



Overcoming Barriers to AI Implementation in University Libraries: A Developing Country Perspective

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ABSTRACT	ARTICLE INFO
<p>This paper explores the use of artificial intelligence (AI) as an enabler for effective library services in universities in developing countries in the contemporary information age, focusing on its use in library functions, librarians' attitudes, readiness, challenges, and recommendations for effective implementation. The paper shows that AI has the potential to enhance library services and improve user experiences. It also assures that librarians play a crucial role in the implementation and use of AI, and their attitudes towards AI vary. Some librarians are excited about the possibilities AI offers, while others are skeptical or hesitant about its implementation in libraries. However, the paper concludes that librarians in developing countries express a readiness to adopt AI in university libraries. Despite this readiness, there are several challenges in implementing and using AI in university libraries in developing countries, including limited resources, lack of technical expertise, and concerns regarding privacy and data protection. To overcome these challenges and ensure effective use of AI, the paper recommends appropriate tools such as embracing AI technologies like chatbots, RFID, and robotics for top-level service delivery, as well as leveraging AI to connect with remote users and regain relevance within the user base..</p> <p>© 2024 EduLib</p>	<p>Article History: <i>Submitted/Received 19 Jan 2024</i> <i>First Revised 02 Feb 2024</i> <i>Accepted 10 Sept 2024</i> <i>First Available online 07 Oct 2024</i> <i>Publication Date 01 Nov 2024</i></p> <hr/> <p>Keyword: <i>Artificial Intelligence (AI), Library services, Librarians, Developing countries.</i></p>

1. INTRODUCTION

The rapid adoption of artificial intelligence (AI) across various sectors, including healthcare, finance, and education, has sparked widespread excitement. However, its integration into university libraries, particularly in developing countries, presents significant challenges that cannot be overlooked. AI, while offering the potential to revolutionize library services through personalized recommendations, automation of administrative tasks, and enhanced search capabilities, also introduces ethical, operational, and resource-related concerns.

One of the most pressing issues in the adoption of AI in libraries is the lack of adequate resources and infrastructure. Many libraries in developing countries struggle to maintain basic operations, let alone implement sophisticated AI systems. As noted by researchers, limited financial resources and outdated infrastructure hinder the full-scale implementation of AI technologies in libraries, particularly in resource-constrained environments (Barsha & Munshi, 2023). The cost of deploying AI technologies, including hardware, software, and staff training, places an immense financial burden on institutions that are already underfunded.

Another significant concern is the skepticism and hesitation among library staff regarding the implementation of AI. While some librarians embrace the potential of AI to streamline tasks and enhance user experiences, others are wary of the risks it poses to their roles and responsibilities. Research indicates that librarians in developing countries express mixed feelings toward AI adoption, with many fearing job displacement and a loss of personal interaction with users (Asim et al., 2023). This resistance to change could slow down or even prevent successful AI integration in libraries.

Privacy and data protection issues also pose substantial barriers to the adoption of AI in libraries. As libraries increasingly rely on AI-driven systems to analyze user behavior and provide personalized services, concerns about user privacy have intensified. A study by Cox (2023) highlights that the use of AI in libraries raises questions about the protection of sensitive data, especially in regions where privacy regulations are either weak or non-existent. Without strong data governance frameworks, libraries may inadvertently expose users to risks such as data breaches and unauthorized access to personal information.

Furthermore, ethical concerns regarding bias and fairness in AI systems must be addressed. AI algorithms, especially those used for recommendations or search functionalities, are often trained on biased datasets that may not reflect the diversity of library users. As pointed out by Bubinger & Dinneen (2021), bias in AI systems can perpetuate inequality by favoring certain user groups over others, thereby limiting access to information for marginalized communities. In developing countries, where socioeconomic disparities are already pronounced, biased AI systems could exacerbate these inequalities.

In addition to these challenges, libraries face the issue of technical expertise. The successful implementation of AI requires skilled professionals who understand both AI technologies and library sciences. However, many libraries in developing countries lack staff with the necessary technical expertise. As observed by Hervieux & Wheatley (2021), the shortage of trained AI specialists in libraries limits the ability of institutions to fully leverage AI tools for improving services.

In light of these challenges, it is crucial to strike a balance between embracing the potential of AI and addressing the inherent risks it presents. By tackling these problems head-on, libraries can pave the way for more effective, equitable, and user-centric AI implementations that truly enhance the user experience while safeguarding the rights and privacy of their patrons.

Several authors including Wood and Evans (2018), Vijayakumar and Sheshadri (2019), Ex Libris (2019), Pence (2022), Okunlaya et al. (2022), and Hussain (2023) have explored the

importance of AI in libraries and its role in the renaissance of libraries. However, none of these authors have addressed the position of librarians in developing country university libraries on the adoption of AI to support traffic management in future library services in the mix of factors such as increasingly unstable power supply, lack of institutional policies, lack of funding for advanced AI, unsafe working conditions in the evolving library environment and changes in the 5th Industrial Revolution technology that necessitate AI. These authors have also not addressed how prepared are the librarians for these developments and how they consider the role of AI in the future of library services. The study therefore posits to address these shortcomings.

This study is set to close the gaps in the statement of the research problem by analyzing the gaps between AI and the future library services. Emphasizing the importance of AI driven human-computer interaction for facilitating library services highlighting the need for familiarity with AI interactivity, user experience, user interface design, librarian training and support, and AI-driven culture which library can effectively incorporate to improve their services and meet the evolving needs of their users. The study acknowledges the potential of AI to enhance library services, but also acknowledges the challenges and limitations that come with implementation of AI. Overall, this research serves as a valuable resource for library professionals seeking to harness the power of AI in order to provide more efficient and personalized services to their patrons. Specifically these include the followings: (i) Use of AI in university libraries; (ii) Librarians' attitudes towards the introduction and use of AI in libraries; (iii) Readiness of librarians to adopt and use AI in university libraries in developing countries; (iv) Challenges to the adoption and use of AI in university libraries in developing countries; (vi) Recommendations for appropriate tools for effective use of AI.

Several studies have been undertaken on the subject of Ai in the library landscape. In a study conducted by [Abayomi et al. \(2021\)](#), the awareness and perceptions of academic librarians in Nigeria regarding the use of artificial intelligence (AI) in university libraries were examined. The study utilized a survey research design with both qualitative and quantitative approaches, and 80 academic librarians from 8 selected university libraries participated. The findings revealed that the librarians were familiar with AI use in libraries but expressed concerns about potential job losses. Moreover, AI was perceived as a tool to enhance work performance and user satisfaction, although there was a need for greater awareness of its importance in libraries. The study recommended that librarians acquire the necessary skills to incorporate AI into library operations and that library management should provide training on AI utilization and its benefits. Additionally, it emphasized the need to promote collaboration and partnerships between libraries and AI experts to maximize the potential of AI in library services.

In this paper, [Li et al. \(2021\)](#) explores the use of artificial intelligence (AI) in library cybersecurity. The author proposes an AI-based library network security prevention mechanism, which utilizes AI technology and a hierarchical analysis process to assess the security status of the network. The study also implements data fusion, hierarchical situation assessment, and cybersecurity prediction using artificial immune system and improved population knowledge-based algorithms. Through experimental studies, the effectiveness of the proposed AI model in predicting and evaluating the cybersecurity situation in libraries is demonstrated. The results highlight the ability of AI to enhance protection and security in library management networks. Overall, Li's study provides valuable insights into the application of AI in library network security.

In his article, Yuan (2021) discusses the impact of artificial intelligence (AI) on libraries. The author highlights that with the advancement of technology, AI has become a global frontier

for research, and many countries are now planning to incorporate AI into their national strategies. The article examines how AI will affect the integration of innovation and technology within libraries, and provides suggestions on how AI can be implemented in various aspects of library services such as resource creation, information services, and library development. The author argues that technological innovations and research in library development will continue to play a significant role in the development of libraries, even as they evolve into the age of AI. The article emphasizes that despite the rise of AI, technological innovation and research in library development will still have a vital contribution to make.

A study conducted by [Farag et al. \(2021\)](#) explores the implementation of artificial intelligence (AI) in academic libraries in Saudi Arabia. The research reveals that a majority of library staff possess a limited understanding of AI, with 69% indicating that they do not utilize AI in their work. The study also highlights that AI is currently being employed for various purposes, including indexing, analysis, searching, storage, photography, and meeting the needs of library users. However, there is a shortage of training programs available for AI workers, contributing to the inadequate utilization of AI in libraries. Despite this, the study suggests that AI should be regarded as a supportive tool for librarians rather than a sole reliance. Furthermore, the challenges faced by academic libraries in implementing AI involve the lack of physical facilities, a limited number of local AI technology providers, and the need for better training programs.

According to [Adetayo \(2023\)](#), artificial intelligence (AI) chatbots, specifically ChatGPT, are becoming increasingly important in academic libraries. These chatbots can quickly and accurately respond to user queries, offering convenience and accessibility beyond regular library hours. ChatGPT's advanced language processing capabilities allow it to generate context-appropriate and user-friendly answers, making it a valuable tool for academic libraries. It can be used for reference services, information dissemination, and data collection. However, there are challenges associated with its implementation, such as the potential job displacement for library staff, the inappropriate use of technology, inaccuracies in responses, and its limited understanding compared to human librarians. Despite these challenges, ChatGPT has the potential to benefit libraries by automating routine tasks, thus freeing up librarians' time to provide more advanced assistance and ultimately improving the quality and efficiency of academic library services. A paper titled *Transforming Academic Libraries in Africa through Artificial Intelligence* discusses the opportunities and challenges of using artificial intelligence (AI) in African academic libraries. The authors explore the potential benefits of AI in providing information services and improving efficiency. However, they also highlight challenges such as inadequate infrastructure and lack of training. To address these issues, the authors recommend that government and library management collaborate to promote the use of AI and develop appropriate policies.

In a separate study, [Yoon et al \(2021\)](#) conducted a survey among North American librarians to understand their perspectives on AI usage in libraries. The survey revealed that a majority of the respondents had positive perceptions of AI and related technologies. Many librarians believed that these technologies would change the way libraries operate, and expressed a desire to receive training in AI. The survey also found that a significant percentage of librarians were already using AI or related technologies, and a majority anticipated their widespread adoption in the future. Additionally, both academic and public librarians expressed curiosity and similar views on the suitability of AI for various library tasks. In [Liu et al. \(2022\)](#)'s study on the use of artificial intelligence (AI) technology in university libraries, the main problems identified include a lack of understanding of natural language, unclear knowledge representation, and difficulty in accessing knowledge. The study proposes innovative

solutions based on the latest technological advances in AI to address these issues, which significantly improve the comprehensive management capability and user experience of university libraries. Similarly, Rojas et al. discuss the growing popularity of mobile robots in personal and industrial applications, and propose an easy-to-use DRL library that simplifies the configuration of robots and training scenarios. This library aims to reduce coding time and enable researchers to quickly develop and test viable robotic algorithms. Ali et al.'s study explores the views of senior librarians on incorporating AI in Pakistani university libraries and highlights reservations about the costs and resources needed for implementation. Brown's survey reveals that most chatbots in academic libraries have feminine characteristics, signaling a move towards more inclusive technology design. In a survey conducted in Hungary, library directors see AI as an opportunity and recognize its potential in various library activities, with 25% of libraries already using AI-powered information retrieval solutions. The article by [Bradley \(2022\)](#) discusses the ethical issues surrounding the use of artificial intelligence (AI) in libraries and highlights the potential role of libraries in regulating and promoting AI. It emphasizes the need for libraries to contribute to the establishment of ethical frameworks and align their activities with national AI initiatives. Despite the limited involvement of libraries in current AI initiatives, the article suggests that there is still potential for libraries to engage in shaping the future of AI through active consultations. [Borgohain et al. \(2022\)](#) conducted bibliometric analysis and found that there has been relatively little research on the application of AI in libraries compared to other fields. The study emphasizes the growing importance of AI technology and its potential to significantly improve current information systems. [Al-Aamri and Osman \(2022\)](#) conducted a study on the application of AI in library services, highlighting the integration of AI technologies in various library functions to facilitate user access to information. The study emphasizes the need for a strong technological foundation and competent staff to fully benefit from AI. [Ajani et al. \(2022\)](#) investigated the perceptions of Nigerian librarians regarding the implementation of AI in their processes and services. The study found that while there is awareness of AI's potential, Nigerian academic libraries face challenges in integrating AI due to funding limitations and lack of expertise. The study recommends allocating resources to acquire AI technology and train librarians. [Panda and Chakravarti \(2022\)](#) explore the use of AI chatbots as a practical solution for libraries, particularly in response to the COVID-19 pandemic. The study highlights the potential of AI chatbots to meet users' needs with minimal human intervention and adapt to the increasing reliance on virtual space. [Gasparini and Kautonen \(2022\)](#) conducted a literature review on AI in research libraries and found that libraries and librarians hold different views on AI. Some embrace its potential, while others express concerns about its impact on human values. The researchers suggest using design methods to address challenges and create opportunities associated with AI, including ethical transparency and the status of AI as a separate entity. Furthermore, the interaction between libraries and stakeholders is considered crucial. Another study focused on the use of AI in a university in Taiwan and revealed that librarians' perceptions about AI could be positively influenced by more information and organizational activities related to AI. Funding, cost, technical difficulties, and privacy/ethical issues were identified as barriers to implementing AI in libraries. [Harisanty et al \(2022\)](#) examined the level of awareness of AI among academic library leaders in Indonesia and found that participants showed a positive and enthusiastic attitude towards AI and its potential benefits. Practical knowledge of information technology, data analysis, library management, and user behavior were highlighted as prerequisites for deploying AI effectively. Budget management, leadership vision, and lack of awareness of AI were identified as potential obstacles. [Thalaya and Puritat \(2022\)](#) focused on improving libraries'

service skills and enhancing user well-being through AI technology. Their experiment showed that AI can save librarians time and improve service management, leading to increased user satisfaction. [Harisanti et al \(2023\)](#) found that AI can be easily integrated into libraries for administrative, technical, and information functions, but many obstacles need to be overcome. In a study conducted by [Hussain \(2023\)](#), the potential and challenges of using artificial intelligence (AI) in library services were explored. The research employed a qualitative research methodology and found that although AI has the ability to enhance library services, various barriers exist. These barriers include limited budget, librarians' attitudes towards AI, and technical capabilities required for implementation. Despite these challenges, the study suggests that the implementation of AI in libraries can have a positive transformative impact and accelerate the development of library services. Additionally, the paper identifies several low-cost applications of AI that can be utilized by librarians and information professionals to improve library services. Overall, the study highlights both the potential benefits and obstacles associated with AI integration in library services.

2. METHODS

This study used a qualitative methods approach to explore the implementation, challenges, and perceptions of artificial intelligence (AI) in university libraries, particularly in developing countries. The methods employed were designed to gather comprehensive insights from library professionals and analyze the practical application of AI technologies in library services. A descriptive research design was used to investigate how AI technologies are currently being implemented in university libraries, the attitudes of librarians toward AI, and the challenges they face. Data collection techniques were employed to obtain a detailed understanding of AI adoption.

The document analysis conducted for this research aimed to provide additional context and support for the primary data collected from surveys and interviews. By examining existing institutional reports, policy documents, and previous studies related to artificial intelligence (AI) in libraries, the document analysis offered a more nuanced understanding of the current state of AI implementation in university libraries, particularly in developing countries.

3. RESULTS AND DISCUSSION

3.1. Use of AI in libraries

AI using facial recognition technology in university libraries has the potential to go beyond student check-in and can be utilized for book check-in, return, and reservation, as well as providing university-wide information. However, a major concern with this technology is the risk of linking facial data to personal data. To tackle this issue, the users are to upload their facial images, and the system extracts and securely stores the actual facial values in a data center, reducing the chances of personal data leakage. Nonetheless, caution is advised when employing facial recognition for sensitive transactions, as an algorithm error could result in mistaken identity and unauthorized access to someone else's account ([Chen et al., 2019](#)). Two methods to mitigate this problem include incorporating an additional layer of password or fingerprint recognition after facial recognition to offer double protection, and including an iris image along with the facial data to enable unique identification. This approach not only enhances security but also reduces the cost of data collection.

3.2. Mechanical book inventory and navigation system

The most important and difficult part of library work which affects everything else in the system is the logical arrangement of books on the shelves (Chan & Chan, 2018). University libraries often struggle with lost books that are difficult to locate using traditional manual methods. However, the implementation of RFID technology has provided a solution to this problem. RFID tags embedded in books contain data about the book, allowing library staff to use RFID devices to scan and confirm the correct placement of each book. If a book is misplaced, it can be easily moved to the correct location by a receptionist or a robot. There are two types of book inventory devices available: manual devices and automated mobile robots. While the latter option is more convenient and eliminates the need for human intervention, it is also more technically complex. Precise indoor navigation is required, and this can be achieved using MEMS sensors, WIFI, or machine vision systems. WIFI-based indoor navigation systems are preferred for university libraries as they are compatible with the existing wireless network. Additionally, a mobile phone application can be developed to assist users in quickly finding books within the library (Asemi et al., 2020).

3.3. Question answering and intelligent recommendation system

University libraries play a crucial role in meeting the information needs of their users, and their success is determined by user satisfaction. One way to increase student satisfaction is by implementing personalised book recommendations. This can be achieved by using an intelligent recommendation system that utilizes natural language processing technology to answer queries and make recommendations. Recommendation algorithms like collaborative filtering, points of interest, knowledge graph, and context sensitivity are essential components of such a system. However, the use of personalised recommendation systems in university libraries in developing regions is currently limited due to challenges in implementing the system, which require adequate data storage and management facilities (Zhang, F. 2020). Additionally, an intelligent question and answer system based on natural language processing technology, particularly with deep learning, can autonomously provide intelligent answers to users' questions. Such a system relies on the Internet, continuous data collection, and iterative updates for continuous improvement.

3.4. Librarians' views on artificial intelligence

The use of artificial intelligence (AI) in library services is a subject that sparks mixed views among librarians. Some view AI as a tool that can enhance efficiency and improve user experience, while others worry about its impact on job performance, user privacy, and the quality of human interaction in libraries (Oladokun et al., 2023). Many librarians see AI as a powerful tool that can automate time-consuming processes like cataloguing and data analysis, allowing them to focus on more strategic and personalised aspects of their work (Adetayo 2023). According to Omame and Alex-Nmecha (2020), AI is seen as a means to provide faster and more accurate search results, ultimately increasing user satisfaction and engagement. However, there are concerns that widespread adoption of AI may lead to job losses and a decrease in the need for traditional library functions. Librarians are also worried about user privacy and data security, and they emphasise the importance of strong safeguards to protect users' privacy. Despite these concerns, librarians recognize the need to adapt and acquire new skills to effectively integrate AI tools into their services.

3.5. Integrating artificial intelligence into library services bypassing librarians

The integration of AI into library services has the potential to address the shortage and inaccessibility of librarians. By utilizing AI, libraries can provide assistance and services to users without the need for human librarians. This can help overcome challenges such as limited staff availability and remote access to libraries. AI can be employed to carry out tasks such as cataloging, answering basic queries, recommending books, and providing information on library resources. [Oladokun et al. \(2023\)](#) asserts that AI technology can enhance the efficiency and accessibility of library services, ensuring that users can access the resources they need even in the absence of librarians. While AI cannot completely replace the role of human librarians, it can play a crucial role in filling the gaps and improving the overall library experience for users. The use of AI in library services empowers librarians and lead to a more dynamic and rewarding profession. AI technologies can automate routine tasks such as cataloging, basic referencing, and data entry, freeing up librarians to engage in more complex and creative work. Tools like chatbots and virtual assistants can provide immediate responses to routine queries and direct users to relevant resources, allowing librarians to have deeper interactions with users, provide expert advice, and teach information literacy skills ([Lund & Wang, 2023](#)). AI can also help librarians provide personalized recommendations based on user preferences. Additionally, AI can be utilized to analyze large datasets, identifying trends, usage patterns, and user preferences that librarians can use to optimize collection development, improve services, and make informed decisions about resource allocation. Delegating routine tasks to AI gives librarians the opportunity to work on more innovative projects, collaborate with researchers, maintain specialized collections, and contribute to the strategic development of libraries. Overall, AI can enhance library services and create new opportunities for librarians. Artificial Intelligence (AI) has the potential to revolutionize library services by allowing librarians to focus on more complex and creative tasks. With AI technologies, routine tasks such as cataloging and data entry can be automated, freeing up librarians' time for more specialized work. Chatbots and virtual assistants can provide instant answers to routine queries, enabling librarians to engage in deeper interactions with users and offer personalized advice ([Lund & Wang, 2023](#)). AI can also analyze large data sets to identify trends and user preferences, helping librarians optimize collection development and improve services. By delegating routine tasks to AI, librarians can work on innovative projects, collaborate with researchers, maintain specialized collections, and contribute to the strategic growth of libraries. The integration of AI in library services can enhance the overall quality and efficiency of libraries, providing new opportunities for librarians to excel in their profession.

3.6. Librarians' knowledge and skills in using AI

AI is seen as a valuable tool for librarians to improve their competencies and adapt to the changing demands of the digital age. Librarians play a crucial role in the successful implementation and utilization of artificial intelligence (AI) technologies in library services. In order to effectively engage with AI, librarians need to possess certain knowledge and skills ([Neumann et al. 2022](#)). This includes a basic understanding of AI's capabilities, limitations, and different AI technologies such as machine learning and natural language processing. Additionally, librarians should be data literate, with an understanding of data types, sources, quality, privacy issues, and ethical considerations surrounding data collection and use. Awareness of algorithm transparency and interpretability is also important to ensure fair and accurate AI services ([Oladokun et al., 2023](#)). Librarians should familiarize themselves with

digital tools and technologies, as well as have basic programming knowledge in languages like Python and R. Data management skills, including data cleansing and analysis, are crucial for preparing and processing data for AI applications (Lund & Wang, 2023; Neumann et al., 2022). Project management skills are needed to plan, execute, and monitor AI-related programs, and librarians should critically evaluate AI technologies to identify areas where they can add value to library services (Evans and Ward 2018). By acquiring these knowledge and skills, librarians can use AI technologies to enhance library services, promote innovation, and meet society's evolving information needs in today's digital landscape.

3.7. Librarians' technophobia and willingness to use AI

The integration of AI in libraries is a complex process that requires the adaptation of librarians. Oladokun et al. (2023), assert that librarians may experience technophobia and fear losing their jobs due to AI automation. However, research shows that AI can complement, not replace, librarians' expertise. According to Orr and Niegaard (2020), to address these concerns, librarians need to be prepared for the symbiosis of AI and their role, which can be achieved through training programs and professional development opportunities. Lund and Wang (2023) posit that librarians who are not technologically savvy may find it difficult to adopt AI solutions, so training activities that provide basic technical knowledge and hands-on experience can help overcome this fear. While librarians value providing personalized, human-centered service, AI can actually improve their ability to provide personalized recommendations and insights, enhancing the user experience (Lee and Shim 2017). According to Evans and Ward (2018), librarians should have access to training programs that cover the basics of AI, its use in libraries, and ethical considerations. Collaboration with AI experts and data scientists can also deepen librarians' understanding of AI technologies while AI pilot projects can provide librarians with hands-on experience and increase their confidence (Neumann et al. 2022). By addressing fears and providing necessary support and training, libraries can ensure librarians are ready to embrace AI and transform library services.

3.8. Challenges of AI implementation in Libraries

The implementation of artificial intelligence (AI) in university libraries faces various challenges and difficulties in developing countries. These include issues related to copyright and intellectual property rights, data protection regulations such as the General Data Protection Regulation (GDPR), the high cost of extensive work, and the re-integration of project data into the system (CILIP, 2021). Additionally, there is a lack of management support and insufficient budget and funding for keeping up with new technology developments. According to Stiglitz et al (2018), the development of AI technologies could lead to job polarization or unemployment, which could increase inequality. Therefore developing countries may be less likely to adopt AI technology, in order not to further exacerbate the issue. Some studies have shown that the use of AI has resulted in job losses and job destruction. In university libraries specifically, the implementation of AI faces challenges such as lack of suitable infrastructure, emerging skills gaps, job losses, unstable energy supply, and the availability of alternative sources of information. However, the adoption of AI is also expected to reduce the labor needs of many library functions.

The application of AI in library work faces various challenges that need to be addressed before it can be successfully implemented (Vijayakumar & Sheshadri, 2019). One major challenge is funding, as libraries often lack the necessary resources and infrastructure to

support AI technologies. Outdated infrastructure can prevent the effective use of AI in library services. Resistance to change is also a barrier, as some librarians may be reluctant to adopt new technologies. Additionally, the negative perception of librarians' IT skills can impede the adoption of AI. Other challenges include poor network facilities, unstable power supply, and lack of trained staff, outdated technology, and high costs of technology tools (Echedom & Okuonghae, 2022). Despite these challenges, the introduction of AI in libraries can lead to positive changes, including improved information delivery services, time savings, cost efficiency, and faster services for users.

4. CONCLUSION

This study concludes that AI will have a crucial role in the future of library services in universities. Already, librarians in advanced nations are utilizing AI and working with intelligent machines that exhibit human behavior, leading to advances in processing, communication, decision-making, recommendations, and multitasking. By embracing AI, librarians in developing countries can use it as a tool to improve their efficiency and save time, enabling them to concentrate on important tasks such as enhancing user experience, attracting diverse audiences, and assisting students in developing research skills. Instead of fearing AI as a threat that may replace their jobs and disrupt traditional practices, they should view it as an opportunity to overcome obstacles. Incorporating intelligent technologies can lead to increased productivity, decreased costs, measurable return on investment and the ability to cater to a new generation of users. Ultimately, AI has the potential to help university libraries adapt to the modern era while also delivering value to stakeholders. To fully utilize AI, regular training to acquire the necessary knowledge and skills for implementing AI applications should be given the high precedence in developing country universities.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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