

## Application of Artificial Intelligence for Innovative Services in Federal University Libraries in Nigeria

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### Abstract

*This study investigates the application of Artificial Intelligence for Innovative services in federal university libraries in Nigeria. The objectives of the study were to identify the types of AI technologies used for innovative services in federal university libraries in Nigeria, to identify challenges encountered in the application of AI for innovative services in federal university libraries in Nigeria, to determine measures taken to mitigate the challenges in the application of AI for innovative services in federal university libraries in Nigeria. This study adopted a qualitative research approach. The sample size for this study was thirty (30) System librarians and Heads of ICT units drawn from the total population of two hundred and fifty-two (252) librarians in the six (6) federal university libraries in Nigeria that constituted the study setting, the sample size was the outcome of the multistage sampling technique was employed to draw the sample for this study. The data collected from the participants through interview was first organized transcribed and analysed thematically into different themes. The findings revealed that Federal university libraries in Nigeria employ various AI technologies, including chatbots, recommendation systems, automation of cataloguing and classification, and digital asset management. These innovations enhance user experience and improve library services. However, challenges persist, such as inadequate IT infrastructure, internet connectivity, and hardware resources. To address these, measures include aligning AI solutions with user demands and library goals, conducting needs assessments, and establishing moral standards for AI decision-making. Libraries can improve accuracy and accessibility by integrating AI-powered systems, benefiting researchers, teachers, and students. Successful integration requires funding, staff education, collaboration with experts, data security, and performance monitoring. Recommendations include prioritizing training programs for library staff, developing a comprehensive AI strategy, and addressing ethical and privacy concerns through transparent policies and guidelines. By leveraging AI technologies, federal university libraries in Nigeria can transform library operations, improve user experiences, and meet the evolving needs of the academic community."*

**Keywords: Artificial Intelligence, Innovative Services, University libraries, Nigeria**

## Introduction

Over the past decade, libraries have been able to realize their physical space intelligence, information resource organization intelligence, service mode intelligence, management method intelligence, and artificial intelligence, big data, cloud computing, RFID technology, virtual reality, and other emerging technologies under the influence of the new technological revolution. This transformation has led to the emergence of a smart libraries worldwide, where Artificial Intelligence and robotics are used to offered innovative services. A smart library aims to provide users with better, more efficient services, provide a more inviting atmosphere for knowledge connections, and expand the space available for information exchange. Applications of the smart library include the mobile phone self-renewal system, the intelligent inventory/positioning system, the 3D navigation system, and the 24/7 self-borrowing and returning system. This has not only eased the work of the librarians but also enhanced reader services and elevated the reading experience, modern scientific and technological approaches must be included into smart libraries, a high-level development stage of digital libraries. Instead of relying just on RFID, the Internet of Things, and other technologies to meet the technological requirements of smart libraries, artificial intelligence will be the new engine driving their development.

Artificial intelligence (AI) is advancing at a rapid pace, revolutionizing several industries, including libraries It embodies the two fold goal of increasing fundamental scientific knowledge and developing increasingly advanced computers for human use. Artificial Intelligence mainly focuses on understanding and performing intelligent tasks such as reasoning, learning new skills and adopting to new situations and problems. Artificial Intelligence for short is a combination of computer science, psychology, and philosophy. It is concerned with the concept and methods of symbolic inferences by computer and the symbolic representation of knowledge to be used in making inferences (Jakati & Kumar, 2021). The most popular Artificial Intelligence programs are the Expert systems, which are computer programs that embody human mention of Artificial Intelligence which creates vision of electron-mechanical devices replacing human beings. Many rules and facts make up Artificial Intelligence programmes and these programmes process ideas and knowledge, not members, in several different ways.

Considering the rapid advancement and wide adoption of Artificial Intelligence, Echedom and Okuonghae (2021) explained that it is time for users and librarians to start imagining themselves in a library, with bookshelves loaded with titles that have been hand-picked just for you based on your reading tastes and areas of interest. Imagine being in a library, where a chatbot is always available to answer your questions and provide information based on your needs. Think of a library where employees may concentrate on other tasks thanks to digital cataloging. This is the library of the future, powered by artificial intelligence (AI). AI is making libraries more individualized, user-centred, and efficient than ever. The cataloging of libraries is one area where AI is being employed, for example, the process of creating bibliographic records for library objects is being automated with the assistance of AI. This increases productivity and accuracy while freeing up staff time for other duties. In addition, personalized recommendations of information resources for library patrons are also being generated by AI, considering their reading habits and past usage. This contributes to a rise in patron satisfaction and involvement with the library. The application of AI in chatbot development has numerous possibilities, including enhanced user experience: AI-powered chatbots can offer personalized and interactive experiences for users, making interactions more engaging and human-like. Improved customer service: AI-driven chatbots can provide 24/7

support, answering frequent queries and freeing up human customer support agents to focus on complex issues.

Today, libraries have benefited greatly from artificial intelligence (AI), which has transformed many elements of library operations and services. For example, improved user experience is one of the main benefits of AI in libraries. Artificial Intelligence technologies have the potential to enhance library patron experiences by personalizing services, suggesting relevant materials, and providing specialised support. Additionally, artificial intelligence can expedite book acquisition, cataloguing, and circulation services, thereby improving library resource management. Kim and Lee (2022), they explained that AI systems may analyse data to provide insights for decision-making processes, such as recognizing popular authors or suggesting book purchases based on user behavior. They went on to say that routine jobs like document classification, cataloguing, and overdue book reminders can be automated by artificial intelligence (AI), freeing up staff time for more difficult duties. Furthermore, AI-powered algorithms can enhance the relevancy and accuracy of search results, making it simpler for consumers to locate the data they require rapidly.

Similarly, Artificial Intelligence enables libraries to offer individualised subscription services, customised recommendations, and tailored assistance to individual users, leading to a more engaging and user-centric experience. In the research of Massis (2021) explained that artificial intelligence technologies contribute to the development of smart libraries that provide anytime, anywhere access to resources, utilise robots for tasks like book retrieval, and offer intelligent services to users. It helps in optimizing the balance between human involvement and automation in library management, ensuring that both AI-driven systems and human expertise work together effectively for efficient library operations. The integration of AI in libraries brings about significant benefits in terms of user experience, resource management, decision-making, automation, and customised services, ultimately enhancing the overall efficiency and effectiveness of library operations.

Artificial Intelligent technology according to the studies of Chen, *et al.* (2021) displays a crucial role in book acquisition and subscription processes within libraries. Tasks such as book subscription, selection, and the provision of bespoke subscription services to individual readers benefit significantly from AI-driven capabilities. The seamless execution of these functions is intricately intertwined with the integration of artificial intelligence (AI) technology. Furthermore, the utilisation of artificial intelligence (AI) has facilitated the deployment of robots for organising bookshelves and the implementation of web chat bots, further enhancing the efficiency and user experience in library operations.

In another related study, Garcia and Patel (2022) discovered that artificial intelligence and related technologies have significantly streamlined library management processes, the management of book collections still necessitates substantial human intervention. Tasks such as verifying and validating book collection data in databases, confirming book search numbers, and rectifying incorrect book locations inherently require manual effort. Nonetheless, automated library management offers a plethora of conveniences, including book numbering, archive modifications, and document retrieval. However, the ongoing circulation of books necessitates continuous resource organisation by library staff.

Besides, the establishment of intelligent libraries as pointed Jakati and Kumar (2021) necessitates not only the allocation of skilled technical personnel but also the availability of diverse resources. The prevalent scarcity of artificial intelligence experts significantly hampers the research and development (R&D) progress of related technologies, thereby impeding the automation management processes in libraries and resulting in service content gaps. Insufficient availability of other resources further compounds the sluggish R&D pace. Meanwhile, the cornerstone of automation system development lies in data acquisition, where the absence of robust data support undermines the self-learning capabilities of artificial intelligence, essential for optimal functionality. Therefore, this study investigates the application of Artificial Intelligence for innovative services in federal university libraries in Nigeria.

### **Research Objectives**

1. To identify the types of AI technologies used for innovative services in federal university libraries in Nigeria.
2. To identify challenges encountered in utilisation of AI used for innovative services in federal university libraries in Nigeria.
3. To determine measures taken to mitigate the challenges of AI for innovative services in federal university libraries in Nigeria.

### **Statement to the Problem**

According to Tan (2019) libraries can take advantage of AI to Artificial Intelligence (AI) to enhanced user experience by personalise services, recommend relevant resources, and provide tailored assistance to users, thereby enhancing their overall experience within the library. More so, AI can streamline tasks such as book acquisition, cataloguing, circulation services, and document retrieval, leading to more efficient and effective resource management in libraries. And analyse data to provide insights for decision-making processes, such as identifying popular authors or suggesting book purchases based on user behavior. Artificial intelligence can automate repetitive tasks like document classification, cataloguing, reminders for overdue books, freeing up staff time for more complex activities. Artificial intelligence technologies can contribute to the development of smart libraries that provide anytime, anywhere access to resources, utilise robots for tasks like book retrieval, and offer intelligent services to users.

Despite the importance of AI in ensuring effective library services, studies have indicated that there are challenges facing libraries that hinders application of artificial intelligence for innovative services in libraries worldwide For example, Wang and Liu (2020) explained that the adoption of artificial intelligence (AI) poses challenges that hinder the full realisation of its potential in transforming library reader services. According to them, key issues include the scarcity of AI experts in the field of library and information science, the need for training and upskilling of library staff to effectively utilise AI systems, and the lack of robust data support essential for optimal functionality of AI-driven automation systems. Additionally, barriers such as insufficient resources, inadequate data governance frameworks, and limited budgetary allocations for acquiring AI technologies impede the automation management processes in libraries, resulting in

service content gaps and sluggish research and development (R&D) pace. These challenges are of no difference with the situation in Nigeria.

Challenges facing application of AI in federal university libraries in Nigeria, such as limited understanding and awareness of the need for artificial intelligence (AI) Brown (2022) posited that the potential benefits leading to resistance or hesitancy in adopting artificial intelligence technologies, scarcity of AI experts of AI experts in the field of library and information science, making it challenging for libraries to find professionals with the necessary skills to develop and implement artificial intelligence (AI) solutions, high initial investment and ongoing costs in implementing artificial intelligence (AI) systems in libraries, and libraries facing difficulties in establishing robust data management strategies to ensure the availability, quality, and security of data required for AI applications. Consequently, for the library to provide its services and access to its users, there is a need to secure a platform where access must be unfettered and not location specific through the deployment of AI in libraries operations in Nigeria. Therefore, investigates the application of Artificial Intelligence for innovative services in federal university libraries in Nigeria.

### **Significance of the Study**

This study holds significance in unveiling the transformative potential of artificial intelligence (AI) in reshaping library automation and enriching reader services in federal university libraries in Nigeria. By delving into the applications of artificial intelligence (AI) in book retrieval platforms, document classification, and personalised subscription services within libraries, the research illuminates how AI technologies can streamline operations, enhance user experiences, and optimise resource management. Moreover, the investigation into balancing human involvement and automation in library management provides valuable insights into the synergistic relationship between AI-driven systems and human expertise, underscoring the importance of leveraging both for efficient library operations. Furthermore, the study highlights the value of gathering large amounts of data to advance library automation technologies and make use of data mining techniques like neural networks. This is because it addresses important challenges in creating intelligent libraries, such as the lack of AI experts and the requirement for strong data support.

### **Literature Review**

#### **Artificial Intelligence in Libraries**

Libraries are creating new operating models. It is important for any library to adapt new tools and techniques to serve their users better for their sustainability. In the studies of Magali (2020) he posited that the sources and services, being the major focus of a library, need to have great attention towards innovations to provide users what they have not expected and surprise them. The following are the services that artificial intelligence provides in the libraries s observed by Massis (2021) acquisition services, circulation services / help desk and information services.

### **Acquisition Services**

The Artificial Intelligence system according to Jakati and Kumar (2021) will process the circulation data of the library which will help in analysing the prominent authors and publishers to the librarians which can be decision making tool for the library authorities. The artificial Intelligence will not only suggest readers for books authored by same author but also will help librarian to identify the books of same author for further procurement at his end. Jakati and Kumar (2021) also explained that when the books are procured in the library, the artificial intelligence system will help in automatically floating the data and details like vendor, purchase history about the books. Classification and Cataloguing of the book will also be done by the Artificial Intelligence system and details will be updated in the OPAC.

### **Circulation Services / Help Desk**

Massis (2021) explained that Artificial Intelligence systems can understand the users' need and behavior and help in decision making in providing relevant and timely services. For example, if a user has been issued number of books, the Artificial Intelligence system can suggest regarding sending reminders, calculation of fine, alert librarian regarding no further issuing, and if the books are lost, the system can also suggest the possible places from where purchase can be made (Smith & Johnson, 2021).

### **Information Services**

Library can develop Artificial Intelligence system which can understand the reading habits of users and recommend relevant books and other documents such as journal articles, patents, standards. Jakati and Kumar (2021) posited that Artificial Intelligence can also analyse the highly read books in a subject through data mining in the library and can recommend to the readers interested in that subject. Hosseini & Holmes (2023) in their studies explained that conversational Artificial Intelligence refers to the use of messaging apps, speech-based assistants, and chat bots (computer programs which conduct a conversation via auditory or textual methods) to automate communication and create personalized customer experiences at scale. A library can answer query through chatbots and serve its users better. This will be highly useful in reference services of the library. Microsoft has created technology that uses Artificial Intelligence to read a document and answers questions just like human. Stanford Question Answering Dataset (SQuAD) is such a machine reading comprehension dataset that is made up of questions about a set of Wikipedia articles.

Smith and Johnson (2021) observed that image recognition systems may find its importance in libraries also, for example, in a library dealing with defense science and technology, a scientist brings an image of a weapon and requires details such as specifications, reports, applications. In such scenario, Wang and Liu (2020) posited that image recognition Artificial Intelligence can help to identify and understand the weapon, and produce the results such as its make, evolution, specifications. According to Yu (2020), advanced Artificial Intelligence (AI) systems can extract and read out text from images or documents of any length. Additionally, AI-powered library systems can pinpoint the exact location of print resources within the library and even link them to corresponding electronic or online resources, providing a seamless transition between print and

digital materials. Furthermore, Wang and Chen (2023) explained that human cannot read very fast and can't mentally mine and structure the large quantity of data available in the text form in the libraries. But new with advanced artificial intelligent system that reads and understands large number of articles that can help scientists to recommend highly relevant information for new inventions. For example, a scientist working in defense science can develop new weapons systems using recommendations provided by such Artificial Intelligence system. For text document, artificial intelligence not only can understand the text but can also summarize, which is a prime job of librarians as Yu (2020) rightly pointed out that librarians who can give summaries of large text in advance and if user is interested, he can provide the full text.

### **Barriers in Implementing Artificial Intelligence in Libraries**

As libraries are working towards adopting artificial intelligence in libraries, there are challenges they must face. Some of the challenges the libraries are facing according to Zhang and Li (2021) is that management of the organisation must first understand the need of Artificial Intelligence in libraries and be willing to develop and use it. According to Jakati and Kumar (2021), effective adoption of Artificial Intelligence requires meticulous planning, involving clearly defining objectives and tasks, identifying responsible personnel and key stakeholders, outlining workflows and schedules and establishing a detailed implementation timeline. This thorough approach ensures a successful integration of AI technology. More so, Hosseini & Holmes (2023) explained that high end technology, coding, large data, servers, databases, communication system, networking will be required. The implementation of artificial intelligence systems can be very expensive, so sufficient budget is required. As the field of artificial intelligence is still an emerging area for library and information professionals, they must clearly define their requirements to the developers and must be participative in the designing of the Artificial Intelligence systems. As the technology keeps on changing with fast speed and new versions keep arriving, Yu, *et al.* (2020) noted that there will be requirement of up-gradation to complete switch over from obsolete technology. There is a requirement for training and upgrading the skills of staff regarding the use of artificial intelligence systems.

### **Methodology**

This study adopts qualitative research methodology. This methodology was chosen because it an-depth understanding which provides a rich, detailed understanding of phenomena, contexts, and experiences. It also allows for exploration and discovery of new themes, patterns, and insights which brings about a holistic understanding, considering the whole context rather than isolating variables.

The target population of the studied consist of 30 librarians which includes the University Librarians, Heads of Information Technology (IT) units, and the IT staff in charge of the administration of revolutionizing library reader services through Artificial Intelligence Innovations in federal university libraries in Nigeria.

The sample size for this study was thirty (30) System librarians and Head of ICT units drawn from the two hundred and fifty-two (252) librarians in the six (6) federal university libraries in Nigeria that constituted the study setting. The sample size was the outcome of the multistage sampling

technique employed for this study. Firstly, the researcher used stratified sampling technique to carefully zone the university libraries into six (6) geopolitical zones to allow unbiased selection of federal university libraries used as research setting.

Secondly, from each stratum of the six (6) geopolitical zones in Nigeria, one federal university library was selected using a simple random sampling technique through a ballot box, after writing the names of the libraries on pieces of papers, folding the papers, putting them in a container, shaking the container and picking one paper at a time. This process was undertaken for all the strata until the required number of libraries were selected for the study. The following university libraries were samples for the study.

**Sample Size of the Study**

S/No	Name of Library/ Institution	University Librarians	Head of ICT Units	System Librarians Total
1	John Harris Library, University of Benin, Edo State.	1	1	3
2	Nnamdi Azikiwe Library, UNN Nsukka	1	1	3
3	Kenneth Dike Library, University of Ibadan.	1	1	3
4	University of Jos Library	1	1	3
5	Kashim Ibrahim Library, A B U Zaria.	1	1	3
6	Ramat Library, University of Maiduguri	1	1	3
	<b>Total</b>	<b>6</b>	<b>6</b>	<b>18</b>
	<b>Grand Total</b>	<b>6 + 6+18=30</b>		

**Instruments for Data Collection**

The instruments used to collect data for this study were direct observations and guided interviews and the use of digital recorder to record the interview process. The guided interview involves the researchers personally interviewing the System Librarians and Heads of Information Technology (IT) unit in the libraries, based on a structured set of questions that have been prepared before the interview. This enabled the researchers to explain or elaborate on any question that is not well understood by the respondents.

**Method of Data Analysis**

The data collected from the research instruments was first organized for analysis and transcribed into different types, depending on the source of information. The data was then tabulated and discussed descriptively.

## Discussions and Findings

### Types of Artificial Technologies used for Innovative Services

S/No	Cloud Computing Service/Resource	Federal University Libraries in Nigeria					
		UNI JOS	UI	UNN	UNIMAIID	UNIBEN	ABU
1)							
2)	Chatbots	√	√	√	√	√	√
3)	Catalog searches	√	√	√	√	√	√
4)	Basic library information	√	√	√	√	√	√
5)	Recommendation Systems	√	√	√	√	√	√
6)	Koha	√	√	√	√	√	√
7)	Automation of Cataloging and Classification	√	√	√	√	√	√
8)	Digital Asset Management	√	√	√	√	√	√
9)	Natural Language Processing (NLP)	√	√	√	√	√	√
10)	AI and machine Algorithms	√	√	√	√	√	√
11)	Robotics	X	X	X	X	X	X
12)	Content Creation and Curation	X	X	X	X	X	X
13)	AI Chatbots and Virtual Assistants	√	√	√	√	√	√

The findings revealed that different types of AI technologies for innovative services used in federal university libraries in Nigeria include chatbots, Catalog searches, Basic library information, Recommendation Systems, Koha, Automation of Cataloging and Classification, Digital Asset Management, Natural Language Processing (NLP), AI and machine Algorithms and AI Chatbots and Virtual Assistants. While Robotics and Content Creation and Curation are not applicable in federal university libraries in Nigeria.

### Challenges encountered in the Application of Artificial Intelligence for Innovative Services in Federal University Libraries in Nigeria

Libraries	Theme-ID	Responses
University of Jos Library	Q2-001	Inadequate IT infrastructure, internet connectivity, hardware resources to support AI applications are challenges we encountered in the application of AI.
Kenneth Dike Library, University of Ibadan	Q2-002	Unstable power supply, high costs of implementing and maintaining AI systems, limited staff training and expertise in AI, data science, and programming, inadequate or poor-quality data are the challenges we encountered in the application AI for innovative services in our library.

Ramat Library, University of Maiduguri	Q2-003	Resistance to change, lack of trust in AI, and cultural or social preferences for traditional library services, IT infrastructure, internet connectivity are the challenges we encountered.
John Harris Library, University of Benin, Edo State	Q2-004	Poor power supply, inadequate IT infrastructure, internet connectivity, hardware resources to support AI applications are challenges we encountered in the application of AI.
Nnamdi Azikiwe Library, University of Nigeria, Nsukka	Q2-005	Inadequate knowledge about AI, unstable power supply, high costs of implementing and maintaining AI systems, limited staff training and expertise in AI, data science, and programming, inadequate or poor-quality data are the challenges we encountered in the application AI for innovative services in our library.
Kashim Ibrahim Library, Ahmadu Bello University, Zaria	Q2-006	Inadequate IT infrastructure, internet connectivity, hardware resources to support AI applications are challenges we encountered in the application of AI for innovative.

Inadequate IT infrastructure, internet connectivity, hardware resources to support AI applications are challenges we encountered in the application of AI. (Q2-001).

Unstable power supply, high costs of implementing and maintaining AI systems, limited staff training and expertise in AI, data science, and programming, inadequate or poor-quality data are the challenges we encountered in the application AI for innovative services in our library. ((Q2-002).

Resistance to change, lack of trust in AI, and cultural or social preferences for traditional library services, IT infrastructure, internet connectivity are the challenges we encountered. (Q2- 003).

Poor power supply, inadequate IT infrastructure, internet connectivity, hardware resources to support AI applications are challenges we encountered in the application of AI. (Q2-004).

Inadequate knowledge about AI, unstable power supply, high costs of implementing and maintaining AI systems, limited staff training and expertise in AI, data science, and programming, inadequate or poor-quality data are the challenges we encountered in the application AI for innovative services in our library. (Q2-005).

Inadequate IT infrastructure, internet connectivity, hardware resources to support AI applications are challenges we encountered in the application of AI for innovative. (Q2- 006).

**Measures taken to mitigate the challenges of AI for innovative services in federal university libraries in Nigeria.**

S/N	Measures to mitigate challenges of AI in Libraries						
		UNI JOS	UI	UNN	UNIM AID	UNIBEN	ABU
1.	Staff training and upskilling	√	√	√	√	√	√
2.	Ethical considerations	√	√	√	√	√	√
3.	Collaboration with AI experts	√	√	√	√	√	√
4.	Infrastructure and hardware upgrades	√	√	√	√	√	√
5.	Data management and curation	√	√	√	√	√	√
6.	User education and awareness	√	√	√	√	√	√
7.	Continuous monitoring and evaluation:	√	√	√	√	√	√
8.	Diversity and inclusivity	√	√	√	√	√	√
9.	Encouraging innovation and experimentation	√	√	√	√	√	√
10.	Addressing job displacement	√	√	√	√	√	√

The following are the measures taken to mitigate the challenges of AI for innovative services in federal university libraries in Nigeria, it includes staff training and upskilling, collaboration with AI experts, ethical considerations, infrastructure and hardware upgrades, data management and curation, user education and awareness, continuous monitoring and evaluation, diversity, and inclusivity, addressing job displacement concerns.

**Conclusion**

The study concluded that Artificial Intelligence (AI) played an important role in transforming federal university libraries in Nigeria, enhancing services, and user experiences. By investing in AI algorithms for book retrieval, libraries can improve accuracy and accessibility, benefiting researchers, teachers, and students. Successful integration of AI-powered systems can be achieved through funding, staff education, collaboration with experts, data security, performance monitoring, user awareness, and staying updated. This innovation offers a significant opportunity to modernize operations, expedite information access, and meet evolving academic needs. It positions academic libraries to lead in technology utilization, enhancing research and learning environments for all stakeholders.

## Recommendations

1. Federal university libraries in Nigeria should prioritize ongoing training programs for library staff to enhance their skills and understanding of AI technologies. By providing regular training sessions on AI applications, libraries can ensure that staff are proficient in utilizing AI-powered systems for tasks such as book retrieval, document classification, and personalized user services.
2. Federal university libraries in Nigeria should develop a comprehensive AI strategy aligned with the library's mission and goals and provide ongoing training and professional development for librarians to acquire AI skills by investing in infrastructure and technology to support AI applications and addressing ethical and privacy concerns through transparent policies and guidelines.
3. Federal university libraries in Nigeria should prioritize investments in AI infrastructure based on their specific needs and strategic objectives. By allocating resources towards AI technologies that align with the library's goals, such as improving resource management, enhancing user experiences, and optimizing operations, libraries can mitigate challenges associated with the application of AI. Strategic investments will ensure that AI systems are effectively integrated into library operations, leading to enhanced efficiency and effectiveness. Federal University Libraries in Nigeria can enhance their capabilities in leveraging AI technologies to transform library operations, improve user experiences, and meet the evolving needs of the academic community.

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