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## APPLICATIONS AND PERCEIVED IMPACT OF ARTIFICIAL INTELLIGENCE IN ACADEMIC LIBRARIES IN NIGERIA

Uzoamaka Ogwo Ph.D

*National Centre for Energy Research and Development, University of Nigeria, Nsukka,*  
uzoamaka.ogwo@unn.deu.ng

Francis Ibegbulem

*National Centre for Energy Research and Development, University of Nigeria, Nsukka,*  
ibegbulemisfrancis@gmail.com

Victor N. Nwachukwu Prof.

*Department of Library and Information Science, University of Nigeria, Nsukka,*  
victor.nwachukwu@unn.edu.ng

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# APPLICATIONS AND PERCEIVED IMPACT OF ARTIFICIAL INTELLIGENCE IN ACADEMIC LIBRARIES IN NIGERIA

By

Uzoamaka Ogwo

National Centre for Energy Research and Development, University of Nigeria, Nsukka  
[uzoamaka.ogwo@unn.deu.ng](mailto:uzoamaka.ogwo@unn.deu.ng)

Francis Ibegbulem

National Centre for Energy Research and Development, University of Nigeria, Nsukka  
[ibegbulemisfrancis@gmail.com](mailto:ibegbulemisfrancis@gmail.com)

And

Victor N. Nwachukwu

Department of Library and Information Science, University of Nigeria, Nsukka  
[victor.nwachukwu@unn.edu.ng](mailto:victor.nwachukwu@unn.edu.ng)

## ABSTRACT

This paper expounds the application and perceived impact of Artificial Intelligence (AI) in academic libraries in Nigeria. Libraries especially in developing countries may become moribund in the 21 century unless they begin to harness new, smart and intelligent technologies for improved operations and service delivery. This research adopted a literature-based approach to x-ray the applications and perceived impact of Artificial Intelligence (AI) in academic libraries in Nigeria. Through a systematic analysis and review of literature, the study brought to limelight the current state of AI integration in academic libraries in Nigeria and its possible impact on library services, collections, users, professionals and general library operations and services. The application of Artificial Intelligence (AI) in academic libraries has the potential to revolutionize library operations and services. Some of the identifies AI tools include: Natural Language Recognition, Robotics, Big Data, Data Mining, Chatbot, Machine Learning, Pattern Recognition and Expert system. Findings from the study revealed that the application of AI in academic libraries have the potentials to increases productivity, improved customer satisfaction through personalization, easy availability and accessibility of information, easy collaboration and knowledge sharing, virtual assistance and chatbots, and ultimately increase overall operational effectiveness. This paper also explored some of the challenges associated with the application of AI technologies in academic libraries in Nigeria such as poor ICT skills and technical expertise, high initial costs of implementation, phobia for job displacement, epileptic power supply, poor maintenance culture, resistance to change, poor network connectivity, privacy and ethical implications, etc. To maximize the potential benefits of AI applications in academic libraries in Nigeria, it is crucial for these libraries to implement appropriate planning, guidelines and regulations on AI use as well as training and retraining of academic librarians to acquire the required ICT skills, knowledge and competence in order to adapt in the present digital and changing library environment.

**Keywords:** Artificial Intelligence, Academic Libraries, Natural Language Recognition, Robotics, Big Data, Data Mining, Chatbot, Machine Learning, Pattern Recognition, Expert system.

## INTRODUCTION

Globally, the library environment and the technological landscape have continued to change and will continue to change even in the future. The library must therefore queue into the pervasive and changing technology in order to remain relevant, optimize value and increase access for effective and efficient information service delivery. On this note, Thamaraiselvi (2009) emphasized that ‘as the information technologies are changing day-to-day and growing at a tremendous speed, the knowledge society is becoming more complex, competitive and dependent on technological changes and information explosion. These new technologies are changing global practices and generating a paradigm shift in all spheres of life in addition to having an impact on people's day-to-day experiences, (CILIP Report, 2021). Librarians and information professionals are presently working in a technological dynamic environment characterized by change. This has given rise to the need for smart and intelligent technologies for effective and efficient information services delivery to meet the changing information needs of the digital savvy users which has become very essential and inevitable. Presently, Artificial intelligence has become one of the key driving forces for the change and development in modern society, and it is gradually transforming and injecting new vitality into the development of smart and intelligent library development.

Currently, Artificial Intelligence (AI) is gaining significant attention due to its potentials to revolutionize almost all facets of human endeavor, including the library and information science environment. It is seen as a new technology and a key factor which has the potential to introduce new sources of growth and change the way work is done across organizations, industries and libraries inclusive, (Duggal, 2023). Today, library operations and services have dramatically changed from mere information repository to a dynamic era of information and digital revolution where modern technologies are transforming and facilitating quick flow and access to information regardless of any geographical boundary (Igwesi, 2010). Under the influence of the new technology revolution, smart and intelligent technological development is transforming the library space into an information intelligence, information resource (knowledge) organization intelligence, service mode intelligence and management method intelligence of library with the help of cutting-edge technologies such as: Internet of things, big data, cloud computing, blockchain technology, Radio Frequency Identification (RFID) technology, artificial intelligence, virtual/augmented reality and other new technologies, (Yu, 2019). These intelligent library

systems provide knowledge-based assistance to both the library staff and patrons (Asemi and Asemi, 2018).

In Nigeria, academic libraries have witnessed tremendous growth and development occasioned by the integration of Information and Communication Technologies (ICTs) in library operations and services. Academic libraries in Nigeria have incorporated the use of technologies in carrying out routine and house-keeping operations and services such as the use of computers, scanning and printing machines, barcode readers, internet, databases, Online Public Access Catalogue (OPAC), CCTV camera, social media, multi-media and most recently the use of Radio Frequency Identification (RFID) technology, etc. However, the use of cutting-edge technologies in academic libraries in Nigeria such as Internet of things, big data, cloud computing, blockchain technology, virtual/augmented reality, artificial intelligence is still a mirage. Hence, the application of AI in academic libraries in Nigeria is still in its nascent stage. However, to effectively operate in the current technological landscapes, librarians in academic libraries in Nigeria need a continuous training and retraining in order to acquire the requisite technological skills, knowledge and competence required for effective service delivery in the present digital/virtual library environment. The traditional roles of librarians in academic libraries are undergoing significant changes that call for new skills, opportunities, and challenges (Oyetola, 2023). Bridges, (2003) observes that librarianship has changed dramatically in the last twenty years. As a result, librarians are expected to be versatile, not only in subject area knowledge and inter personal ability, but also to possess considerable technical skills, required to keep abreast of the trends in modern librarianship. In order to handle the transformed scenario, librarians must alter their roles and promote the evolution of library operations and services modified with machine learning and artificially intelligent technologies (Banerjee, 2022). Knowledge of the new and emerging technologies is indispensable for academic librarians to ensure that services are rendered seamlessly, effectively, creatively and efficiently to meet the dynamic, growing and changing information need of ICT savvy users.

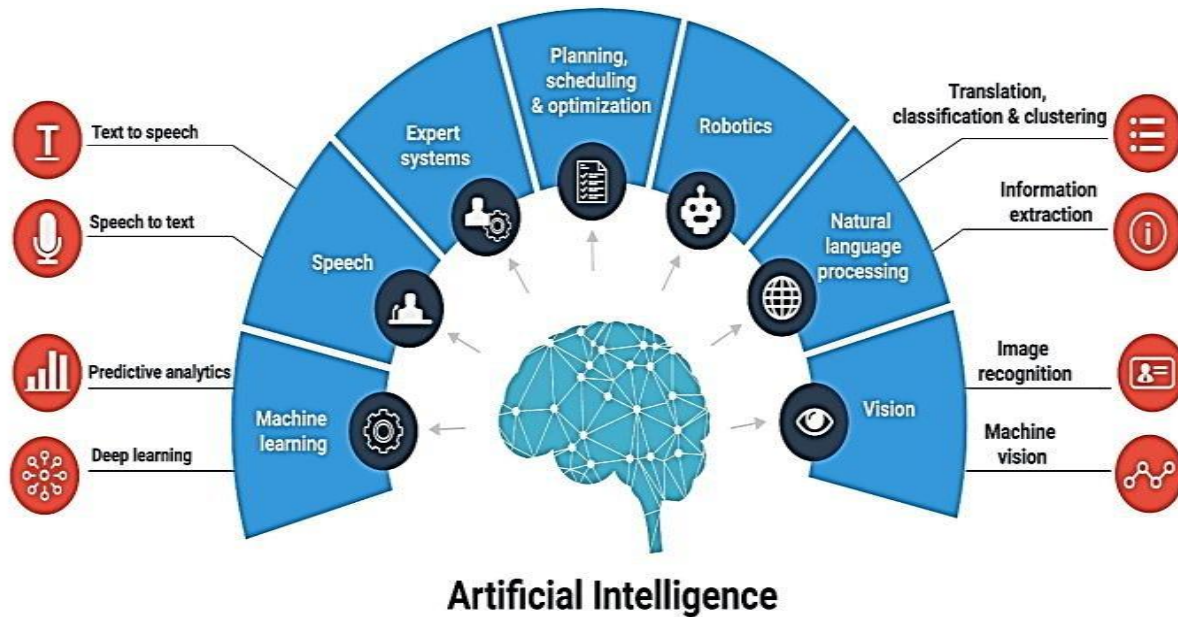
Although several studies have examined the impact of AI on library services, there has been limited research on the applications and perceived impact of AI on academic libraries in Nigeria. Therefore, this study is aimed at X-raying the applications and perceived impact of artificial intelligence in academic libraries in Nigeria by exploring the present state of AI integration,

identifying the challenges related to AI adoption, and evaluating the potential opportunities and benefits of utilizing AI in academic libraries.

### **The Concept of Artificial Intelligence**

Artificial intelligence (AI) is a concept that has been in use since the 1950s, when it was defined as a machine's ability to perform a task that would have previously required human intelligence such as self-driving cars, robots, ChatGPT or other AI chatbots, and artificially created images, (Diaz, 2023). Artificial Intelligence is a method of making a computer, a computer-controlled robot, or a software think intelligently like the human mind (Duggal, 2023). It leverages on computers and machines to mimic the problem-solving and decision-making capabilities of the human mind. Artificial Intelligence (AI) according to Nwakunor (2021), is the computer-controlled robots that think intelligently like human beings. These robots are controlled electronically with the aid of the computer by mimicking the competences of the human mind. Liu (2016) viewed AI as intelligent machines or intelligent systems that simulate human intelligence activities and extend the science of human intelligence.

Artificial intelligence is therefore an emerging technology and the simulation of human intelligence by machine capable of understanding, reasoning, learning, and applying knowledge to function, act and mimic the problem-solving and decision-making capabilities of the human mind to solve problem. The application of artificial intelligence in libraries can be viewed as a collection of cutting-edge technologies that have given libraries access to machines that can sense, comprehend, act, and learn, (Oyetola, 2023). The adoption of AI in the library will influence connectivity of information technology and actively support information usage as well as easing clients' search and immediately address their needs. The impact of artificial intelligence and advanced computer technology on the nature of future libraries will be enormous and the quality difference varies from experts (Vijayakumar & Sheshadri, 2019).



**Fig:** Pictorial Diagram of AI Components (**Source:** Vijayakumar & Sheshadri, 2019).

The above diagramme shows the various sub-areas of Artificial Intelligence which include: expert systems, natural language processing, pattern recognition and robotics, aim to simulate human intelligence with computers (Vijayakumar & Sheshadri, 2019).

### Review of Related Literature

A number of studies have been carried out on Artificial Intelligence in Libraries such as the work done by Akande (2018) on the potentials and limitations of implementing AI technology in libraries. The work highlights the benefits of AI in improving library services, expanding collections, and elevating user experience by automating repetitive tasks like cataloging, reference services, and circulation. However, the author also recognizes the shortcomings of AI, particularly its inability to grasp the complex intricacies of human language and culture. Osuigwe (2020) also explored the potential opportunities and challenges associated with implementing AI technology in libraries located in developing countries, particularly Nigeria in the work titled 'Artificial Intelligence: Opportunities and Challenges for Libraries in Developing Countries,'. The work revealed that AI has the capacity to advance library services by providing customized recommendations, expanding library collections, and automating tedious tasks. However, the article also outlines the obstacles of introducing AI in libraries, such as the expensive implementation process, lack of technical proficiency, and apprehensions regarding privacy.

In another related study done by Chikodi and Ezeugoh (2021) on "The Use of Artificial Intelligence in Nigerian Libraries: Opportunities and Challenges," findings from the study revealed that AI has the potential to considerably improve library services by automating repetitive tasks and enriching library collections. However, the article also highlights the obstacles of implementing AI in libraries, such as limited technical expertise, high costs of implementation, and concerns about privacy. Igwe (2019) also explored the potential impact of AI on library and information services in the future in their article titled "Artificial Intelligence and the Future of Library and Information Services,". The results from the study revealed that AI has the ability to greatly improve library services by providing customized recommendations, augmenting library collections, and automating tedious tasks. However, the article also addresses the challenges that may arise with AI implementation, such as displacement of jobs and privacy concerns. It was recommended that librarians should be equipped the necessary skills to adapt to the evolving technological landscape in order to take advantage of the opportunities and mitigate the risks.

Furthermore, Opara (2021) carried out a study on "Artificial Intelligence and its Implications for Libraries and Information Science Professionals in Nigeria". The work examines the effects of AI on libraries and information science professionals in Nigeria. Findings from the study revealed that AI has the potential to significantly improve library services by automating routine tasks and enhancing library collections. However, some of the challenges identified include: job displacement and the requirement for library professionals to develop new skills and knowledge to adapt to the changing technological environment. Okoro and Ukwoma (2020) conducted a study on "Artificial Intelligence and Library Services in Nigerian Universities: Opportunities and Challenges,". The study investigated the potential advantages and drawbacks of AI implementation in library services of Nigerian universities. Findings from the study revealed that AI has the potential to greatly enhance library services by offering tailored recommendations, augmenting library collections, and automating mundane tasks. Nevertheless, some of the identified challenges of AI implementation in libraries include: high implementation costs, insufficient technical expertise, and concerns about privacy. On the same hand, Anunobi and Ejezie (2021) carried out a study on "The Prospects and Challenges of Artificial Intelligence in Nigerian Libraries,". Findings from the study showed that AI can significantly improve library services by providing personalized recommendations, enhancing library collections, and automating routine tasks. However, the article also highlights the challenges of AI implementation

in libraries, such as insufficient technical expertise, high implementation costs, and privacy concerns.

Nwogu (2021) also carried out a study on the influence of AI on library collections and services in Nigeria. The findings revealed that AI has the potential to notably enhance library services by offering customized recommendations, improving library collections, and automating repetitive tasks. However, the study identified some of the challenges associated with AI implementation in libraries such as job displacement and the necessity for library professionals to acquire new skills and knowledge to adapt to the evolving technological landscape. Udeogu and Mba (2020) conducted a study on "Artificial Intelligence and Library Services in Nigerian Universities: A Critical Appraisal." The findings of the study revealed that AI has the potential to significantly enhance library services by providing personalized recommendations, augmenting library collections, and automating repetitive tasks. However, the article also brings attention to the challenges associated with AI implementation in libraries, such as high implementation costs, lack of technical expertise, and privacy concerns. McHugh et al. (2018) investigated librarians' perspectives on AI and its potential impact on the profession, and discovered that while librarians generally regarded AI as a valuable tool for improving library services, they also expressed concerns about the possibility of job displacement and the requirement for retraining to acquire new skills.

In another related study, Abubakar (2021) conducted a study on the opportunities and challenges of implementing artificial intelligence in libraries. The findings of the study revealed the potential benefits of AI in enhancing library services, such as improving user experience and facilitating research activities. However, some of the challenges associated with AI include the need for appropriate training and support for library personnel, ethical considerations, and the possibility of job displacement. The article provides insights and recommendations for library professionals and stakeholders to navigate the opportunities and challenges of AI integration in libraries. On the same note, Ugwu and Eze (2021) examined the potential benefits and drawbacks of AI in libraries in Nigeria. Findings of the study showed that AI has the potential to greatly enhance library services by offering customized recommendations, improving library collections, and automating repetitive tasks. Nevertheless, the article also highlights some of the challenges of AI implementation in libraries, including lack of technical expertise, high implementation costs, and concerns about privacy. Akintunde and Aina (2021) investigate the opportunities and challenges



associated with the implementation of artificial intelligence (AI) in the library and information science sector in Nigeria. The study revealed that some of the opportunities of AI in library services include: resource discovery, cataloging, and user services. However, the study identified some of the obstacles faced by Nigerian library and information science professionals, such as insufficient training, limited funding, and resistance to change.

### **Applications and Perceived Impact of AI in Academic Libraries**

Artificial Intelligence is gradually but steadily transforming the operations and services in most organizations and library and information science discipline is not an exceptional. Its application and capabilities have continued to increase in leaps and bounds as there has been the integration of smart and intelligent computer technologies in all facets of human endeavour. Artificial Intelligence (AI) holds a lot of potentials, transformation and innovations in library and information science. It is getting increasingly important for easy research, collection, transfer, storage as well as access to data in library field. Moreover, the integration of machine-aided intelligence into technological transformation in information management systems enables a prompt and automatic evaluation and establishment of computer-based feedback and intervention routines (Baca et al., 2009; 2012). Its application is creating a paradigm shift in virtually every sector, organizations and industries.

The application of AI in education and academic libraries has been tremendously transforming the process of teaching, learning and research. Image recognition technology, face recognition technology, adaptive learning and other AI technologies are applied to the education field, initiate a series of changes in the field of education, improve teachers' work efficiency (Kuo, 2020) and students' learning experience (Cui, 2019). AI technology is applied for the development of intelligent methods adapted from conventional machine learning concepts, allowing an automatic assessment of the exercise technique and providing individuals with appropriate feedback. In practice, the implementation of such techniques in libraries is indispensable for the overall library management, (Novatchkov and Beca, 2013). The application of artificial intelligence in libraries can be viewed as a collection of cutting-edge technologies that have given libraries access to machines that can sense, comprehend, act, and learn, (Oyetola, 2023). AI application in libraries has been revolutionizing and transforming library operations and services to a whole new level and it is significantly impacting the way the library discharges her duties. Fernandez (2016)

identifies potential impacts in terms of analysing big corpuses of data, creating metadata, translation of search and integrating search across content. AI is impacting the way information is processed and searched for and information professionals will be able to use these exciting new technologies to enhance their services and help users find and access specific information more easily and quickly.

The application of AI in academic library operations and services is revolutionizing the library landscape. An important area of the impact is likely to be in search/resource discovery, (Cox, 2019). The way we navigate the library in the contemporary library environment keeps changing as the library is a growing organism. Undoubtedly, AI provides a seamless, easy and effective ways to deploy easy library operations and effective service delivery. The emerging and pervasive technologies such as Artificial Intelligence (AI), Internet of Thing (IT), cloud computing, data mining, and smart technologies hold a lot of potentials, transformation and innovations in library operations and services. Artificial Intelligent have found its way into the library as a chat box that handle directional questions on library website, overdue alert, response to simple informational requests and direct users to relevant resources in the library.

### **AI Tools Used in the Context of Information Retrieval**

These are software applications that uses Artificial Intelligence algorithms to perform specific tasks and solve problems. They include the following:

#### **1. Search Engines with Natural Language Processing:**

Search engines like Google have incorporated NLP techniques to improve their information retrieval capabilities. These engines now understand natural language queries, enabling users to search for information using more conversational language. NLP-powered search engines use techniques like semantic analysis to grasp the context and intent behind user queries, thus providing more accurate and relevant results.

#### **2. Text Classification and Sentiment Analysis Tools:**

Text classification tools use AI algorithms to categorize text documents into predefined categories. In the context of information retrieval, these tools can automatically classify documents, making it easier to organize and retrieve information. Sentiment analysis, a subset of

text classification, determines the emotional tone of a piece of text, which can be valuable for understanding public opinion or sentiment towards a particular topic

### **3. Robotics**

Robots are programmable machines that can automatically execute actions. It is AI-enabled or automated machine that is configured to complete particular activities with or without human assistance, McCaffrey (2021). This is an AI tool that deals with mechanical devices, which carries out automation tasks using artificial intelligence techniques, either directly under human control or a predetermined program. This could involve using robotics to retrieve books from shelves, such as the automatic arm or robots that can take them up from libraries. Robots increase the operational effectiveness of libraries by enhancing collection analysis, visualization, preservation, and lowering service delivery costs. Robots are one of the important tools that are used in information retrieval in libraries. It helps users to find, read and write for specific library users on specific topics from different websites.

### **4. Big Data**

Big data refers to the volume, velocity and variety of data sets, archives or repository that artificial intelligence technologies are using to discover patterns and correlations hidden in massive collections of structured, semi-structured and unstructured data sets that have the potential to be mined for information. It is a vast amount of data that traditional storage cannot handle. This is one of the tools AI uses to connect with different libraries, subjects and knowledge management and how to find relevant information materials from different aspects of the knowledge domain.

### **5. Data Mining**

Data mining techniques are analytical tools that can be used to extract meaningful information from a data set. This is a type of indexing system which is derived from Natural Language to identify specific text from a large number of web texts. Analytic and automatic design have been used for data mining in AI. An AI-powered indexing tool can automatically assign keywords based on concepts it identifies in a text through content analysis and can help academic library users discover new sources of information from different disciplines, allowing them to find more specific and accurate material to support their research

### **6. Chatbot**

This is an Artificial Intelligence (AI) software or application that can simulate a conversation (or a chat) with a library user in natural language via a messaging app, a blog, a website, a mobile app,

or a smart device. Voice assistants and chatbots can be utilized for library services, (Hopkins, 2018, Mckie, 2019). Chatbots are used in providing 24/7 user services by answering complex and diverse queries, navigating the library website provides personalized feedbacks and assisting with research by responding to questions from library users and directing them to specific library resources. Chatbots can enable library professionals to increase their efficiency and productivity by responding to difficult questions and save time answering repetitive queries. The difference between chatbots and robots is that chatbots only respond verbally or textually to queries while robots have to show interaction through expressions, movements, verbally and other humanly behaviours.

### **7. Machine Learning**

Machine learning is a type of artificial intelligence that automatically adapts with minimal human interference. Machine learning could be categorized into supervised, unsupervised or deep learning depending on the learning system. Deep learning is a subset of machine learning that uses complex neural networks to mimic or replicate human intelligence. Deep learning models can recognize complex patterns in pictures, text, sounds, and other data sets to produce accurate insights and predictions.

### **8. Pattern Recognition**

Pattern recognition based on prior knowledge or on data from the patterns. Classified patterns typically consist of groups of dimensions or observations that define points in a multi-dimensional space. The application of pattern recognition includes image processing, speech and fingerprint recognition, cybersecurity, Optical Character Recognition (OCR) etc. Components for pattern recognition are data collection, pre-processing, selection of characters, selection of models and training, and evaluation.

### **9. Expert System**

An expert system, a subset of artificial intelligence, is a computer programme that imitates human intelligence by replicating human expertise. It is used to design systems with human-like capabilities in various fields. This AI technology simulates the decision-making and actions of human experts, utilizing components such as a knowledge base, inference engine, explanation features, user interface, and knowledge acquisition tools. Its applications span classification, diagnosis, monitoring, process control, design, scheduling, planning, and option generation. Expert systems are also applicable in libraries for tasks like answering reference questions,

offering bibliographic guidance, managing indexing, and enhancing overall management. Each of these AI tools contributes to enhancing the efficiency and effectiveness of information retrieval, making it easier for users to access the information they need from vast amounts of data.

### **Benefits of Artificial Intelligence in Libraries**

Some of the advantages of AI in libraries include the following:

- **Easy Library Automation.** AI helps to automate processes and repetitive tasks and reduce the time it takes to analyze big data sets. This helps to save time and resources by eliminating the need for employees to perform tedious and repetitive tasks.
- **Saves Labour and Increases Productivity.** An example here is the use of warehouse automation, which grew during the pandemic and is expected to increase with the integration of AI and machine learning.
- **Improve Customer Satisfaction through Personalization.** AI can personalize content, messaging, ads, recommendations and websites to library users. AI-powered tools can provide personalized learning experiences to students.
- **Easy Availability and Accessibility of Information:** AI-powered virtual agents are always available. AI programs do not need to sleep or take breaks, providing 24/7 service.
- **Collaboration and Knowledge Sharing:** AI facilitates collaboration and knowledge sharing among Librarians and library users. For example, AI-powered platforms can connect users with similar research interests, facilitating interdisciplinary collaborations and fostering a sense of community within the academic environment
- **Increase Operational Efficiency,** improve the effectiveness of library services and ultimately reduce operational costs with sustainable libraries
- **Virtual Assistance and Chatbots:** AI-powered chatbots can offer immediate assistance to library users, answering research questions and guiding users to relevant resources.

### **Challenges of the Application of AI in Academic Libraries in Nigeria**

Artificial intelligence systems are generally not in functional use in most libraries in developing countries. The limitations to implementing artificial intelligence systems in these libraries may include the following:

1. **Poor ICT Skills and Technical Expertise Among Library Staff**

Skill gap and poor technical expertise among library professionals could pose a serious challenge in effective applications and use of AI technologies in Academic libraries in Nigeria. Without proactive training and retraining of librarians to adapt to the changing technological landscape, AI implementation in libraries in Nigeria may be near impossible.

## **2. Financial Constraints**

Academic libraries in Nigeria operates with poor library budget and the cost of implementing AI can be very high. This could make it practically difficult to effectively deploy AI technologies in libraries as every other challenge is invariably connected to lack of fund.

## **3. Poor Content Digitization Process**

Most academic libraries in Nigeria are still facing the challenges of digitizing their local contents which are mainly in physical formats. To leverage AI effectively, libraries need to digitize their resources. However, due to financial limitations and other constraints, the digitization process has been facing a lot of challenges.

## **4. Phobia for Job Displacement**

Job displacement is a potential challenge in implementing AI tools in academic libraries in Nigeria. AI technologies are capable of automating routine library operations and services such as cataloguing, inventory management and customer services, which could lead to reduced staff need.

## **5. Privacy and Ethical Issues**

Ethical considerations of AI technologies raise a lot of concerns, such as privacy and data protection. Libraries in Nigeria may face additional challenges in ensuring that these ethical considerations are addressed, given limited understanding about open access to resources. Hence, there is need to ensure that information and data are protected and ethical considerations are adhered to when implementing AI systems.

## **6. Poor Maintenance Culture**

One of the very big challenges of ICT development in libraries in Nigeria is poor maintenance culture. Most ICT facilities in libraries in Nigeria does not work effectively due to neglect and poor maintenance culture.

## **7. Epileptic Power Supply**

Poor and irregular electric power supply in Nigeria has been a major challenging factor that renders most ICT facilities in the library unusable and a state of moribund. There is

need for improvement and building alternative power supply such as solar energy resources for effective implementation.

### **8. Poor Infrastructure and Technological Development**

Most academic libraries in Nigeria lack the necessary infrastructure and technology to support the implementation of AI. Without a well-established infrastructure and technological development, the application of AI in academic libraries in Nigeria may be a mirage.

### **9. Poor Network Connectivity**

The bane of successful AI implementation in academic libraries in Nigeria is poor bandwidth for network connectivity. Poor bandwidth in libraries results to very low internet connectivity which makes it difficult to access and download the require datasets. Robust internet connections and advanced computing systems are vital for implementing AI in libraries, but these are not readily available in Nigeria.

### **10. Resistance to change**

Introducing AI in academic libraries may face resistance from staff and users who are not familiar or comfortable with new technologies. Some users as well as library staff may prefer traditional services or may find it difficult to adapt to new technologies. This resistance can hinder the successful implementation and adoption of AI technologies. The application of AI in academic libraries in Nigeria may face resistance or limited adoption due to cultural attitudes, reluctance to change among library staff. Overcoming resistance and ensuring the adoption of AI technologies can be a significant challenge in developing countries.

## **Conclusion**

The current development and application of smart, intelligent and cutting-edge technologies are changing the global library landscape and generating a paradigm shift in the overall library operations and services. Artificial Intelligence is an emerging technology which holds significant potential for enhancing the efficiency, effectiveness and accessibility of academic library resources in Nigeria. However, there are several challenging factors in Nigeria that may hinder its successful implementation. These factors include: Lack of ICT skills and technical expertise among library staff, financial constraints, poor content digitization process, phobia for job displacement, poor

maintenance culture, privacy and ethical concerns, epileptic power supply, poor infrastructure and technological development, poor network connectivity and resistance to change. Academic libraries should however, endeavor to overcome the above identified challenges in order to leverage on the opportunities presented by artificial intelligence and other emerging technologies in order to offer quality services. AI can help academic libraries to assist researchers in discovering and synthesizing information from vast amounts of existing research papers, patents, and other academic sources. This can help identify research gaps, topics, find relevant literature, and generate research questions etc. In conclusion, AI applications in academic libraries in Nigeria can help bridge the resource gap, improve efficiency and effectiveness; empower users, and provide a more personalized and inclusive learning environment.

### **Recommendations**

For the purpose of providing effective library services, academic libraries in Nigeria should embrace new and emerging technologies such as artificial intelligence technologies and other smart technologies. This will help to improve the quality of teaching, learning and research processes in academic environments. However, this requires a proactive training and retraining of librarians to acquire the required knowledge, skills and competence on how to use AI tools for improved library operations and services. Therefore, academic libraries in Nigeria and other developing world must adopt innovative, smart and cutting-edge technologies to meet the information needs of the current dynamic ICT savvy users in the changing library environment. Hence, academic libraries should establish clear guidelines and policies to ensure responsible and ethical use of AI.



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