., & Hinton, G. E. (2012). Imagenet classification with deep convolutional neural networks. *Advances in neural information processing systems*, 25.
- LeCun, Y., Bengio, Y., & Hinton, G. (2015). Deep learning. *Nature*, 521(7553), 436-444.
- Li, C. (2021). Construction of Intelligent Service System of University Library Based on Internet of Things in Artificial Intelligence Environment. 2021 5th International Conference on Intelligent Computing and Control Systems (ICICCS), 471–474. <https://doi.org/10.1109/ICICCS51141.2021.9432378>.
- Lin, X., Sun, Y., Zhang, Y., & R, K. M. (2023). Application of AI in Library Digital Reading Promotion Service. 2023 IEEE International Conference on Integrated Circuits and Communication Systems (ICICACS), 1–6. <https://doi.org/10.1109/ICICACS57338.2023.10100096>.
- Lippincott, S. (2021). Mapping the current landscape of research library engagement with emerging technologies in research and learning.
- Liu, J., Song, D., & Li, W. (2021). Research on Factors Influencing Smart Library Users' Use Intention in the Era of Artificial Intelligence. *Journal of Physics: Conference Series*, 2025(1), 012089. <https://doi.org/10.1088/1742-6596/2025/1/012089>.
- Massis, B. (2018). Artificial intelligence arrives in the library. *Information and Learning Science*, 119(7/8), 456–459. <https://doi.org/10.1108/ILS-02-2018-0011>.
- Nugroho, P. A., Anna, N. E. V., & Ismail, N. (2023). The shift in research trends related to artificial intelligence in library repositories during the coronavirus pandemic. *Library Hi Tech*, ahead-of-print (ahead-of-print). <https://doi.org/10.1108/LHT-07-2022-0326>.
- OCLC Research. (2019). Predictive analytics for collection development. OCLC.
- Oyetola, S. O., Oladokun, B. D., Maxwell, C. E., & Akor, S. O. (2023). Artificial intelligence in the library: Gauging the potential application and implications for contemporary library services in Nigeria. *Data and Metadata*, 2(1), 5.
- Pence, H. E. (2022). Future of Artificial Intelligence in Libraries. *The Reference Librarian*, 63(4), 133–143. <https://doi.org/10.1080/02763877.2022.2140741>.

- Rahman, M. H., Zakaria, S., & Ahmad, A. (2021). Knowledge Discovery from the Digital Library's Contents: Bangladesh Perspective. In *Towards Open and Trustworthy Digital Societies: 23rd International Conference on Asia-Pacific Digital Libraries, ICADL 2021, Virtual Event, December 1–3, 2021, Proceedings 23* (pp. 34-42). Springer International Publishing.
- Senthilkumar, K. R. (Ed.). (2024). *AI-Assisted Library Reconstruction*. IGI Global.
- Shah, N. U., Naeem, S. B., Bhatti, R., Khan, A., & Wang, X. (2024). Impact of big data and data analytics on the provision of data services in academic libraries. *The Electronic Library*, 42(6), 1039-1054.
- Soofi, A. A., Tahir, M., & Raza, N. (2023). Securing the Internet of Things: A Comprehensive Review of Security Challenges and Artificial Intelligence Solutions. *Foundation University Journal of Engineering and Applied Sciences* 4(2), 1-20. DOI:10.33897/fujeas.v4i2.779.
- Stinson, S., & Le Rouge, M. (2022). *Embodied Environmental Risk in Technical Communication*. Routledge.
- Tella, A. (2020). Robots are coming to the libraries are librarians ready to accommodate them? *Library Hi Tech News*, 37(8), 13–17. <https://doi.org/10.1108/LHTN-05-2020-0047>.
- Tella, A. (2023). Application of artificial intelligence for reference services in academic libraries: A global overview through a systematic review of literature. *Journal of library resource sharing*, 32(1-5), 11-26.
- Thalaya, N., & Puritat, K. (2022). BCNPYLIB CHAT BOT: The artificial intelligence Chatbot for library services in college of nursing. 2022 Joint International Conference on Digital Arts, Media and Technology with ECTI Northern Section Conference on Electrical, Electronics, Computer and Telecommunications Engineering (ECTI DAMT & NCON), 247–251. <https://doi.org/10.1109/ECTIDAMTNCNCON53731.2022.9720367>.
- Țundrea, E., Turcuț, F., & Fotea, S. L. (2020). Challenges and Opportunities When Integrating Artificial Intelligence in the Development of Library Management Systems. In S. L. Fotea, I. Ș. Fotea, & S. A. Văduva (Eds.), *Challenges and Opportunities to Develop Organizations Through Creativity, Technology and Ethics* (pp. 369–382). Springer International Publishing. https://doi.org/10.1007/978-3-030-43449-6_22.
- Vlachokyriakos, V., Johnson, I. G., Anderson, R., Claisse, C., Zhang, V., & Briggs, P. (2024). Design Implications for a Social and Collaborative Understanding of online Information Assessment Practices, Challenges and Heuristics. *arXiv preprint arXiv:2405.00519*.

- Xu, Z. (2023). Research on the application of artificial intelligence in the library sector. Third International Conference on Artificial Intelligence and Computer Engineering (ICAICE 2022), 12610, 1420–1429. <https://doi.org/10.1117/12.2671477>.
- Yuan, X. (2021). Research on the Development of Library in the Era of Artificial Intelligence. In *2021 16th International Conference on Computer Science & Education (ICCSE)* (pp. 1052-1057). IEEE.
- Zheng, Q., Chen, M., Park, H., Xu, Z., & Huang, Y. (2025, April). Evaluating Non-AI Experts' Interaction with AI: A Case Study in Library Context. In *Proceedings of the 2025 CHI Conference on Human Factors in Computing Systems* (pp. 1-20).

About the authors

Adeyemi Adewale Akinola is an academic and information professional with expertise in Library and Information Science. His research interests focus on organizational learning, information literacy, and the integration of emerging technologies in libraries. He has contributed to scholarly discourse through publications and conference presentations in his field. Adeyemi is committed to advancing knowledge management practices and improving user-centered library services. He is actively engaged in research and professional development within the evolving information landscape. (aaakinola@mtu.edu.ng)

Adeniyi Michael Omotade is a committed library professional at Mountain Top University Library, supporting access to quality information resources for teaching and research. He contributes to efficient library services through strong organizational skills and user-focused support. He is dedicated to enhancing knowledge access and promoting academic excellence within the university community. (maomotade@mtu.edu.ng)