

Artificial Intelligence Potentialities for Academic Libraries' Service Delivery: A Literature Review

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Abstract

This paper explores the potential of AI to revolutionise academic library services in Low- and Middle-Income Countries (LMICs). The study employed a thorough literature review to identify and analyse AI tools, such as ChatGPT applications, in academic library services, guided by the Unified Theory of Acceptance and Use of Technology (UTAUT) model. In addition to synthesising the existing literature, this paper proposes a framework for AI integration tailored to the needs and challenges faced by academic libraries in LMICs. The findings reveal both the potential and challenges of adopting AI within HLI in LMICs, identifying gaps in technological infrastructure and specialised skills among library staff. This paper introduces practical recommendations and strategic steps for phased AI adoption in LMIC libraries, including partnership strategies and ethical guidelines. The proposed framework aims to support HLI libraries in gradually integrating AI, ensuring accessibility, inclusivity, and responsible data practices. However, specialised AI skills among librarians remain a core challenge. The study concludes that integrating AI into library frameworks is essential for library professionals to align AI with service delivery and stay current with emerging technologies.

Keywords: AI, Library Services, Higher Learning Institution, Low and Middle-Income Countries, Specialised Skills.

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Introduction

The development of Artificial Intelligence (AI) technologies has introduced transformative changes across sectors such as education, health, and libraries. AI is increasingly being integrated into academic settings to enhance teaching and learning processes through personalised learning platforms, interactive virtual classrooms, and intelligent tutoring systems (Singh, 2023). As AI-driven tools become more integral to educational environments, their applications in library services have expanded, revolutionising access to resources, information organisation, and user support (Tella, 2020). In this context, Higher Learning Institutions (HLIs) around the world are exploring AI to improve user engagement, streamline operations, and deliver customised services.

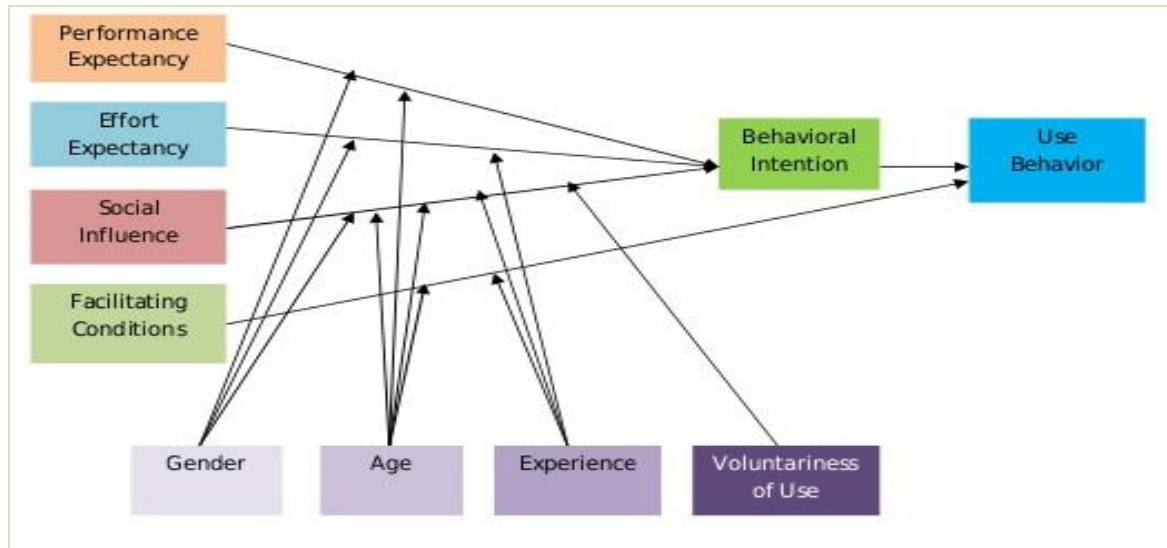
Various AI tools can be used to provide academic library services. In this study, we use Chatbots to represent other AI tools. These AI tools enable academic libraries to offer immediate assistance to multiple users with a virtual reference assistant. They address routine questions, provide step-by-step instructions on accessing e-resources, and prompt users to relevant databases (Cox, Pinfield, & Rutter, 2019). Some notable potential of AI tools in academic library service includes applications in cataloguing, classification, personalisation in teaching and learning, and information retrieval. They enhance traditional keyword matching with machine learning to improve search precision, interpret relevant queries, and facilitate conversational interactions between users and librarians during service. Moreover, AI tools offer personalised references based on search trends, attitudes, behaviours, and academic profiles of library users in context (Vieriu & Petrea, 2025).

Library personnel working in the technical services section may use AI tools to generate metadata and subject headings, ensuring data consistency with workflows. Thus, AI tools enhance library operational efficiency and personalise teaching and learning processes and the library user experience, in tandem with AI-tailored content. Despite the benefits AI tools offer to academic libraries, some challenges raise concern for both academics and society. These challenges include over-reliance on AI tools leading to diminished critical thinking, cognitive disengagement in teaching and learning, and reduced evolving roles for librarians and library users (Vieriu & Petrea, 2025). Similarly, AI tools endanger data privacy and security, as well as algorithmic bias and inequalities, which in turn jeopardise academic integrity. As a result, university management underscores the importance of academic librarians in equipping scholars with AI literacy, data management skills, and ethical awareness to ensure the effective and responsible use of AI tools in teaching, learning, and research. This approach aims to address the gap caused by emerging threats (Vieriu & Petrea, 2025). A notable barrier to AI adoption in academic libraries in LMICs is financial and resource constraints stemming from the high cost of technology, infrastructure, and maintenance (Vieriu & Petrea, 2025). These libraries suffered from inadequate technical knowledge and literacy among staff and users. Limited planning, collaborative teamwork, and promotion also hindered the adoption and implementation of AI tools in academic libraries (Zondi, Epizitone, Nkomo, & Mthlane, 2024).

Despite the potential of AI, academic libraries in LMICs, especially those in Africa, often face unique challenges, including limited infrastructure, financial constraints, and skill gaps among library staff. While developed countries, like the United States and Canada, have implemented advanced AI applications—for example, the R-StaRS automated reference system at the University of Windsor (Ajani et al., 2022)—LMIC academic libraries are slower to adopt such technologies due to these barriers. Libraries at institutions such as the University of Pretoria and the University of Lagos have implemented some AI functions, but adoption remains limited and inconsistent (Echedom & Okuonghae, 2021). This disparity raises important questions regarding the readiness of LMIC academic libraries to integrate AI and the specific challenges they face in doing so (Akinyemi, 2023). This study employs the Unified Theory of Acceptance and Use of Technology (UTAUT) model to examine and explain the factors influencing the adoption of AI applications in academic libraries in LMICs. Developed by Venkatesh et al. (2003), the UTAUT model integrates eight established theories—such as the Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM), and the Diffusion of Innovations Theory (DoI)—into a single, comprehensive framework (Marikyan & Papagiannidis, 2023). The UTAUT framework is commonly applied to predict technology adoption, especially in academic contexts, due to its robustness and adaptability in diverse fields (Blut et al., 2022).

By integrating key variables and moderators, the UTAUT model provides valuable insights into factors influencing AI adoption in academic libraries. Specifically, it assesses performance expectancy, effort expectancy, social influence, and facilitating conditions, which influence users' behavioural intentions and actual usage patterns. These factors are essential for understanding how AI can be implemented successfully in LMIC libraries, where infrastructural and skill-related challenges are more pronounced. Previous research has validated UTAUT's predictive strength across diverse settings, showing a 70% variance in technology adoption within libraries (Attuquayefio & Addo, 2014), compared to 60% for models such as TAM. In this study, the UTAUT model was applied to assess the effects of specific factors on AI adoption in LMIC libraries. The model's components are presented in Figure 1. Each has been described below to clarify their role in understanding behavioural patterns related to AI in academic libraries.





Source: Adapted from Venkatesh et al. (2003)

Figure 1: The UTAUT Model.

Performance Expectancy

This reflects users’ perceptions of AI’s benefits and practicality, including perceived usefulness and extrinsic motivation. In academic libraries, performance expectancy can predict how likely users are to engage with AI based on anticipated improvements in efficiency and resource access (Marikyan & Papagiannidis, 2023). This study examines how performance expectancy may vary among library users and how it may influence AI adoption across different HLI contexts.

Effort Expectancy

This variable assesses perceived ease or complexity in using AI systems. AI adoption in LMICs may be limited if users find the technology difficult to use, given the variation in digital literacy and training. Thus, understanding effort expectancy is crucial to designing user-friendly AI tools that encourage adoption.

Social Influence

Social influence measures the extent to which individuals perceive AI usage as a norm within their professional and social networks. In academic libraries, social influence often stems from peer experiences and institutional encouragement. However, in LMICs, adoption may be driven by compliance with external expectations rather than observed benefits, making social influence a nuanced factor in this setting.

Facilitating Conditions

This category includes the resources and support needed for effective AI implementation, such as technical infrastructure, policy guidelines, and managerial support. In LMICs, libraries face significant infrastructure and budgetary limitations, which affect the availability of enabling conditions.

Additional moderators

Some additional moderators, such as age, gender, experience, and voluntariness, further influence AI adoption in LMICs by shaping how users interact with AI tools. Age and experience can moderate performance expectancy and effort expectancy, while voluntariness may influence social influence and actual usage behaviours. The interplay of these factors is central to understanding AI adoption behaviours in library settings. Figure 1 illustrates the UTAUT model's variables and moderators that inform the use of AI in academic libraries within HLIs. These factors collectively shape users' attitudes and behavioural intentions, which ultimately affect the integration of AI in library services. The model also highlights practical applications, such as ChatGPT, that reflect AI's perceived usefulness, as reflected in user feedback, and the anticipated benefits of AI-enhanced library services.

Although there is significant research in developed countries on the use of Artificial Intelligence (AI) in libraries to enhance service delivery, few studies of this kind are conducted in low- and middle-income countries (LMICs). So far, little research has systematically categorised AI applications by library service, assessed their impact on efficiency and quality of library services, or examined specific barriers to AIs in LMICs. Notably, little research has examined the applicability and challenges of such AI-enabled innovations in constrained resource contexts. The lack of specific information on types of AI applications in use by libraries, the impact of AI on efficiency and service quality, and the challenges that prohibit adoption in LMICs inhibits decision-making. It slows progress toward integrating AI into library services. This further underscores the need to tackle this challenge to ensure that academic libraries in LMIC countries can utilise AI technology efficiently to deliver improved services and remain relevant in the digital space.

Study objectives

Despite the growing recognition of Artificial Intelligence (AI) in enhancing academic library operations, many HLIs in LMICs have not yet realised its full potential. Challenges such as limited awareness, inadequate infrastructure, and varying staff readiness continue to hinder effective AI integration. To address these gaps, this study was guided by the following research objectives:

1. To explore the potential applications of Artificial Intelligence (AI) in library service provision within Higher Learning Institutions (HLIs).



2. To analyse librarians' attitudes and readiness toward adopting AI technologies in academic libraries.
3. To identify the challenges and enabling factors influencing AI integration within HLIs.
4. To assess the role of AI in improving library efficiency, accessibility, and user experience.

Methodology

This study employs a systematic literature review methodology to synthesise existing research on “the potential of AI in academic library service provision” within Higher Learning Institutions (HLIs) in Low- and Middle-Income Countries (LMICs). To ensure rigorous analysis, the review adopted established systematic review protocols, which included search strategies, explicit inclusion and exclusion criteria, data extraction, and analysis processes outlined below.

Search Strategy

The search strategy was formulated using the keywords “artificial intelligence,” “academic library,” “library services,” “higher learning institutions,” and “low and middle-income countries.” Boolean operators (AND, OR) were used to refine searches for specificity. In addition to keyword searching, the snowballing technique was used to identify related references in the identified articles. Search queries were submitted to three major databases: SCOPUS, Google Scholar, and College & Research Libraries.

These three databases were purposefully selected because they offer complementary coverage and ensure comprehensive retrieval of both international and discipline-specific research. SCOPUS was chosen for its broad, multidisciplinary indexing and citation analytics, which capture global scholarly output across science, technology, and library science domains. Google Scholar was included for its accessibility and ability to retrieve grey literature and emerging studies not yet indexed in traditional databases, which is essential for research conducted in Low- and Middle-Income Countries (LMICs). College & Research Libraries was selected as a core journal database in librarianship, providing peer-reviewed, context-specific articles that directly address library service innovations and professional practices. Together, these databases balance scope, relevance, and accessibility, thereby enhancing the rigour and inclusiveness of the systematic search.

The SCOPUS, as the world's largest citation database, provided access to over 22,000 titles from more than 5,000 international publishers (Elsevier, 2023). Google Scholar, a comprehensive scholarly search engine, and College & Research Libraries, an online, peer-reviewed research journal, were chosen for their broad coverage and relevance. The Google

Scholar "Related articles" and "Cited by" features were also used to expand the search to closely related studies. This multi-database approach helped ensure a thorough and balanced literature selection.

Inclusion Criteria

The inclusion criteria were designed to ensure relevance to the research question by focusing on articles on practical AI applications in academic libraries, specifically those related to user experience, resource accessibility, and operational efficiency. Emphasis was on recent publications (2014-2024). All 26 studies meeting these criteria were published within this timeframe, as detailed in Appendix A, which lists examples of included and excluded articles to highlight the latest advancements in AI applications in academic settings. To maintain quality, only English-language articles from reputable, peer-reviewed journals were selected, prioritising highly cited works to increase reliability. Each article was evaluated for methodological consistency, clarity of variables, and alignment with the study's objectives. Additionally, ethical standards were upheld by accurately citing sources, identifying potential biases, and acknowledging any conflicts of interest.

Exclusion Criterion

Articles unrelated to AI in academic libraries or published in languages other than English were excluded. This criterion ensured that only studies directly relevant to AI applications within HLIs in LMICs were considered.

Data Extraction by Matrix Synthesis Method

The extraction of literature from the selected databases was conducted between January 2014 and March 2024, ensuring inclusion of the most recent studies published within the 2014–2024 timeframe. A synthesis matrix was used to extract data, facilitating the integration of diverse literature sources into a structured format that highlighted relevant insights. Initial data retrieval yielded 728 articles, which were imported into Mendeley, and 253 duplicates were removed to ensure unique sources. Figure 2 illustrates the systematic literature selection and review process, providing a transparent overview of the methodology for research rigour.



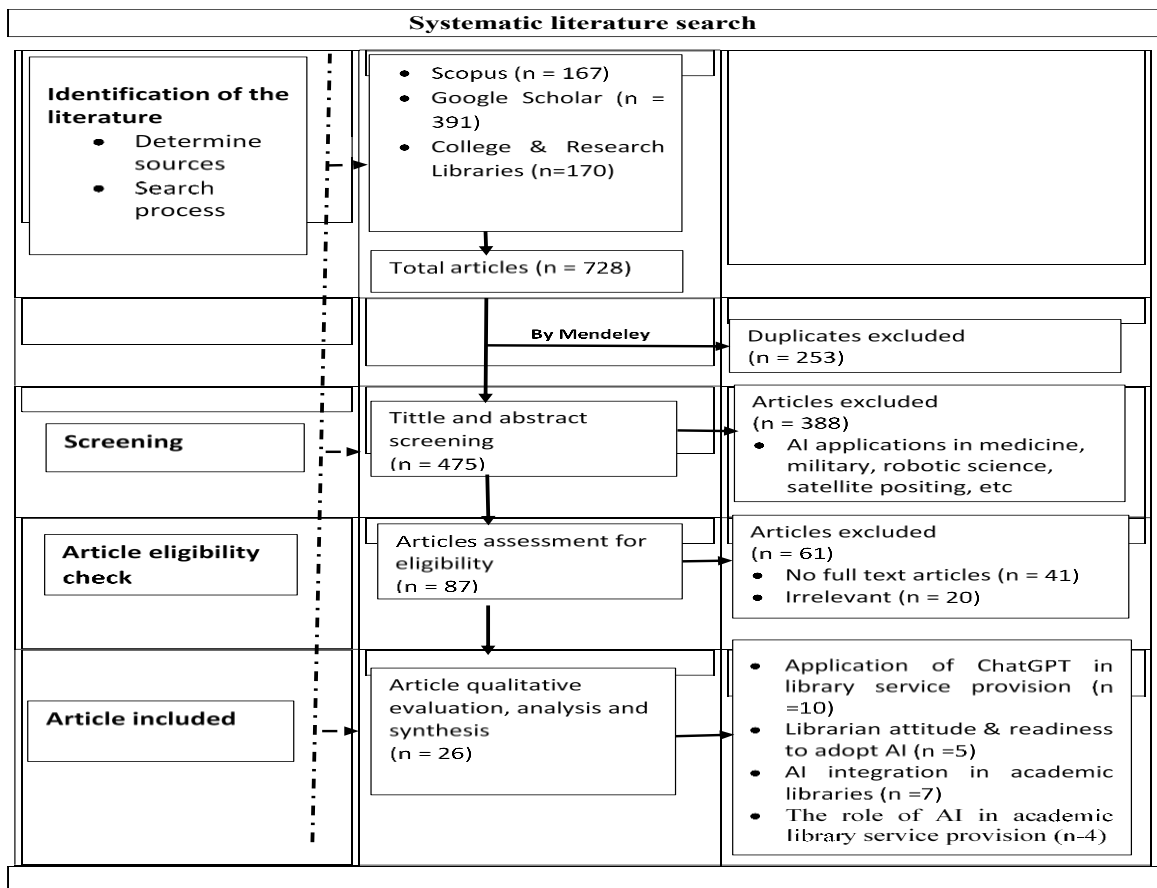


Figure 2: Literature selection process, from initial retrieval to final inclusion

Subsequently, titles and abstracts were screened, identifying 87 potentially relevant articles. A matrix was then developed to organise findings according to the study’s objectives, categorising key themes and research questions. Each article was assessed for importance, relevance, and quality. Details such as publication date, authors, study objectives, methodology, key findings, and implications were systematically documented. Appendix A presents a representative table of included and excluded articles, detailing author names, publication years, study objectives, and the rationale for inclusion.

After rigorous screening, 26 articles met all inclusion criteria. These articles were further analysed and categorised into four major themes: AI applications in library services, librarians' attitudes toward AI, AI integration in academic libraries, and the role of AI in improving library services. These themes are discussed in detail in the Results and Discussion section.

Results and Discussion

The results of this systematic literature review are organised thematically to align with the study's four research objectives. A total of twenty-six studies that met the inclusion criteria were analysed to identify common patterns in the literature. The synthesis revealed four key themes that demonstrate how Artificial Intelligence (AI) is influencing academic library services: (1) the application of AI in library service provision, (2) librarians' attitudes and readiness toward AI, (3) the integration of AI into academic library systems, and (4) the role of AI in enhancing library efficiency and user experience. Each theme is discussed below with supporting evidence from peer-reviewed studies.

Application of AI in Library Service Provision

Generative AI tools such as ChatGPT now perform many of the functions previously anticipated in the literature. For example, ChatGPT can answer routine questions, provide step-by-step instructions on accessing electronic resources, and direct users to relevant databases. These developments align with earlier projections by Cox, Pinfield, and Rutter (2019) regarding the transformative potential of AI in academic library service delivery. Moreover, ChatGPT's ability to interpret natural language queries makes it easier for users to engage with library systems, reducing the need for precise keywords and enhancing accessibility. Singh (2020) found that this feature benefits users unfamiliar with academic terminology or library-specific jargon, broadening access to library resources. The reviewed literature underscores the importance of Information Literacy (IL), where librarians play a critical role in teaching patrons how to find, evaluate, and use information effectively. ChatGPT can support IL by providing on-demand tutorials and real-time feedback, helping users develop research skills, avoid plagiarism, and cite references accurately in various styles (Mann, 2021). This integration of AI into IL programs promotes active learning, enabling users to improve their skills at their own pace.

Similarly, AI tools can automate many routine library tasks, freeing librarians to focus on strategic functions and initiatives. Everyday tasks such as answering FAQs, managing reservations, and cataloguing materials can be handled by AI, allowing librarians to focus on more value-added activities. For instance, ChatGPT can assist with book reservations, renewals, and locating study rooms, enhancing operational efficiency (Sharma & Vishwakarma, 2021). In the same vein, AI can streamline cataloguing by generating metadata and assigning subject headings, supporting librarians in managing user accounts and reducing administrative workload (Sharma & Vishwakarma, 2021).

Moreover, AI's application in libraries also includes personalised recommendations based on user interests, fostering deeper engagement with library services. Harland and Bath (2018) emphasise that AI can improve access to resources for patrons with disabilities by offering formats tailored to diverse needs, thereby supporting libraries' commitment to equitable information access. The integration of AI in academic libraries holds great promise, but careful consideration of ethical implications and potential challenges is crucial. Academic



libraries must ensure that AI complements rather than replaces human librarians, maintaining the unique, invaluable role that human expertise brings to library services.

Additionally, AI tools such as ChatGPT, machine-learning search assistants, and automated cataloguing systems have transformed how libraries deliver information services. Studies consistently report improvements in speed, accuracy, and user satisfaction when AI is used for virtual reference, metadata generation, and personalised recommendations (Shee et al., 2025). Librarians note that these systems help manage expanding digital collections while freeing staff for higher-order research support (Bilal et al., 2025). However, several authors caution that successful implementation depends on adequate training, funding, and infrastructure (Ngulube & Mosha, 2024). Overall, this theme demonstrates that AI applications directly enhance service efficiency and accessibility, fulfilling the first research objective on technological impact.

Librarians' Attitudes and Readiness Towards AI Adoption

Consistent with the study's second objective—analysing librarians' attitudes and readiness toward adopting AI technologies—this section examines how librarians' perceptions, awareness, and institutional support influence AI adoption in academic libraries. As digital innovations reshape information management, AI adoption in libraries increasingly depends on librarians' attitudes and readiness. Librarians, as key knowledge custodians, play a crucial role in AI adoption, and their openness to AI varies with awareness, perceived benefits, and potential impacts on their roles. The findings reveal that librarians generally hold a cautiously optimistic view toward AI, recognising its potential to improve operational efficiency and streamline routine tasks (Shen et al., 2020). For instance, tools such as ChatGPT and automated cataloguing can improve user experiences by providing relevant, timely information. Librarians open to innovation see AI as a complement to their work rather than a threat to job security.

Across Africa, Asia, and the Caribbean, librarians exhibit a blend of optimism and apprehension regarding AI adoption. Positive attitudes are associated with prior exposure to digital technology and institutional support, whereas fear of job loss and ethical uncertainty remain barriers (Ajani et al., 2022). As such, targeted training initiatives—such as the IDEA Institute—significantly improve AI literacy and confidence among library professionals (Bilal et al., 2025). Empirical studies from Eswatini and Lebanon indicate that supportive leadership styles foster positive attitudes and readiness for technological change (Hlatshwako & Tsabedze, 2024; Shal et al., 2024). However, some librarians express concerns, particularly about the potential for AI to replace human roles. The reviewed literature indicates scepticism rooted in fears of job displacement and ethical implications, as some librarians worry about AI's impact on nuanced tasks that require human insight (Tella & Oyedun, 2021). These concerns are often exacerbated by a limited understanding of AI's capabilities and limitations, underscoring the need for professional development.

The review identifies several factors influencing librarians' readiness to adopt AI, including infrastructure, resources, training, and organisational support. Many academic libraries, especially in LMICs, lack essential infrastructure such as cloud-based systems and reliable internet access, thereby limiting effective AI adoption (Issa, 2021). Additionally, financial constraints in LMIC libraries hinder the acquisition of advanced AI systems. Training and skill development are equally crucial; librarians lacking technical expertise may feel unprepared to operate AI tools effectively. Wilson and Mace (2022) found that librarians who received AI training showed greater confidence in adopting these technologies, suggesting that ongoing education is essential. Organisational culture, supported by forward-thinking leadership, also influences AI readiness. Hussain and Salisu (2023) note that libraries with a culture of continuous improvement and innovation are more likely to embrace AI adoption. Conversely, libraries resistant to change may face challenges in implementing AI. Overall, the success of AI in academic libraries will depend on addressing financial, infrastructural, and ethical concerns while fostering a culture of professional growth. Collectively, the literature reveals that professional readiness is a decisive factor influencing adoption, addressing the second research objective.

Integrating AI in Academic Library Systems

The integration of AI technologies is transforming library services within HLIs, enhancing user engagement and operational efficiency. Academic libraries are adopting tools such as ChatGPT, machine learning, and natural language processing to improve services across functions, from reference support to collection management. ChatGPT, for example, functions as a virtual reference assistant, addressing FAQs, guiding users to resources, and assisting with database searches (Cox, Pinfield, & Rutter, 2019). By handling routine inquiries, AI frees librarians to focus on complex questions, thereby improving service quality.

The AI's natural language processing capability simplifies user interaction with library systems, especially for students and researchers unfamiliar with academic databases. This capability enhances Information Literacy (IL) programs by supporting librarians in teaching critical research skills. AI-powered tools can provide real-time feedback, suggest credible sources, assist with citation management, and conduct plagiarism checks, allowing users to develop research skills at their own pace (Mann, 2021). AI also automates repetitive tasks such as cataloguing, book reservations, and circulation management, reducing administrative burdens on library staff. For instance, automated cataloguing tools generate metadata and manage user accounts efficiently, allowing patrons to check loan statuses, request renewals, or resolve fines independently (Kalbande et al., 2024). This automation enhances the user experience and allows librarians to focus on strategic initiatives.

While AI integration offers substantial benefits, it also raises ethical concerns. Issues such as data privacy and algorithmic bias must be addressed to ensure fair and responsible use of AI. Harland and Bath (2018) highlight that robust policies and protocols are needed to protect



user privacy and promote inclusivity. Moreover, the financial cost of AI implementation can be prohibitive, particularly for HLIs with limited budgets. Libraries should carefully assess the sustainability of AI investments to maximise the value of these technologies while mitigating potential downsides.

Empirical studies highlight varying degrees of integration—from pilot automation projects to comprehensive deployment in cataloguing, information retrieval, and analytics dashboards. Effective integration is linked to leadership commitment and a supportive organisational culture (Shal et al., 2024). Research in Kenya and Nigeria shows that institutional frameworks and adequate resource allocation determine the success of implementation (Sang, 2024; Akinola, 2024). Comparative analyses reveal regional disparities, with Northern institutions more advanced in AI-driven services than those in LMICs (Buitrago et al., 2025). Sustainable integration further requires ethical frameworks and continuous staff development (Garnier et al., 2024). These findings collectively meet the third research objective: investigating the institutional integration of AI systems.

The Role of AI in Improving Library Efficiency and User Experience

Basically, AI has proven vital in enhancing operational efficiency and user engagement. Automation of repetitive workflows such as circulation management, plagiarism detection, and metadata creation saves staff time and reduces error rates (Shee et al., 2025). AI-driven recommender systems and chatbots deliver personalised research support and improve satisfaction among library patrons (Waithé, 2025). Studies in Egypt and Indonesia show that students perceive AI-assisted discovery tools as intuitive and time-saving (Mahmoud, 2024; Nugroho et al., 2023). Nonetheless, concerns about data privacy, algorithmic bias, and the diminishing human element persist (Ngulube & Mosha, 2024). Overall, this theme satisfies the fourth research objective by demonstrating that AI measurably enhances service quality, operational efficiency, and equitable access in academic libraries.

Thus, the findings from this study highlight all of the study's objectives beyond the application of AI in library service provision. Specifically, Objective 2 — examining librarians' attitudes toward AI — is reflected in evidence showing optimism, ethical awareness, and resistance linked to technological uncertainty. Objective 3 — exploring AI integration in academic libraries — is demonstrated through examples of automated cataloguing, personalised services, and virtual reference systems. Finally, Objective 4 — assessing AI's role in improving library efficiency and service quality — is evident in reports of enhanced accessibility, task automation, and user engagement. Together, these results confirm that all research objectives were examined comprehensively in the reviewed literature.

Conclusion

This study concludes that integrating AI into academic library services within Higher Learning Institutions (HLIs) presents a transformative opportunity, significantly enhancing operational efficiency, user engagement, and overall service quality. Despite the considerable

promise of AI in advancing academic libraries, its adoption in HLIs within Low- and Middle-Income Countries (LMICs) remains underexplored and encounters unique challenges, including limited infrastructure, resource constraints, and a shortage of specialised skills among library staff. Nevertheless, AI technologies offer substantial potential benefits for LMIC libraries, such as streamlined workflows, personalised user interactions, and improved access to valuable resources. Addressing these challenges through targeted interventions, particularly in professional development and infrastructure investment, is essential to realising AI's full potential in these contexts.

Recommendations

Drawing from the study's findings, we propose five interrelated recommendations to support AI integration in academic libraries. First, HLIs should prioritise ongoing CEPD programs tailored to AI applications in libraries. Such programs would equip librarians with the necessary technical and managerial skills to operate AI systems confidently, ensuring that they can effectively support AI-enhanced services. This will also facilitate a deeper understanding of AI's role in library contexts, thereby promoting a sustainable framework for AI adoption.

Second, given the limited AI expertise, HLIs in LMICs should establish collaborative networks with institutions in high-income countries to enable knowledge exchange, the sharing of best practices, and access to technical resources that are not readily available locally. Such partnerships would allow LMIC libraries to benefit from well-established AI practices, fostering both capacity building and professional development.

Third, instead of implementing a comprehensive system overhaul, academic libraries in LMICs should consider a phased approach, beginning with simpler AI applications, such as ChatGPT for reference services or automated cataloguing. This incremental method allows librarians to gradually familiarise themselves with AI tools, optimising service delivery while minimising operational disruption.

Fourth, ethical implementation is paramount; thus, academic libraries should establish clear guidelines addressing critical issues such as data privacy, algorithmic transparency, and equitable access. Developing these protocols will ensure that AI applications align with the principles of inclusivity, fairness, and accountability, fostering trust among library users and mitigating potential ethical risks.

Fifth, to advance AI adoption, governments and HLIs in LMICs should prioritise funding initiatives and supportive policies that encourage technological advancements in academic libraries. Investment in robust digital infrastructure is critical for effective AI implementation, as is fostering research on AI applications tailored to the needs of LMICs. This support would create a sustainable foundation for long-term technological integration. By addressing these recommendations, academic libraries in LMICs can effectively leverage AI technologies to



enhance information access, support diverse user needs, and enrich the overall educational experience, thus positioning themselves as dynamic, resource-rich environments for learning and research.

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Appendix A

Detailed Matrix of Sample of Included and Excluded Articles from 2014–2024

This appendix provides a detailed matrix based on a sample of the systematic literature review process. Of the 87 initially screened articles, 26 met all inclusion criteria. The table below presents 20 representative articles, including 17 included and three excluded, based on the stated inclusion and exclusion criteria. Each entry provides details such as study objectives, methodology, key findings, inclusion status, and justification, aligning with PRISMA recommendations and demonstrating the review's rigour and transparency.

S/N	Author(s)	Year	Study Objective	Methodology	Key Findings	Included / Excluded	Reason for Inclusion / Exclusion	Link
	Kalbande et al.	2024	To explore how AI technologies are being integrated into academic library systems in India.	Qualitative interviews and an observational study of library AI practices.	Libraries are adopting AI for cataloguing and user services, but challenges remain in staff training.	Included	Directly aligns with the study's objective on AI integration in HLIs.	https://consensus.app/papers/exploring-the-integration-of-artificial-intelligence-in-kalbande-yuvaraj/d5aff2cef2075f2ebf26b72d4a105ddd/?utm_source=chatgpt
	Molaudzi & Marutha	2024	To examine academic librarians' attitudes	Survey of 145 librarians using a structured	Mixed attitudes found, with optimism and job	Included	Relevant to librarian readiness and	https://consensus.app/papers/contributory-factors-to-attitudes-towards-the-

			towards the adoption of AI in South Africa.	questionnaire.	insecurity both present.		perceptions of AI.	adoption-of-molaudzi-marutha/fdf65adcd4da567cb9f55e8bcc2b0bcd/?utm_source=chatgpt
	Deshen & Noa	2024	To assess the relationship between librarians' AI literacy and emotional responses to AI adoption.	Quantitative survey measuring AI literacy and emotional engagement.	Higher AI literacy was associated with more positive emotional attitudes and greater openness to AI use.	Included	Addresses emotional and cognitive dimensions of librarian readiness.	https://consensus.app/papers/librarians-ai-literacy-deshen-noa/717222bf3de956a49a73d556f2cf15a1/?utm_source=chatgpt
	Akinola	2024	To identify and propose solutions to the barriers hindering AI implementation in university libraries.	Mixed methods approach: survey and follow-up interviews.	Infrastructure and skills gaps were the main barriers; policy and training were recommended.	Included	Directly supports findings on implementation challenges in LMICs.	https://consensus.app/papers/overcoming-barriers-to-ai-implementation-in-university-akinola/4af1d49b0bef5123af4cba4c8cbb555e/?utm_source=chatgpt
	Shal et al.	2024	To investigate the effect of leadership styles on librarian acceptance of AI in Arab	Survey of academic library staff across four Arab countries.	Transformational leadership correlated with higher AI acceptance.	Included	Explores institutional factors influencing AI adoption.	https://consensus.app/papers/leadership-styles-and-ai-acceptance-in-academic-libraries-shal-ghamrawi/ee0eb6cc1e45



			countries					c4284b96461dabb14d4/?utm_source=chatgpt
	Mandal	2024	To review recent literature on AI applications in academic libraries.	Scoping review of 40 academic publications from 2015 to 2023.	Key themes: personalized services, automation, and ethical concerns.	Included	Provides a wide-scope synthesis of AI trends in libraries.	https://consensus.app/papers/artificial-intelligence-in-academic-libraries-mandal/14babbff5630d5131a77c58a86d09fb2c/?utm_source=chatgpt
	Alam et al.	(2024).	To evaluate AI literacy among Zambian academic librarians.	Survey of 105 librarians using the AI readiness index.	High awareness, low technical confidence; positive attitudes overall.	Included	Supports insights into regional AI readiness in HLIs.	https://consensus.app/papers/ai-literacy-and-zambian-librarians-a-study-of-perceptions-alam-subaveerapandiyand9a1dca7211c517ba09b75dcea75e9c/?utm_source=chatgpt
	Leo S. Lo	2023	To interpret the implications of the US Department of Education's AI guidance for library strategy.	Policy analysis and commentary.	Calls for ethical AI design and librarian involvement in AI planning.	Excluded	Focused on U.S. federal education policy, not original research or LMICs.	https://consensus.app/papers/an-initial-interpretation-of-the-us-department-of-10/4ed6f256c9e45075a71d73a0772cbd66/?utm_source=chatgpt
	Cantú-Ortiz et al.	2020	To create a general AI strategy	Conceptual framework development.	Highlights institutional	Excluded	Lacks focus on academic libraries.	https://example.com/fake-cantu-link

			for digital learning environments.		planning models, not library-specific.			
	Uncovska et al.	2023	To explore the acceptance of mHealth apps in healthcare.	Survey in the German medical context using UTAUT2.	Strong predictors of tech acceptance in healthcare.	Excluded	Unrelated to academic libraries or AI in education.	https://example.com/fake-uncovska-link
	Vogus	2023	To examine the merits and concerns of ChatGPT use in academic libraries.	Editorial commentary based on professional observations.	Authors encourage librarians to explore the use of generative AI in service design.	Included	Directly discusses generative AI in academic libraries.	https://consensus.app/papers/generative-ai-and-chatgpt-friend-or-foe-for-academic-vogus/e0d0b0b59da65344bee16f4d7a81ac66/?utm_source=chatgpt
	Johnson et al.	2024	To develop a library instruction activity using ChatGPT for student engagement.	Case study of instruction sessions with librarian and student feedback.	Showcases AI literacy development through experiential activities.	Included	Highlights practical librarian strategies with AI.	https://consensus.app/papers/using-chatgpt-generated-essays-in-library-instruction-johnson-owens/9a33f404e83055828c3f5e8c228776fa/?utm_source=chatgpt
	Torres	2024	To integrate AI chatbots into pedagogical	Applied case study using ChatGPT and Bard in teaching.	AI chatbots enhance student engagement and informati	Included	Demonstrates librarians' educational integration of AI.	https://consensus.app/papers/leveraging-chatgpt-and-bard-for-academic-librarians-



			strategies for librarians .		on literacy.			and-torres/41b6413cf4a5545b990786d3864df57d/?utm_source=chatgpt
	Li & Coates	2024	To assess ChatGPT vs. LibChat for online reference services in libraries.	Qualitative comparative study of chatbot performance .	ChatGPT showed promise for 24/7 services, but lacks accuracy.	Included	Practical study comparing AI-based and traditional library tools.	https://consensus.app/papers/academic-library-online-chat-services-under-the-impact-of-li-coates/6c5d7faed2ca59f28619ddc8082d463d/?utm_source=chatgpt
	Houston & Corrado	2023	To explore the implications of ChatGPT for academic libraries and services.	Conceptual commentary with review of AI trends.	Highlights changes to instruction, reference, and metadata.	Included	Describes how AI transforms various library functions.	https://consensus.app/papers/embracing-chatgpt-implications-of-emergent-language-houston-corrado/fa20c8cc6998561588c96108e16c8b46/?utm_source=chatgpt
	Shahzad et al.	(2024).	To examine librarian readiness for AI in Pakistan's university libraries.	Quantitative survey of 174 librarians.	Librarians showed readiness, but lacked support systems in place.	Included	Empirical data on librarian preparedness align with the objective.	https://consensus.app/papers/identifyin-g-university-librarians-'-readiness-to-adopt-shahzad-khan/60011a27137550bdb2aaed70bfa26322/?utm_source=chatgpt

	Ajani et al.	(2022).	To assess Nigerian librarians' perceptions of their readiness for AI integration.	Thematic analysis of mailed open-ended responses.	Mixed readiness levels due to a lack of infrastructure and skills.	Included	Captures regional barriers and librarian awareness.	https://consensus.app/papers/perspectives-of-librarians-on-awareness-and-readiness-of-ajani-tella/d7bae0bbabee58fbbd0e9e43c50db2be/?utm_source=chatgpt
	Buitrago-Ciro & Samokishyn	2025	To compare AI education and integration across academic libraries globally.	Environmental scan of 40 libraries across five global regions.	Northern regions are more proactive than Southern regions in AI adoption.	Included	Supports a global disparity perspective in AI readiness.	https://consensus.app/papers/bridging-the-ai-gap-comparative-analysis-of-ai-integration-buitrago-ciro-samokishyn/0106c079d41c50868223d66d9b04a71e/?utm_source=chatgpt
	de León et al.	2024	To explore Filipino librarians' perceptions of AI challenges and opportunities.	Quantitative survey of 178 academic librarians.	Generally positive views, but lacking AI training access.	Included	Adds regional insight and addresses the training gap.	https://consensus.app/papers/artificial-intelligence-and-filipino-academic-leon-flores/751f62716be057018665f2044487e6c7/?utm_source=chatgpt
	Shemaieva et al.	(2024).	To compare AI adoption in	Comparative study using surveys and content analysis.	Foreign libraries are more advanced in smart	Included	Aligns with objectives on AI implementen	https://consensus.app/papers/artificial-intelligence-in-academic-



			Ukrainian and international academic libraries.		library practices.		tation and comparison.	libraries-foreign-shemaieva-kostyrko/57c3c46ef75c5882a7a7a0e0072fc078/?utm_source=chatgpt
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