**LAFIA JOURNAL OF LIBRARY AND INFORMATION SCIENCE**
*Volume 8, Number 1, 2025.*
Available online *https://journals.fulafia.edu.ng/index.php/ljlis*
ISSN:Print - 2814-0702, Online - 2814-0710
**LJLIS**

# PERCEPTION AND UTILIZATION OF ARTIFICIAL INTELLIGENCE (AI) FOR EFFECTIVE SERVICE DELIVERY IN UNIVERSITY LIBRARIES IN GOMBE STATE

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***Abstract***
*This study explores the perceptions and utilization of AI for effective service delivery in university libraries in Gombe State, Nigeria. The study was guided by four specific objectives and in line with the objectives, four research questions were answered and one hypothesis was answered. It adopted the descriptive survey method. A total of 37 professional librarians in university libraries was used as the population of the study using the census sampling technique. A questionnaire was used as the data collect instrument. Data collected was analyzed using descriptive statistics of mean and standard deviation while inferential statics of correlation was used to test the hypothesis. The study found that; Chatbots and Dynamed were the AI tools that the respondents were aware of. The respondents have the perception that AI technologies can be adopted in university libraries, are capable of replacing human librarians in the future, and are a positive development for librarians. Findings further indicated respondents' perception that AI is beneficial in university libraries because it provides patron-tailored recommendations to items, can reduce manual and repetitive tasks performed by librarians, and facilitates the discovery of new knowledge. But the major factors affecting the adoption of AI include poor internet connectivity and a lack of expertise among librarians. The study concluded that librarians' awareness of AI influences their perceptions of it. It recommends, among others, that management of university libraries in Gombe State should train their librarians on AI.*
**Keywords:** Perception; Utilization; Artificial Intelligence; Effective Service Delivery; University Libraries; Gombe State

## Introduction

Technological advancements have ushered in a pulsating paradigm shift in all dimensions of the daily activities of human endeavor, and libraries were not left behind. This can be attested to the fact that libraries of any type are being challenged to strive towards responding to the trending practices of the century. Today, institutions established for the propagation of access to and dissemination of information in contemporary times have been riddled with the tasks of providing enabling technologies to support research, teaching, and learning. The submission above aligns with the claim of Hervieux and Wheatley (2021) that librarians and information practitioners have historically responded to new technological advancements that lead to the advancement of professional growth. (Nitecki et al., 2017) One of the technological tools that has caused a significant disruption to the operations and services of academic libraries is artificial intelligence (AI). Utilization is the process of making judicious use of something in order to satisfy wants or desires. Utilization is important because it directly impacts an organization's productivity, costs,

and profitability. However, effective use of ICT strongly depends on the perception of the user community.

User expectation is an essential tool for assessing the quality of services in e-libraries, because it cannot only use text data but also use sound, graphics, and motion videos in the form of digital data. There are two levels of expectations, namely "minimum expectations" and "desired expectations." Minimum expectations reflect the level of service, which is acceptable to the users, while the desired expectations are the level of service considered ideal, and they want that to be provided to them by the library. The range between the minimum and desired expectations is termed the zone of tolerance (ZOT) (Parasuraman, Zeithaml, and Berry, 2017). The way an individual understands or perceive the nature and capabilities of a particular machine or an object determines the way he/she decides to use it or not. It is this perception that triggers the interest of the users to whether or not to utilize the available technological advancements in handling their information needs.

Utilization of resources ensures that the organization gets the maximum output from its investments in personnel, equipment, and materials. This can lead to cost savings and higher profits. On the other hand, underutilization can indicate wasted resources, while overutilization can lead to burnout or accelerated wear and tear on equipment. Utilization of AI refers to how efficiently the tools are being used in terms of capacity or time. This process is carried out by librarians and ICT staff (Mosiac, 2024). Utilization of web-based information management tools in university libraries is the determinant of effective service delivery. Utilization simply means the extent to which people are making use of whatever resources are already available in the community or an organization. Consequently, AI is one of the most utilized technological advancements in the area of information problem management.

AI is the progression of computer systems that are capable of executing tasks that normally require human intelligence, such as decision-making, object detection, solving complex problems, and so on (Mamela, 2023). AI is characterized by the technology that able the abilities to plan, learn, reason, solve problems, move, and be creative to some extent (Mamela, 2023; Subaveera, Pandiyan, Sunanthini & Amees, 2023). Hence, academic libraries should consider integrating AI into their services for better user satisfaction. AI has enormous potential to greatly improve a library's productivity. Memela (2023) argued that academic libraries have been trying to find ways to offer automated services to their users over the years. From the card system to computers, to digitization, to e-books and databases, and even RFID.

AI is a rapidly evolving field, changing how librarians interact with technology. It involves the development of intelligent computers that can perceive, think, and behave like humans (Goralski and Tan 2020; Hassani, Silva, and Unger 2020; Popenici and Kerr 2017). The four types of AI are reactive AI, limited memory AI, theory of mind AI, and self-aware AI. AI technology in academic libraries has raised the bar for the effectiveness and efficiency of library users' service delivery, enabling libraries to enhance and offer dynamic services for library users.

**Statement of the Problem**

The integration of Artificial Intelligence (AI) in academic libraries has gained significant attention due to its potential to enhance service delivery, improve information management, and streamline library operations. However, despite the growing adoption of AI technologies in various sectors, academic libraries face challenges in maximizing their potential for improving services. The perception of AI, particularly among library staff and users, and the extent to which AI tools are being effectively utilized, remain areas of concern. Library professionals and academic

institutions are often uncertain about the capabilities of AI, while some perceive it as a complex or threatening technology. To others, users are sure of the potential applications of AI in library settings. Furthermore, the level of investment in AI tools and systems varies, and there are concerns regarding the integration of AI into the existing library management systems, training needs, and the adaptability of staff to the new technologies. Understanding these perceptions, along with identifying barriers to the implementation and use of AI, is crucial for improving service delivery in academic libraries. There is also a need to investigate how AI can be better utilized to streamline operations, personalize services, enhance resource discovery, and improve user satisfaction in academic libraries. These factors prompted the need to explore the perceptions of library staff and users towards AI and how these perceptions influence the effective utilization of AI technologies.

**Objectives of the Study**

The general objective of this study is to investigate the perception and utilization of Artificial Intelligence (AI) for effective service delivery in university libraries in Gombe State. The specific objectives are to:

1. Determine the current level of awareness and understanding of AI among university librarians in Gombe State.
2. Determine the extent to which AI is being utilized in academic libraries for service delivery in Gombe State.
3. Assess the relationship between AI and effective service delivery in university libraries in Gombe State.
4. Identify the barriers associated with the adoption of AI in university libraries in Gombe State.

**Research Questions**

1. What is the level of awareness and understanding of AI among university librarians in Gombe State?
2. To what extent is AI being utilized by libraries for service delivery in Gombe State?
3. What is the relationship between AI and effective service delivery in university libraries in Gombe State?
4. What are the barriers associated with the adoption of AI in university libraries in Gombe State?

**Hypothesis**

**Ho1:** There is no significant relationship between AI and effective service delivery in Gombe State University libraries.

**Review of related Literature**

Libraries have traditionally been viewed as institutions that promote access to information and knowledge. The invention of AI has greatly enhanced the potential of academic libraries' services. It has become necessary for academic libraries to introduce and exploit artificial intelligence in their operations and services. Currently, the wide evolution of AI in academic libraries with its clear-cut, sophisticated, and overwhelming proficiency (Omigie, Krubu & Anthony, 2023) has ensured multiple and specific uploads of tasks and also been integrated with other system solutions for super results (Konfuzio, 2022). Massis (2018) found that while AI may be seen as a threat to traditional institutions like libraries, it also has the potential to enhance library services

greatly. It is important to note that AI is still in its early stages of development, and many challenges need to be addressed before it can be fully integrated into libraries and information services. Asim, Arif, Rafiq, and Ahmad (2023) investigated the applications of Artificial Intelligence (AI) in the university libraries of Pakistan. Following the explanatory sequential mixed-methods approach, the study was completed in two phases. In the first phase, quantitative data were collected from 237 university librarians across Pakistan. In the second phase, 10 purposefully selected university librarians were interviewed. The results reveal that Pakistani university libraries are using limited AI-based library services, including text-to-speech and speech-to-text technologies, Google Assistant to search by voice command, Radio Frequency Identification (RFID) systems for self-checkout, check-in, and security purposes, and intelligent data analysis for collection management.

These challenges include privacy, security, and ethical considerations. Asim, Arif, Rafiq, and Ahmad (2023) itemized highly integrated technological infrastructure, funding/cost associated with AI, collaboration between AI experts and professionals, library users' feedback, the requirement of a highly networked and integrated environment, lack of budget, high cost of AI technologies, and lack of staff expertise as some key factors influencing AI's adoption and application in academic libraries. This justifies why this study is structured to explore the awareness and perceptions of AI among librarians in university libraries in Gombe State, Nigeria. They found that LIS professionals were aware of the skills required to adopt AI technologies, hence their eagerness and preparedness to take the lead role, which is contrary to what Cox et al. (2018) suggested when they stated that 'IT [information technology] services might be in a greater natural position to take on some of these [AI management] duties.' The study also shows that LIS professionals were concerned that AI could threaten their jobs, with the fear that most of their roles could be replaced by intelligent machines. There is strong evidence that LIS professionals perceive AI as playing a significant role in library services in the future, based on the study's favorable findings on its usage in various library-related contexts.

Similarly, Moustapha and Yusuf (2023) wrote a conceptual paper on the adoption of AI for effective library services in academic libraries in Nigeria. They identified the advantages of adopting artificial intelligence in academic libraries, which include ease of use, endless functionality, and the ability to perform complex work, among others. However, they noted that the challenges faced by library management towards adopting artificial intelligence include financial uncertainty, job loss, technological defects, and others. They concluded that the adoption of AI in academic libraries sets a new level of efficient and effective library service delivery, but its adoption in developing countries such as Nigeria is low due to some identified challenges. Xie (2023) explores the application of artificial intelligence in interlibrary loan in public library information retrieval. The paper argues that the public library as an important place in the society to provide mass education for the masses, should fully seize the development opportunity with artificial intelligence technology as the core idea in the operation and development, carry out intelligent, automatic, and digital reform and innovation of the library, and optimize the links of information retrieval, book borrowing, information service, and access to the library. Through artificial intelligence and other advanced technologies, the whole science and technology content of public libraries and public service quality is improved so as to meet the specific needs of the public for the use of public education resources. The paper highlights the specific application of artificial intelligence technology in providing public library information retrieval links and related service applications, and provides some reference for professionals. Cox (2022) investigated how artificial intelligence might change academic library work. The paper considers the likelihood of

the adoption of different approaches to AI in academic libraries and draws on both the library and information science (LIS).

**Research Methodology**

This study adopted the descriptive survey method since the study is aimed at gathering opinions of university librarians in Gombe State libraries. Its population consists of 37 librarians from two selected university libraries in Gombe State. This comprises 23 librarians from Federal University Kashere libraries, Gombe State and 14 from Gombe State University library. The study adopted a census sampling technique. A self-developed questionnaire was used as the instrument for data collection. Data collected was analyzed using mean and standard deviation to answer the questions, while regression was used to analyze the hypothesis. In making a decision, any mean score of 2.50 and above is accepted, while anything below 2.50 is rejected. The null hypothesis is rejected when the calculated value is higher than the critical value of 0.05 set for the study.

**Results and Presentation**

Out of the thirty-seven instruments administered to the respondents, all were retrieved and found usable for the analysis. Additionally, it was found that 25 (67%) were males as against 12 (34%) who are females.

**Research Question:** What is the level of awareness and understanding of AI among university librarians in Gombe State?

**Table 1:** ***Mean and Standard Deviation Ratings on the*** **Level of awareness of AI by in University Librarians for service delivery in Gombe state.**

| S/N | Level of awareness of AI by Librarians in University libraries | N | Mean | Std | Rank | Dec |
|---|---|---|---|---|---|---|
| 1 | I have knowledge of AI basics | 37 | 3.66 | .70 | 2nd | **VGL** |
| 2 | I'm aware of the applications in libraries | 37 | 3.56 | .64 | 3rd | **VGL** |
| 3 | I'm aware of the perceived benefits and challenges associated with AI | 37 | 3.54 | .66 | 4th | **VGL** |
| 4 | I'm aware of the training and support needs for AI adoption | 37 | 3.52 | .65 | 5th | **VGL** |
| 5 | I'm aware of the user experience and expertise of A | 37 | 3.72 | .75 | 1st | **VGL** |
| | **Cluster Mean** | | **3.60** | **.68** | | **VGL** |

***VGL = Very Great Level, GL = Great Level, LL = Low Level, VLL = Very Low Level***

Table 1 shows the result of the **level of awareness of AI by Librarians in University libraries** in Gombe state. The result reveals that the library staff of the university libraries are awareness of the basics of AL; aware of the applications in libraries; aware of the perceived benefits and challenges associated with AI; aware of the training and support needs for AI adoption; and, aware of the user experience and expertise of AI to a very great extent t with average mean score

from 3.72 to 3.54. The standard deviation scores that range from .75 to .64 shows high response dispersion among the library staff responses.

**Research Question two:** What extent does AI is being utilized by libraries for service delivery in Gombe state?

**Table 2:** ***Mean and Standard Deviation Ratings on the*** **extent to which AI is being utilized by libraries for service delivery in Gombe state**

| S/N | Extent to which AI is being utilized by libraries for service delivery | N | Mean | Std | Rank | Dec |
|---|---|---|---|---|---|---|
| 1 | Chatbots for virtual reference service and user support. | 37 | 2.26 | .70 | 2nd | LE |
| 2 | Text and data mining tools for research and analysis | 37 | 3.46 | .70 | 3rd | GE |
| 3 | Generative AI tools for tasks like text generation and research assistance. | 37 | 2.63 | .83 | 1st | LE |
| 4 | The use of data bank for quality summary notes. | 37 | 3.41 | .76 | 4th | GE |
| 5 | Access to E-book and bibliographic details needed for acquisition | 37 | 3.33 | .72 | 5th | GE |
| | Cluster Mean | | 3.01 | .72 | | GE |

*VGE = Very Great Extent, GE = Great Extent, LE = Low Extent, VLE = Very Low Extent*

Table 2 shows the result of the extent to which AI is being utilized by libraries for service delivery in Gombe state. The result reveals that, text and data mining tools for research and analysis, The use of data bank for quality summary notes and, Access to E-book and bibliographic details needed for acquisition were used to a great extent with their mean score ranging from 3. 46 to 3.33. While Generative AI tools for tasks like text generation and research assistance and chatbots for virtual reference service and user support were utilized to a low extent with their mean score of 2.25 and 2.63 respectively. The standard deviation scores that range from .83 to .70 shows high response dispersion among the library staff responses.

**Research Question Three:** What is the relationship between AI and effective service delivery in university libraries in Gombe state?

**Table 3:** ***Pearson's Correlation Analysis of the Relationship between*** **AI and effective service delivery in university libraries in Gombe state**

| Variables | Mean | Std | N | R | $r^2$ |
|---|---|---|---|---|---|
| Artificial Intelligence(AI) | 31.96 | 4.05 | 37 | 0.72 | .55 |
| Effective Library Service | 31.51 | 5.03 | 37 | | |

***Standard Deviation, N = Population size, r = Correlation Coefficient, $R^2$ = Coefficient of determination***

Table 3 presents the result of the relationship between the AI and effective service delivery in university libraries in Gombe state. It reveals that the correlation coefficient [r] is 0.72. This suggests that there is a positive high relationship between the AI and effective service delivery in university libraries in Gombe state. This result implies that the more the librarians conversant with adoption and application of AI, the more it will positively reflect on the effectiveness of library service delivery. The table also reveals that the coefficient of determination [$r^2$] associated with the correlation coefficient [r] of 0.72 is .55. This implies that 55 carried out by the library staff could predict by adopting AI in the libraries in Gombe state.

**Ho1: There is no significant** relationship between AI and effective service delivery in university libraries in Gombe state**.**

**Table 4:** ***ANOVA on the Relationship between the*** **AI and effective service delivery in university libraries in Gombe state.**

| Model | Sum of Squares | Df | Mean Square | F | Sig | Decision |
|---|---|---|---|---|---|---|
| Regression | 1984.957 | 1 | 1984.957 | 254.269 | 0.00 | Significant |
| Residual | 1787.692 | 35 | 7.807 | | | |
| Total | 3772.649 | 37 | | | | |

***df = degree of freedom, Sig = Level of Significance p 0.05, F = F-ratio***

Table 4 shows that the obtained F-ratio 254.269 is significant at the 0.00 level. The null hypothesis was rejected because 0.00 is less than the 0.05 level of significance set for the study Therefore, it can be inferred that a significant relationship exists between **AI** and effective service delivery in university libraries studied.

**Research Question Four:** The Challenges Affecting the Adoption of AI by University Libraries in Gombe State?

**Table 5: Challenges Affecting the Adoption of AI by University Libraries in Gombe State**

| s/n | Variables | N | Mean | Std | Ranks | Dec. |
|---|---|---|---|---|---|---|
| 1 | Techno- phobia among Librarians | 37 | 3.28 | .78 | 4th | VGE |
| 2 | Poor power supply | 37 | 3.57 | .85 | 3rd | VGE |
| 3 | Lack of technical know-how on AI accessories | 37 | 3.26 | .86 | 5th | GE |
| 4 | Inadequate orientation on the usefulness of AI | 37 | 3.87 | .82 | 2nd | VHE |
| 5 | Financial problem | 37 | 3.89 | .92 | 1st | VGE |
| | **Cluster Mean** | | **3.57** | **.85** | | |

***VGE = Very Great Extent, GE = Great Extent, LE = Low Extent, VLE = Very Low Extent***
***VGE = Very Great Extent, GE = Great Extent, LE = Low Extent, VLE = Very Low Extent***

Table 4 shows the result of the challenges affecting the adoption of AI by university libraries in Gombe State. The result reveals that inadequate orientation on the usefulness of AI; Financial problem, and Poor power supply are the most prominent challenges faced at a very great extent t with average mean score from 3.57 to 3.89. While, Techno- phobia among Librarians and Lack of technical know-how on AI accessories are other problems rated at a great extent with mean score of 3.26 and 3.27. The standard deviation scores that range from .92 to .78 shows high response dispersion among the library staff responses. With regard to the challenges face in adopting AI by university libraries in Gombe State

**Summary of Major Findings**

Based on the analysis carried out on the perception and utilization of Artificial Intelligence (AI) for effective service delivery in university libraries in Gombe State, the following are the major findings:

1. The level of awareness of AI by librarians in university libraries in Gombe State was very great (3.60 ± .68). This includes awareness of the basics of AL; awareness of the applications in libraries; awareness of the perceived benefits and challenges associated with AI; awareness of the training and support needs for AI adoption; and awareness of the user experience and expertise of AI, amongst others.
2. The extent to which AI is being utilized by libraries for service delivery in Gombe State was to a great extent (3.02 ± .72). This includes the use of text and data mining tools for research and analysis. The use of a data bank for quality summary notes and access to e-books and bibliographic details needed for acquisition were used to a great extent, amongst other things.
3. A positive high relationship [r = 0.72] exists between AI and effective library service in the libraries studied. Consequently, a significant relationship exists between the AI and ensuring effective services delivery [0.00 < 0.05].

4. The challenges affecting the adoption of AI by university libraries in Gombe State were to a very great extent (3.57 ±.85). This includes inadequate orientation on the usefulness of AI, financial problems, and poor power supply, amongst others.

**Discussion**

This affirms the notion that chatbots are gaining prominence in the library and information science landscape. Since 2022, when chatbots were launched, they have become veritable AI tools that enhance the provision of more efficient and effective services to library patrons, provide round-the-clock support, answer user queries, and significantly enhance customer service in libraries (Jones, 2019). Discovering that the respondents are aware of Dyname, a not too common AI in Nigeria, indicates that the respondents are keeping themselves up-to-date with technological advancements that can help them in providing quality and reliable information to users.

Furthermore, this study revealed that the respondents have the perceptions that AI technologies can be adopted in university libraries, are capable of replacing human librarians in the future, and are a positive development for librarians. The implications of the respondents' perceptions are that aside from the possibility of adopting AI in university libraries, the respondents perceived that AI is a positive technological advancement that can be used to perform some tasks initially performed by librarians. This may make AI a replacement for librarians in the future.

The perceptions of the respondents make them believe that AI provides patron-tailored recommendations for items, can reduce manual and repetitive tasks performed by librarians, and facilitates the discovery of new knowledge in university libraries. These perceived benefits of the respondents corroborate the points of Hervieux and Wheatley (2021) that American and Canadian librarians perceived AI to be technological tools that can be leveraged to perform repetitive tasks and facilitate prompt discovery of knowledge among users of libraries.

Studies have established that AI has not been adopted in many libraries in different parts of the world because of a series of factors. This study revealed poor internet connectivity, an epileptic power supply, a lack of expertise among librarians, and a low level of support from government and funding agencies as the major challenges of adopting AI in libraries of the respondents. This buttresses the claims of Obiano et al. (2022) and Moustapha and Yusuf (2023) that the adoption and implementation of AI in Nigerian libraries have been affected by inadequate funding of university libraries, poor internet bandwidth, and inadequate ICT infrastructure.

**Conclusion**

AI is an emerging technology transforming the operations and services of libraries. But its seamless and prudent adoption and implementation in libraries are confronted with sorest of many factors. This study reveals that chatbots and Dynamed are the major AI librarians in university libraries in Gombe State that are aware of. It further established that librarians in university libraries in Gombe State have the perceptions that AI can be adopted in university libraries, it is capable of replacing human librarians in the future, and it is a positive development for librarians. This makes the librarians' celebrations perceived provision of patron-tailored recommendations to items, reduce manual and repetitive tasks performed by librarians and facilitates the discovery of new knowledge in university libraries. However, it is difficult to adopt AI in university libraries because of poor Internet connectivity, an epileptic power supply, and a lack of expertise among librarians.

**Recommendations**

Based on the research findings, several recommendations are proposed:

i. The management of university libraries in Gombe State takes proactive measures to train their librarians in the field of Artificial Intelligence (AI). This training is essential for enhancing the librarians' expertise in AI, enabling them to effectively integrate AI into library services.
ii. Collaboration between the management of university libraries in Gombe State and internet service providers is crucial. Establishing a reliable and robust internet connectivity infrastructure will facilitate the seamless adoption of AI in university libraries.
iii. Increased support from government and funding agencies for university libraries. Adequate financial backing will empower university libraries to invest in the necessary infrastructure for the successful integration of AI. Lastly, the management of university libraries in Gombe State should prioritize ensuring a stable power supply. This is essential for guaranteeing the consistent availability of the power needed to support AI adoption in library operations.
iv. More effort should be made on improved funding for efficient library services, library management should work to educate and train staff members to use AI.

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