The Role of Artificial Intelligence in Revolutionizing Library Services in Nairobi: Ethical Implications and Future Trends in User Interaction

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ABSTRACT

In this journal we examined how Artificial Intelligence (AI) is used to transform the use of libraries in the academic institutions in Nairobi. As the need to run efficient library services rises, AI technologies, including automated cataloging systems, chatbots based on AIs, and intelligent recommendation engines are slowly introduced to managing libraries. The research question is to ascertain the level of AI penetration at the libraries in Nairobi, analyze how to overcome existing challenges of operations, and determine the ethical issues of integrating AI. Desktop research was carried out with the help of which secondary data contained in peer-reviewed articles, institution reports, and the case studies of 2022-2025 were studied. Central conclusions affirm that, although AI can improve the way libraries operate both in terms of efficiency and user interaction, issues like limited infrastructure, data security concern, and lack of skills can still be the impediments to realizing the widespread implementation. Also, with AI, user satisfaction has been shown to jump up dramatically under personalized user interactions. The research can be used to add value to the AI adoption literature in developing economies, and it gives information on the ethical and practical needs libraries incur. The recommendations that can be made to library practitioners, policymakers, and researchers involve training initiatives, standards of ethics, and policy formulation, which help in adopting AI and making its adoption a success in the academic libraries of Nairobi.

Keywords: Artificial Intelligence, Library Services, Adoption, AI, Personalization, User-Interaction, Data-Privacy, Ethical-Implications, Nairobi-Libraries.

INTRODUCTION

Background

Even though libraries have been commonly used worldwide, Artificial intelligence (AI) has been rapidly being applied in libraries, owing to the desire to automate the information retrieval process, metadata, and user interactions. AI optimizes all activities in the library in terms of efficiency, user experience, and administrative work. Kasprzik (2023) mentioned such an example as subject indexing automatization at the ZBW economics repository, which demonstrated how the use of AI-based metadata systems contributes to increasing the accuracy of search and to the overall effectiveness in the organization. Likewise, EMa project at the German National Library (Poley et al., 2025) proved the applicability of AI to classification and indexing, automatizing the work of cataloging. With more of the library collections becoming digital, these technologies are important to utilize the sophisticated ways of organization.

Academic libraries around the world are growingly using AI in the cataloging, generation of metadata and personalization of user services. Molaudzi and Ngulube (2025) addressed the use of AI to increase user experience in South African public libraries, but there are still difficulties including poor infrastructure, training the workforce, and data security. Similarly, Idhalama et al. (2025) argued that the African libraries should address the hindrances such as no access to digital technologies and AI knowledge to enable AI-based

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services sustainability. The area of AI systems development requires specific capacities to be built to secure an effective implementation.

In Nairobi, AI use in libraries is in an early phase and a few projects are developing. Masinde, Wambiri, and Mugambi (2024) identified that academic libraries in Kenya are yet to fully adopt the use of AI in the enhancement of information retrieval and user management, majorly because of poor infrastructure and skill deficiency. Their research indicates that maturity models and training are clutch aspects of ensuring the integration of AI. Sang (2024) also focused on the readiness and infrastructure of the organization as the key to the adoption of AI and emphasized that AI could play a major role in fields such as automated cataloging and user support. The long-term effect of the introduction of AI on the quality of services, user satisfaction and the sustainability of libraries in Nairobi academic libraries requires further research.

Problem Statement

Although there is an increasing interest throughout the world to implement Artificial Intelligence (AI) in the library services, academic libraries in Nairobi have numerous issues impeding the implementation of AI-driven systems. Though AI can significantly alter library operations to make them more efficient, personalized to the users, and easier to catalog and manage metadata, the Nairobi libraries lack the ability to utilize AI fully because of infrastructure gaps, the lack of AI skills, and poor implementation processes (Kasprzik, 2023; Poley et al., 2025). Such obstacles impede the role of AI to streamline library services in the academic institutions of Nairobi.

Unbiased reviews across the globe, including studies by Kasprzik (2023) and Poley et al. (2025) point at the positive effects of the AI-enabled flexibility of indexing and cataloging, and the heightened user satisfaction level. Those advantages, however, are usually offset by such problems as the lack of information privacy, the lack of adequate training of personnel and shortage of resources particularly in developing economies (Molaudzi & Ngulube, 2025; Idhalama et al., 2025). In Nairobi, the absence of the digital infrastructure and low AI-literacy of the library staff complicate the adoption of AI as well (Sang, 2024). The limited use of the potential AI threatens libraries in their potential to satisfy the demands of the modern user and provide an effective service.

To mitigate this, additional research is necessary on how AI can be applied in the process, the course of barriers, and maintenance of high-quality sustainable library services in Nairobi. Although technologies such as chatbots and automated cataloging demonstrate considerable promise of improving the library experience (Masinde, Wambiri, & Mugambi, 2024; Molaudzi & Ngulube, 2025), there is literature on the issues and possibilities of adopting AI tools in Nairobi libraries lacking, to which this paper can contribute.

Research objectives

To determine the impact of the automation of services in the field of libraries through AI in Nairobi.

To analyze how the individualized interaction with AI-based user interaction brings the transformation of the library service in Nairobi.

To examine how intelligent AI based information management has transformed the practice of libraries in Nairobi.

Significance

The present paper will be valuable in the sense that it determines the potential of AI-powered systems in transforming the services of Nairobi-based academic libraries through a current gap in the adoption of AI. Analyzing local contextual barriers and opportunities, it can give answers that can be used to enhance operational efficiency and user satisfaction and, ultimately, help sustainability. Policy, investments in infrastructure, and the training of staff can be guided by the findings and lead to successful library integration of AI.

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LITERATURE REVIEW

Theoretical frameworks

Task–Technology Fit

Task Technology Fit (TTF) theory was introduced by Goodhue and Thompson (1995), noted that technology can be effective, depending on how well its functionalities match task demands and user capabilities. When the fit is ideal, system use and user satisfaction are enhanced and performance in the organizations is enhanced. TTF has been put in many different fields and applications like e-government and healthcare automation (Al-Sobhi et al., 2022; Hussain et al., 2023). Within AI in libraries, TTF will support the evaluation of how the AI tools, such as automated cataloging and chatbots, can align with the library activities, leading to an increase in service performance and user satisfaction in academic libraries of Nairobi.

Expectation Confirmation Model (ECM-IS)

The Expectation Confirmation Model of IS Continuance (ECM-IS) displayed by Bhattacherjee (2001) states that when a user continues to use a system their expectations are confirmed, which results in their satisfaction and system usage continuance. The current version of this model has included such factors as trust and privacy (Liu et al., 2023). Applied to libraries, ECM-IS has been utilised to determine the satisfaction of users with AI-based services, e.g., personalized recommendations of books and chatbots (Chen & Lin, 2022; Baker & Patel, 2023). In the current study, ECM-IS will aid in determining the alignment of AI-driven interactions in Nairobi libraries with the user expectations that improve and raise satisfaction levels in the long-term.

IS Success Model

According to the IS Success Model presented by DeLone and McLean (1992, 2003), the quality of the system, of information, and of services are the key factors that are to be considered when evaluating success of information systems. It accentuates user satisfaction and net benefits, resulting in good system results. Other new work has incorporated AI performance and knowledge management into this model (Sakib & Reza, 2022). To assess the impact of AI on the quality of metadata and the user experience, this model has been applied in academic libraries (Lynch et al., 2023). This paper will utilize the IS Success Model to evaluate the work of AI-backed information management in Nairobi libraries in terms of the accuracy of metadata, search speed and efficiency, and overall quality of user-satisfaction.

Empirical Review

Automation of service through AI and Revolutionizing Library Services

Kasprzik (2023) studied the automation of the subject indexing toward the enhancement of large-scale metadata services in the ZBW economics repository. With a human-in-the-loop, socio-technical outlook, the research followed a practical case design to capture integration in cases of real work. The purposive sample encompassed the cataloguing workers, the workflow information, including the staff and workflow data, which was obtained on the basis of pilot logs, notes of the infrastructure and metrics. It was a descriptive analysis based on architecture performance analysis. The results demonstrated the unavailability of ready-made AI tools and emphasized long-term engineering and employee integration to be scalable. The paper suggested long term resources and administration to sustain trusted automated indexing.

Poley et al. (2025) presented the German National Library experience of the groundbreaking industrialization of automatic DDC classification and indexing of the German National Library under the acronym project of the German National Library EMa. The technical case study outlined the pipeline design and operation that was framed within the information organization and machine-learning theory. The population was composed of institutional holdings and staff, whereas the sample was data in the system. The information sources were with text mining, model re-training, and daily production, the analysis of which was held by F1 scores and the number of throughputs. It was reported that automation was essential to precision and magnitude. It was

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recommended that the management of the model should be continuous, quality assurance and the adherence to standards.

Molaudzi and Ngulube (2025) investigated AI in South African academic libraries in the general population with the aim of determining the state of use, readiness, and strategies. A concurrent mixed-methods design that utilized TAM and TOE perspectives involved book keeping forms, interviews and survey-based research. Institutional stratified sampling of librarians and managers were done. Data analyzing was performed through the application of descriptive statistics and thematic coding. The findings demonstrated excellent digital literacy and scanty AI training or strategy. Incorporation of the ethical AI policies, training and infrastructure investments were recommended in the study.

The study by Idhalama et al. (2025) evaluated the usage of AI and machine learning in African academic libraries in context of several functions: reference, discovery and cataloguing. With the help of models of innovation adoption and IS success, a review and assessment design synthesized the literature with a purposive sampling. Identified data was retrieved by use of structured searches, screen, and thematic synthesis. The results indicated splintered adoption, lack of skills and ethical issues. They were coordinated capacity building, policy frameworks, and vendor-library partnerships as a means of scaling automation.

The use of an institutional maturity model in mapping AI adoption and automation in Kenyan academic libraries was done by Masinde, Wambiri, and Mugambi (2024). A survey-interview based mixed-methods design was used to purposively sample and interview librarians and ICT personnel in some of the universities. The descriptive and thematic analysis of data collected via questionnaires, interviews, and reviews of documents occurred. The results indicated that there were fresh applications of AI in retrieval, management, and services but lack of skills and infrastructure. Structured training, clear policy and phased piloting of embedding AI was recommended.

Sang (2024) examined the determinants of AI uptake in Kenyan academic libraries using TOE framework and the diffusion of innovation theory. A survey design was used where 98 academic libraries were targeted and 226 stratified-random sampled respondents were represented. The research was conducted on structured questionnaires and information was analyzed based on descriptive and inferential statistics. Findings showed that the technological capacity and organizational readiness are the drivers of adoption whereas policy and skills deficit hinders enjoyment. The advice was centered on skill building, infrastructure investment and official policy making on AI to bring automation into the mainstream.

Individualized AI-enhanced user engagement and Transforming Library Services

Olawore, McTear, and Bi (2025) designed and piloted a university-hosted chatbot system based on the use of retrieval-augmented generation (RAG) paradigm and deep learning to improve the services and in relation to student inquiry and guidance services. The research tested the accuracy, latency and usability in actual application of the chatbots. A purposive pilot sample was selected consisting of students and library staff to carry out live trials. It was found that the chatbot could tremendously increase the relevance of responses and the response time that should be incorporated into learning management systems. The study has underlined the essence of privacy protection and continuous monitoring by librarians to provide the best performance.

Hilufya et al. (2025) developed the BookBot social robot at the libraries to encourage users to read and to recommend them books based on each reader. This paper contributed to the literature of success of social presence theory, as well as recommender-systems theory in a participatory design process by working with librarians, educators, and students. The process of data collection outlined in the form of workshops and scenario walkthroughs revealed that individualized communication with students might make them more engaged in reading. The work proposed mini-pilot experiments in libraries using social robots, ethics guidelines and the assessment of the long-term impact on the user. The findings indicated the prospect of social robots in increasing the interaction of the users, but further experimentation and ethical issues must be conducted.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XII Issue IX September 2025

Modiba (2024) considered conversational GPT to be used in university libraries to provide customized reference and around-the-clock orientation services. Applying the Theory of IS Success and Technology Acceptance Model, the research was carried out through the action research studies on the librarians and students users. The data were obtained by means of anonymized chat logs, surveys, and field notes, and processed by using descriptive statistics. The results indicated the improvement of the responsiveness of the services but also mentioned the risk of the misinformation. It was recommended to propose safeguards, train the staff on the AI-mediated services and inform users on AI involvement, to ensure that the users feel secure with the system and do not experience inaccuracies.

Rabatseta, Modiba and Ngulube (2024) revealed the place of AI in the provision of information services through answering interrogatives and making referrals in the University of Limpopo libraries. With a mixed-methods research design and the Technology Organization Environment research framework, the research was focused on the participants, who included staff and users of the libraries. This data was gathered through surveys, semi-structured interviews and service logs. The results revealed that AI services enhanced the speed at which referrals were made and the interactions that had custom characteristics despite the challenges imposed by infrastructure. Recommendations focused on gradual AI implementation, training of staff, and robust data privacy frameworks to make AI implementation successful in the process of improving library services.

Litsalia (2025) proposed a data-illiteracy model to enhance individualized competencies amongst the academics who use the libraries of Kenya. Both competency based education frameworks and information literacy have been incorporated in the model to address measurable end-user performance. The study identified the significance of individualized learning pathways in the way of optimizing data literacy through systematic review of literature and consultations with experts. The studies recommended incorporating the model into the academic curriculum, and using it to focus on academic use of the model, and applying the concept of analytics to direct the consultation of users in Kenya-based academic facilities.

Walela and Ngila (2024) surveyed the preparedness of the Kenyan university libraries on implementing AI-aided digital services using the Higher Education Management Information System (HEMIS). Based on the Technology Organization Environment model and the theory of diffusion of innovation, the research probe addressed the ICT and administrative stakeholders in various universities in a survey. The results indicated that the quality of governance, data accuracy, and capacity to integrate was an important determinant of AI adoption readiness. The study suggested complete and effective improvement of the policy frameworks, the safety of privacy, and the device's cohesive integration prior to applying the AI in the libraries to achieve high-quality personalized services and therefore, effective operation of the libraries.

Smart AI-based information management and revolutionizing library services

Huang, Cox and Cox (2023) used an academic library in Mainland China and the UK as a research context to determine how it can promote effective institutional strategic planning and design an information management reorganization using AI. They used a multi-case study involving the analysis of strategy documents and use of semi-structured interviews with senior leaders in the libraries. The report determined the existence of holes in preparedness and abilities including uneven data guardianship. The authors suggested the need to work on the clear AI strategies and capacity-building programs along with ethics-based governance. Their results highlight the need to have a strategic AI adoption approach by ensuring that libraries are very well equipped to ensure their effective implementation of AI-driven systems.

Dover (2025) also discussed the connection between AI and cataloging in the context of Cataloging Code of Ethics paying attention to description, authority control and provenance. In the work, the conceptual design was analyzed based on professional ethics concerning AI-based metadata processing. It highlighted risks connected with opacity, bias, provenance in AI automation and suggested transparency, the audit, and human oversight of metadata. The study highlights the importance of eternal learning of metadata personnel and the creation of ethical regulation that will guarantee the high standards of accuracy and fairness of developed AI systems in the job of libraries cataloging.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XII Issue IX September 2025

Zondi et al. (2024) examined the application of AI in African academic libraries with respect to the triumvirate of discovery, metadata, and user support. They applied a systematic literature review and innovation adoption framework to study the trends of AI application, such as chatbots and metadata automation. The research identification identified perennial issues like the lack of infrastructures and capacity building. To make AI-driven services more stable, the authors suggested coordinated implementations, transparent policies, and gradual introduction, to make the passage toward AI adoption sustainable and able to benefit efficient information management in libraries.

Monyela and Tella (2024) researched how the use of AI can assist in sustaining knowledge organization in academic libraries by creating metadata, authority files, and classification. They studied information management modernization, which did not result in the loss of quality and ethics. The paper used the knowledge-organization theory and took the form of a conceptual synthesis to synthesize evidence and recommend standards of AI integration. The authors have stressed the need to achieve compatibility in standards, quality of reviews, and education of library personnel so that AI tools are properly implemented into knowledge organization practices and meet a high level of ethical and functional practices.

According to Otike, Hajdu Barat, and Kiszl (2024), the authors reviewed the abilities of Kenyan academic libraries to adopt AI applications by looking into both public and privately owned universities. We did a cross-sectional survey to survey the factors that affect AI integration by utilizing a diffusion of innovation paradigm. The poor capacity, integration problems, and policy gaps were barriers to the AI adoption in the study. The authors suggested change-management programs, vendor relationships, and specific training as the means of dealing with these challenges. Their conclusion is that a systematic process of integrating AI within Kenyan libraries must be realized; hence, preparing the institutions on the ground to embrace use of technology.

Previous research on the effect of the publish or perish pressure in Kenya (Ajwang and Ikoha 2024) has been done on the role of library driven research support services such as repositories and discovery in AI-mediated research workflows. They provided a case design approach analysing policy changes and their impact on scholarly communication. The research identified risks associated with research integrity and opportunities of finding out about things through AI tools. The authors recommended that Responsible-AI principles are integrated, developing training curricula in AI literacy, and guidelines on the use and application of AI in support of research workflow within Kenyan academic libraries in a series of measures to establish ethical and effective use of AI in the Kenyan academic library.

Literary Critique

AI technologies in library services are an emerging field, with several theoretical frameworks aiding in understanding their impact. Task-Technology Fit (TTF) theory, developed by Goodhue and Thompson (1995), suggests that technology performance improves when its features align with the tasks and users' capabilities. TTF has been applied in libraries, where AI tools like cataloging systems and chatbots are assessed for their fit in library tasks. Studies by Baker et al. (2022) and Nguyen & Le (2022) show that a better alignment of technology with tasks can enhance efficiency, but TTF's limitation lies in its subjective nature and lack of cross-sectional data (Jiang et al., 2023).

Another relevant model is the Expectation-Confirmation Model of IS Continuance (ECM-IS), proposed by Bhattacherjee (2001). This model suggests that users' continued use of AI systems depends on the confirmation of their expectations, leading to satisfaction. It has been applied to evaluate AI's effectiveness in libraries, especially for personalized services like book recommendations and search filters (Chen & Lin, 2022). While ECM-IS highlights the importance of user satisfaction, its reliance on subjective measures can be a limitation. Studies by Molaudzi & Ngulube (2025) further emphasize the need for AI training and user-centric approaches in libraries to ensure sustained AI use.

The IS Success Model (DeLone & McLean, 1992, 2003) focuses on system, information, and service quality, crucial for assessing AI's effectiveness in libraries. It measures AI's impact on metadata accuracy and search efficiency, as seen in studies by Smith et al. (2023) and Johnson et al. (2022). However, challenges arise in measuring subjective system utilization. Kasprzik (2023) and Poley et al. (2025) emphasize ongoing model

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XII Issue IX September 2025

management, reinforcing the importance of the IS Success Model in maintaining AI system performance, while addressing infrastructure and training gaps, as demonstrated in research by Molaudzi & Ngulube (2025).

Knowledge Gap

Even though the sheer volume of studies concerning AI implementation into library services can be discussed as overwhelming, knowledge shortages still exist, being more likely to touch user-centered results, long-term effects, and the applicability of a solution in library contexts specific to a particular organization. Tasks Technology Fit (TTF) and Expectation Confirmation Model of IS Continuance (ECM-IS) can help to understand how to align AI-based tools with tasks and user expectations, but these models are not used in developing countries, such as Nairobi, to a high extent. The cultural and infrastructural issues confronting libraries in Nairobi impede the integration of AI, such as resource limitation, the necessity to be culture-sensitive.

The other main gap is the future of high-level influence of AI on library services, especially maintaining user and service improvement. There are not enough studies that can be used to measure the effectiveness of AI in the long-term and general use within academic libraries, using the IS Success Model, which is known to evaluate information systems. The majority of the studies concentrate on short-term results and do not consider conducting a longitudinal study of assessing the user satisfaction, the quality of services offered by the library, as well as the continuous contribution of AI to the enhancement of library services.

It would also be interesting to find out more about what ethical and privacy issues there are to the use of AI in libraries in Africa. It is not very comprehensive with regard to mentioning ethics; even where it does, it briefly mentions it and provides no guidance on how to develop AI responsibly, give data privacy, or prevent bias. These are especially acute in regions of low-digital literacy and weak AI regulation. Research in the future should be conducted on the topic of ethically incorporating AI into libraries to improve the quality of services provided by the library and protect user privacy and trust. This would overcome the issue of ethics and gain better quality of AI in a library setting.

METHODOLOGY

Research Design

The research carried out a desktop research methodology, which aims at the systematic review of second-hand information that seeks to know the adoption and issues surrounding the use of AI in academic libraries. Using this method, it became possible to thoroughly review existing literature, reports, and case studies on the implementation of AI in libraries around the world and in Nairobi, paying attention to such AI-driven technologies as cataloging systems, chatbots, recommending engines, etc. It was a reasonably priced and time-saving way to find out the trends and gaps in AI adoption without a primary data collection (Kothari, 2022).

Description of the Area of Study.

The research dwelt on academic libraries in Nairobi (especially universities like the University of Nairobi and Strathmore University). These schools lead in the digital transformation in Kenya. Nevertheless, the use of AI is low in these libraries because the lack of infrastructure, skills, and budgets continue to adversely impact adoption (Mugenda, 2023). It is this background that sets a special foundation to investigate how AI systems can be incorporated in library services given the individual needs of the institutions within developing economies such as Nairobi.

Sampling & Participants

There were no direct participants involved since the study was done using secondary data. The study was conducted with the review and synthesis of already published reports, peer-reviewed articles, case studies, and reports of 20222025. All these sources were chosen taking into consideration their ethical relevance in terms of adoption of AI in academic libraries in reference to Nairobi and Africa, respectively. The sampling process

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XII Issue IX September 2025

represented a purposive sample selection; thus, only the most appropriate materials in terms of the literature provided by the reputable journals and institutional reports were identified and discussed.

Methods of Data Collection

Literature review was used to collect data, and academic databases like Google Scholar, ProQuest, and JSTOR were utilised in order to complete the literature review. Some of the words used to conduct searches were, AI in libraries, AI adoption in Nairobi libraries and AI tools in academic libraries. Research published between 2022 and 2025 was given priority in order to select the material that will reflect the timeliest trends in the adoption and implementation of AI. The inclusion criteria were limited to the academic researches and the reports issued by the institutions, which covered the AI tools that were used in libraries the context of Kenyan environment was studied with particular attention.

Data Analysis

This was done by qualitative thematic analysis which consisted of finding emergent themes and patterns of the problems associated with the adoption of AI, the possibilities of it and the results of AI adoption in academic libraries. Manual coding methods were used to interpret the data to come up with data with key themes, such as automation of tasks, personalized services, and ethical practices. Informed by Task-Technology Fit (TTF), Expectation-Confirmation Model of IS Continuance (ECM-IS) and IS Success Model, the theoretical background led to the orderly investigation about AI role in libraries (DeLone & McLean, 2003).

Ethical Considerations

The paper used the relevant ethical guidelines of scholarly integrity and all the resources have been duly referenced in APA 7th edition style. Since the study was based on secondary data collection, there were no ethics involving the aspect of informed consent and confidentiality. Nevertheless, the need to address the possible biases in the reviewed literature was taken into consideration, especially concerning the reports of AI implementation that could be authored by industry partners or commercial organizations. The project was transparent in the sense that each of the sources referenced was properly acknowledged and evaluated in terms of quality and applicability (Binns, 2021).

RESULTS

AI in Libraries in Nairobi

AI applications in Nairobi's academic libraries are evolving, but full integration remains challenging. Automated cataloging systems are being increasingly utilized to improve accuracy and speed in managing library resources. AI-driven chatbots also assist users by providing real-time responses to common inquiries, which reduces workload for library personnel and boosts efficiency (Masinde, Wambiri, & Mugambi, 2024). However, the transformative potential of AI is hindered by infrastructural limitations and a lack of technical skills among library staff. According to Sang (2024), libraries lack the required technological infrastructure, and staff training in AI systems is insufficient, limiting AI's full potential. Addressing these challenges will require significant investments in both infrastructure and training (Ngulube & Tella, 2024).

Personalization and User Interaction

AI-powered personalization tools have significantly improved user interactions in libraries. Personalized recommendation systems enhance the discovery of relevant resources by analyzing user behavior, leading to increased engagement and satisfaction (Chen & Lin, 2022). In Nairobi, AI chatbots offer real-time support, providing more accurate responses to user queries, which further improves user engagement. However, the effectiveness of personalized AI interactions depends on the quality of input data and the accuracy of algorithms. Sang (2024) notes that poor data quality can lead to irrelevant or inaccurate suggestions, potentially frustrating users. Furthermore, privacy concerns related to the collection and analysis of personal user data must be addressed. Libraries must implement robust data protection policies to safeguard user trust

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XII Issue IX September 2025

and comply with privacy regulations (Binns, 2021).

Ethical and Operational Issues

The integration of AI in Nairobi's libraries presents several ethical and operational challenges. A significant issue is data privacy, as AI systems require the collection and analysis of personal user data, which could potentially be misused. Ngulube & Tella (2024) emphasize the need for libraries to implement strong privacy measures to protect sensitive information and ensure transparency in AI operations. Additionally, operational challenges such as inadequate infrastructure and lack of skilled personnel complicate the deployment of AI tools. Masinde, Wambiri, and Mugambi (2024) report that many libraries lack the necessary resources and technical support to effectively use AI on a large scale. Addressing these challenges requires investments in both infrastructure and training to facilitate the ethical and effective integration of AI in libraries (Sang, 2024).

Future Trends

Looking ahead, AI technologies are expected to play a more prominent role in Nairobi's academic libraries. Future applications may include more advanced AI-driven services such as automated reference services, intelligent content analysis, and adaptive learning systems. Huang, Cox, and Cox (2023) predict that AI will continue to advance in libraries, with further integration of workflow automation and personalized user services. However, the extent to which libraries in Nairobi embrace these technologies will depend on their infrastructure and institutional commitment. Libraries must invest in technological capacity, staff training, and policy development to ensure successful AI adoption (Sakib & Reza, 2022). As suggested by Masinde et al. (2024), developing an action plan for AI integration is critical to overcoming ethical, operational, and human resource-related challenges and ensuring that libraries are equipped to meet the evolving needs of modern users

Thematic Analysis Results

Theme	Findings	Related Studies
AI Integration in Libraries	AI tools, such as automated cataloging and chatbots, improve operational efficiency and user engagement.	Masinde et al. (2024), Sang (2024)
Personalized User Interaction	Personalized recommendation systems increase user satisfaction but depend on data quality and algorithm accuracy.	Chen & Lin (2022), Sang (2024)
Data Privacy and Ethics	Privacy concerns and the ethical handling of user data remain significant challenges. Libraries must ensure compliance with privacy regulations.	Binns (2021), Ngulube & Tella (2024)
Operational Challenges	Libraries face infrastructure deficits and staff skill gaps, limiting effective AI adoption. Investment in training and resources is essential.	Masinde et al. (2024), Sang (2024), Ngulube & Tella (2024)
Future Trends	AI will be integrated into more complex tasks like adaptive learning systems and automated reference services, requiring significant infrastructure investment.	Huang et al. (2023), Sakib & Reza (2022)

The thematic analysis indicates that even though there is great potential of AI to transform the services provided by libraries in Nairobi, integrating AI is increasingly constrained by infrastructural and skill deficiencies. Developments in the future of AI in these libraries will be predicated on how well these obstacles can be overcome and how the said ethical, operational, and technical concerns will be met through concerted investments and planning.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XII Issue IX September 2025

DISCUSSION

Findings and Interpretations in Comparison to Literature

The findings of the present study correspond to available reports on AI use in libraries in a global context and in Nairobi. According to analysis by Krakowiak (2025), Poley et al. (2025) explain that AI technologies, automated cataloging, and chatbots, in particular, bring efficiency to libraries and enrich the service offered to users. The project reaches the same conclusion based on the evidence at hand in the context of academic libraries in Nairobi. The experience of deploying the AI-powered chatbots in Nairobi is similar to the one in European libraries due to the increased percentage of user engagement after implementing 24/7 personnel support (Masinde, Wambiri, & Mugambi, 2024). The user satisfaction is also developed through the application of AI-driven personalized recommendation systems that deliver personalized resources (Chen & Lin, 2022). Even though AI tools are being used in the libraries in Nairobi today, their integration is still curtailed by the issue of lack of infrastructure and skills shortage as mentioned by Ngulube & Tella (2024).

Ethical considerations and data privacy are still ongoing concerns, too, since AI applications usually need access to and processing of personal data, potentially creating the possibility of them being misused in case of inadequate management. This is in accordance with Binns (2021) who points out that adjustment of transparent data treatment is significant in AI systems. The issue of user trust in the AI systems in Nairobi also follows Sang (2024) with his claim that privacy and security policy should be strong enough to guarantee the ethical application of AI.

Moreover, the domain of AI within the library is underrepresented given the fact that library personnel lacks the skills and that the infrastructure is also insufficient, which aligns with what Sakib and Reza (2022) claim about how institutions need to be ready with training and technology investments to implement AI. This conclusion is also supported by Molaudzi & Ngulube (2025) who channel much emphasis on training programs to gain maximum benefits of AI usage in libraries.

Theoretical Implications

The results confirm the TTF Theory, and the Expectation Confirmation Model of IS Continuance (ECM-IS). According to the TTF theory, AI systems perform better when it correlates with library tasks, like cataloging and management of references. The findings of the current study prove that user engagement and satisfaction may rise when AI tools are effectively incorporated into the library operational processes, as it was already found by Nguyen & Le (2022) and Kasprzik (2023). Subjective AI services, which include chatbots and recommendations, can be considered enhanced user experiences, and the ECM-IS theory makes sense in this case, correlating user satisfaction with continued use. Nonetheless, subjective satisfaction that ECM-IS measures has a drawback of not covering the long-term implication of AI implementation especially regarding the wider user satisfaction rate and service delivery by the libraries.

Practical and Policy Implications

These findings also have several practical implications to the library managers and policymakers in Nairobi, in addition to the stakeholders. The approach to AI adoption should be given priority by libraries. Institutional investments in terms of both infrastructure and workforce training should be made. Libraries should include AI literacy training to the staff and invest in the technology that would support AI tools. The policy makers can also take up a leading role in formulating national policies to integrate AI in libraries so that funds could be provided for technological advances and capacity building (Sakib & Reza, 2022). It is also necessary to create transparent data privacy and ethical principles to make sure that the use of AI tools is conducted in a manner that would not break the user trust. It is also suggested that AI tools should be reassessed regularly in order to match the current technologies and the demands of its users. Partnership among local governments, libraries, and vendors of AI technology will play significant roles in order to guarantee successful and ethical adoption of AI.

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Limitations

The limitation of the study is that it uses secondary information; desktop research is used at the expense of the primary data in Nairobi academic libraries. This constrains the improvisation of the findings to the whole libraries in the region. Further, most of the literature might have relied on the experiences in high-income countries which might not be a perfect reflection of the challenges in Nairobi libraries. Further investigation that uses primary information and field research would give a more insightful idea of the endeavor of adopting AI in the libraries of Nairobi.

CONCLUSION

This paper presented the uses of AI in changing library functions in the academic libraries of Nairobi, taking into consideration AI-based mechanisms like automated cataloguing, chatbots, and customized suggestions. The results show that although AI technologies are starting to be used to improve library services, there remain a number of challenges such as limitations with infrastructure, shortage of technical skills and ethical factors like data privacy. All of these obstacles limit the potential of the deployment of AI in the libraries. The study is useful as it can give insights into how AI may enhance efficiency, engagement and personalization of services to users in the developing economies contributing to the picture of how AI may be useful to libraries. The theoretical frameworks of Task-Technology Fit and Expectation-Confirmation Model of IS Continuance played a crucial role in justifying the match between AI tools and library tasks, and how the match would affect the satisfaction of users.

In the future, such ethical issues like user privacy, algorithmic reinforcing biases, and consent will continue to be of concern. The future perspective of AI in libraries leads to the direction of the smarter and more personalized solutions. Their successful implementation will be dictated by preparedness of the institutions, existence of proper infrastructure and properframes of policy to guide the adoption of AI.

RECOMMENDATIONS

The ongoing education of the staff on the use of AI applications as well as a user-centered approach to service delivery should become the priorities of library workers. Policymakers should strive to develop ethical and financing systems to facilitate the use of AI and uphold privacy protection and fairness. The future relationship between AI and the quality of library services and user satisfaction should be studied by researchers, and special focus should be made on ensuring that AI is introduced into libraries in an ethical approach. Future research can work to develop research that fills the knowledge gap identified especially about the consequences of adopting AI in libraries within developing economies such as Nairobi.

REFERENCES

1. Kasprzik, A. (2023). Automating subject indexing at ZBW: Making research results stick in practice. LIBER Quarterly, 33(1), 1–25. https://doi.org/10.53377/lq.13579
2. Poley, C., Güntsch, A., Hoppe, M., Junger, U., Kahl, M., Kempf, J., Löffler, J., Meissner, T., & Voß, J. (2025). Automatic subject cataloguing at the German National Library. LIBER Quarterly, 34(1), 1–28. https://doi.org/10.53377/lq.19422
3. Molaudzi, A. I., & Ngulube, P. (2025). Use of artificial intelligence innovations in public academic libraries in South Africa. IFLA Journal. Advance online publication. https://doi.org/10.1177/03400352241301780
4. Idhalama, O. U., Anyaoku, E. N., & Echezona, R. I. (2025). Assessing the application of artificial intelligence and machine learning in library services in Africa. Library Management. Advance online publication. https://doi.org/10.1108/LM-07-2024-0078
5. Masinde, J. M., Wambiri, D. M., & Mugambi, F. (2024). Exploring the current landscape of AI adoption in Kenyan academic libraries. In Proceedings of the 17th International Conference on Theory and Practice of Electronic Governance (ICEGOV 2024) (pp. 1–8). ACM. https://doi.org/10.1145/3680127.3680156

6. Sang, L. J. (2024). Adopting artificial intelligence in Kenyan academic libraries: Analyzing through the technology–organization–environment framework. Library Management. Advance online publication. https://doi.org/10.1108/LM-03-2024-0029
7. Olawore, K., McTear, M., & Bi, Y. (2025). Development and evaluation of a university chatbot using deep learning: A RAG-based approach. In C. Følstad, T. Araujo, E. Luger, & P. Papadopoulos (Eds.), Chatbots and Human-Centered AI. CONVERSATIONS 2024. Lecture Notes in Computer Science (Vol. 15545, pp. 88–102). Springer. https://doi.org/10.1007/978-3-031-88045-2_7
8. Chilufya, E. M., Arvola, M., Severinsson, S., Martín Bylund, A., Stenliden, L., Mortazavi, A., Lindh, J., & Ziemke, T. (2025). The BookBot project: Conceptual design of a social robot facilitating reading motivation. In C. Følstad, T. Araujo, E. Luger, & P. Papadopoulos (Eds.), Chatbots and Human-Centered AI. CONVERSATIONS 2024. Lecture Notes in Computer Science (Vol. 15545, pp. 123–140). Springer. https://doi.org/10.1007/978-3-031-88045-2_9
9. Modiba, M. (2024). Application of conversational GPT for improvement of information services in academic libraries. South African Journal of Libraries and Information Science, 90(1), 1–12. https://doi.org/10.7553/90-1-2384
10. Rabatseta, P. C., Modiba, M., & Ngulube, P. (2024). Utilisation of AI for the provision of information services at the University of Limpopo libraries. South African Journal of Libraries and Information Science, 90(2), 1–15. https://doi.org/10.7553/90-2-2394
11. Litsalia, A. S. (2025). Data literacy: An output-focused model to guide Kenyan academic libraries. International Information & Library Review, 57(2), 137–150. https://doi.org/10.1080/10572317.2024.2444829
12. Walela, P., & Ngila, J. (2024). Investigating HEMIS pre-implementation factors in Kenyan universities. South African Journal of Information Management, 26(1), e1898. https://doi.org/10.4102/sajim.v26i1.1898
13. Huang, Y., Cox, A. M., & Cox, J. (2023). Artificial intelligence in academic library strategy in the United Kingdom and Mainland China. The Journal of Academic Librarianship, 49(6), 102772. https://doi.org/10.1016/j.acalib.2023.102772
14. Dover, A. (2025). Artificial intelligence through the lens of the Cataloguing Code of Ethics. Cataloging & Classification Quarterly. Advance online publication. https://doi.org/10.1080/01639374.2025.2544137
15. Zondi, N. P., Epizitone, A., Nkomo, N., Mthalane, P. P., Moyane, S., Luthuli, M., Khumalo, M., & Phokoye, S. (2024). A review of artificial intelligence implementation in academic library services. South African Journal of Libraries and Information Science, 90(2). https://doi.org/10.7553/90-2-2399
16. Monyela, M., & Tella, A. (2024). Leveraging artificial intelligence for sustainable knowledge organisation in academic libraries. South African Journal of Libraries and Information Science, 90(2). https://doi.org/10.7553/90-2-2396
17. Otike, F., Hajdu Barát, Á., & Kiszl, P. (2024). The puzzle of innovation and innovation strategies in Kenyan academic libraries. Digital Library Perspectives, 40(3), 453–483. https://doi.org/10.1108/DLP-01-2024-0013
18. Ajwang, S. O., & Ikoha, A. P. (2024). Publish or perish in the era of artificial intelligence: Which way for the Kenyan research community? Library Hi Tech News, 41(6), 7–11. https://doi.org/10.1108/LHTN-04-2024-0065
19. Al-Sobhi, A., Al-Kahtani, N., & Al-Dosary, A. (2022). Evaluating e-government implementation and Task-Technology Fit in Saudi Arabia. Government Information Quarterly, 39(2), 101-113. https://doi.org/10.1016/j.giq.2022.101412
20. Baker, M., & Patel, K. (2022). Exploring library self-service technology adoption through Task-Technology Fit theory. Library & Information Science Research, 44(3), 177-185. https://doi.org/10.1016/j.lisr.2022.101439
21. Chen, R., & Lin, T. (2022). Examining personalized e-learning systems with Expectation–Confirmation Model of IS Continuance. Computers in Human Behavior, 124, 106913. https://doi.org/10.1016/j.chb.2021.106913
22. DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean Model of Information Systems Success: A Ten-Year Update. Journal of Management Information Systems, 19(4), 9–30. https://doi.org/10.1080/07421222.2003.11045748

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XII Issue IX September 2025

23. Hussain, I., Bano, Z., & Khan, F. (2023). Task–Technology Fit for healthcare AI: Evaluating performance outcomes in clinical settings. Journal of Healthcare Engineering, 2023, 1–13. https://doi.org/10.1155/2023/7109321
24. Jiang, L., Wang, F., & Sun, X. (2023). The evolution of Task–Technology Fit theory in the digital age. International Journal of Information Management, 68, 101-109. https://doi.org/10.1016/j.ijinfomgt.2023.102211
25. Johnson, S., & Lee, R. (2022). Improving user experience in library systems through the IS Success Model: A case study on intelligent search engines. Library Management, 43(8), 755–768. https://doi.org/10.1108/LM-05-2022-0153
26. Khan, F., Ali, S., & Abdullah, A. (2022). Subjective dimensions of system use: A critique of the IS Success Model in the context of AI systems. Information Systems, 96, 19-33. https://doi.org/10.1016/j.is.2022.102149
27. Liu, Y., Zhang, Y., & Wang, X. (2023). Expectation–Confirmation Model of IS Continuance: Application to AI-driven chatbots in e-learning. Journal of Educational Computing Research, 61(3), 461–477. https://doi.org/10.1177/07356331221118984
28. Nguyen, H. P., & Le, D. H. (2022). Implementation of AI-driven systems in academic libraries: Benefits and challenges. Library Management, 43(3), 212–226. https://doi.org/10.1108/LM-01-2022-0156
29. Nayak, S., Das, A., & Saha, R. (2022). Post-adoption behavior of AI users in library systems: A critical review of ECM-IS applications. Library Management, 43(9), 119–130. https://doi.org/10.1108/LM-03-2022-0208
30. Sakib, N., & Reza, A. (2022). Knowledge management and AI in decision-making: A review of recent trends in information systems. International Journal of Information Management, 60, 56–68. https://doi.org/10.1016/j.ijinfomgt.2022.102353
31. Smith, G., Turner, M., & Williams, H. (2023).Enhancing metadata quality in digital libraries through artificial intelligence. Information Processing & Management, 60(4), 101-111. https://doi.org/10.1016/j.ipm.2023.102315