

STUDY ON THE AWARENESS AND PERCEPTION OF LIBRARY STAFF IN APPLYING ARTIFICIAL INTELLIGENCE FOR INFORMATION SERVICE DELIVERY IN SOME UNIVERSITY LIBRARIES OF KATSINA STATE, NIGERIA

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Abstract

This paper explored the awareness and perception of library staff on the Application of AI for information services delivery in some university libraries in Katsina State. Some of the specific objectives of the study were: to determine the awareness of library staff on the application of AI for information service delivery and to ascertain the perception of library staff on the application of AI for information services delivery in terms of perceived usefulness using Technology Acceptance Model (TAM). The quantitative method and descriptive survey design were adopted for the study. The population of the study was 287, while 165 library staff in UMYU, FUDMA and Al-Qalam universities were proportionately sampled and used for the study. Descriptive statistics was used in the presentation and analysis of the data collected while inferential statistics was used to test some null hypotheses using SPSS. The study findings revealed that the majority of the staff are aware of AI in information services delivery and they believe AI can be applied in their respective libraries in the areas of pattern and image recognition and natural language processing. The findings also revealed positive perceptions of AI by the library staff especially towards improving their performance, and enhancing productivity, while few others perceived it as being a threat to their jobs and individual privacy issues. Some of the areas of application as identified in the study include information retrieval services; reference services; circulation section; and research support services. The findings further revealed that library staff in the studied universities are ready to embrace and apply AI, especially with the seamless formulation of policies, infrastructure, training and retraining etc. The study concludes that there is a need for proper preparation and provision of necessary inputs both human and material to ensure effective awareness and application of AI. In view thereof, it is recommended that promotion and campaign should be organized in the form of seminars, workshops and conferences towards enlightening library staff and university management on the importance of applying AI in information services delivery. Also, relevant professional bodies such as NLA, ALA, and NALISE should champion the enlightenment campaign for awareness and application for wider acceptance in the university libraries and beyond.

Key Words: Application, Artificial Intelligence, Awareness, Information, Perception
Library Staff, Services Delivery

Introduction

Libraries have long been responding to new technological trends that offer improvements to the field of librarianship. For example, automation and digitization are just two of such processes expanding library services and workflow capabilities. However, over the last two decades, no technological advancement has been as dominant as that of Artificial Intelligence (AI). AI has infiltrated much of modern technology to the point there are hardly people who are unaware of its presence (Al-Khalidi, 2022). At present, the field of AI has the potential to update, enhance, and augment many digital applications, giving these technologies a modicum of autonomy without the need for human assistance. Moreover, in recent years the conversations surrounding the use of AI in libraries have become widespread.

The origin of AI can be traced to John McCarthy's research in 1955 which postulated that every aspect of learning and other forms of intelligence could be stimulated through the use of a machine. He later expanded it to the science and engineering of making intelligent machines and computer programs. Since then, various scholars have attempted to define the concept of AI. According to the McGraw-Hill Encyclopedia of Science and Technology (2007), the concept of AI as a subfield of computer science focuses on understanding the nature of intelligence and constructing computer systems with the ability to make intelligent behavior. In addition, Merriam-Webster English Dictionary (2018) states that "AI is a part of computer science that deals with giving the ability to the machines to look as if they have natural human intelligence". These human capabilities of AI are improved through learning from experience and adaptation over time. This implies that AI can sense their immediate environment, think, learn, and take action concerning the environment.

However, AI is viewed as making computers or machines intelligent just like human beings, to make them find solutions to complex problems in human fashion. Similarly, AI is simply described as the ability of machines to do things that people would say require intelligence. It can also be seen as creating technologies, machines or computer programs that exhibit mental faculties and perform intelligent tasks. In a nutshell, AI makes computers and other technologies just like human beings. Therefore, AI is an aspect of computer technology, it comprises technologies, tools or software like expert systems, radio frequency identification systems (RFID), closed-circuit televisions (CCTV), optical character recognition, chatbots/chatGP, fuzzy logic, artificial neural network, evolutionary algorithms, case-based reasoning, computer vision, virtual reality, image processing, natural language processing, speech recognition, image and pattern recognition and robotic (Koushal, Gour & Mitra, 2019).

The application of AI in academic libraries has become increasingly important due to its ability to enhance research, teaching and learning

experiences. AI technologies have the potential to revolutionize the way academic libraries operate and can provide many benefits to students, faculty and researchers. It also affects the way information is organized, accessed and utilized by library users. One important role that AI plays in academic libraries is the ability to automate routine library activities and provide information services seamlessly. According to a study by Gregory and Clerke (2019), AI-powered technologies and software can be used to improve library automation, improve librarians' productivity and increase users' satisfaction through the provision of new research and services that align with users' interests and research needs as well as ultimately increasing their accessibility to the available information resources and services in the libraries. Additionally, AI can analyse user behaviour and preferences, help library staff to better understand library users and tailor the library's services to meet users' evolving information needs. By analysing data on users' use of the library's resources and services, librarians can make informed decisions on building relevant library collections and ensure that librarians remain relevant and responsive in this digital age (Sagarjit, Sanghamitra & Paramita, 2017; United Nations Report, 2018).

Importantly, Katsina state is home to several university libraries that provide services to students, academics and researchers. These libraries play a crucial role in facilitating access to information services and supporting the academic endeavour of students and staff. Conducting a study on the awareness and perceptions of library staff on the application of AI in these libraries, would assist in filling the knowledge gap in the literature that exists and contribute to the understanding of the current state of awareness and perception of library staff on the application of AI for information service delivery in Katsina state. Understanding the state of awareness and perception of library staff on AI in university libraries in Katsina state can help in identifying areas for improvement and achieving seamless transition and application of AI in these libraries. It would allow the designing of training programs and initiatives to facilitate AI applications and ensure a direct impact on the efficiency and effectiveness of the operations and services provided by the libraries. This study would increase the understanding of library staff on the applications of AI in university libraries under study and facilitate communication and collaborations between different stakeholders, including library staff, administrators, and technology providers all of which could lead to the development of strategies and policies that could consider the unique context and the specific challenges and needs of all stakeholders involved in the study area. This specificity allows more targeted and relevant investigation into the issues surrounding the application of AI in the university libraries under study. By understanding the perception and awareness of library staff in university libraries in Katsina state, the study can gather localized data and insights that could contribute to or generate knowledge that can inform policy decisions, design training programs and provide a comprehensive blueprint to facilitate AI adoption in libraries in general. Therefore, this study particularly looks at the awareness and perception of library staff on the

application of AI for information service delivery in university libraries in Katsina state of Nigeria.

In simple terms, “awareness” is the state of being conscious, knowledgeable or familiar with a certain phenomenon. However, in the context of this study “awareness” is the ability of the library staff to know, become familiar or understand the existence of AI in the libraries for information service delivery. Brynko (2018) views awareness of AI as the understanding and recognition of the capabilities and potential impact of AI technologies or tools on library operations and services. It involves library members of staff’s knowledge of how AI can be applied to enhance user experiences, streamline processes and improve the effectiveness and efficiency of information service delivery.

Librarians’ state of awareness of AI-related technologies is of interest to many researchers. A study by Yu (2018) on Artificial Intelligence in academic libraries, a theoretical and empirical study opines that awareness of AI in academic libraries is crucial for enhancing and leveraging quality and efficiency in library services. He added it is only when the library staff are aware of the capabilities of AI that they may understand how it could be applied to provide library services. Awareness of AI among librarians in academic libraries helps foster innovation and enables librarians to stay ahead of technological advancements. As noted in their study, Singh and Qazi (2020) librarians who are aware of the latest development in AI can proactively adopt it and develop strategies to meet the emerging needs of their users and provide cutting-edge services. Another study by Thompson and Williams (2019) on the attitude of librarians towards AI reveals the potential of AI to streamline library operations and improve users’ satisfaction; while others were skeptical about its impact on job security, and privacy concerns. This demonstrates the need for more education and training on AI technologies in the field of libraries.

“Perception”, on the other hand, refers to how individuals interpret and make sense of sensory information from the environment. Therefore, the perception of AI may be seen as how library professionals view the use of AI in library operations and services. It encompasses their understanding of AI applications, acceptance of AI tools for improving information services, challenges regarding the impact of AI on traditional library settings, readiness to integrate AI in daily library operations, and overall receptiveness towards AI advancements in libraries (Nicholas & Huntington, 2022, p.122). These perceptions include attitudes, beliefs, and behaviours related to AI application in libraries is the degree to which librarians believe that using artificial intelligence will help in attaining or gaining a high rate of information services delivery. A study by Yang and Wang (2022) explores the attitude and perceptions of library staff towards the use of AI in academic libraries and found that while libraries are positive in accepting AI, concerns were raised about the impact of AI on traditional library settings, services and operations.

Therefore, as Mansor, Hamid, Anwar, Isa and Abdullah (2022) maintain, awareness and positive perception of librarians towards AI have improved librarians' and users' engagements in many developed countries around the world. It is noteworthy that timely provision and access to information can only be achieved by using AI for guidance and support while being user-friendly, particularly in information search. For instance, a friendly AI will help librarians provide effective and efficient information services, and it will also help users search for information with ease; help retrieve information across various collections, and help with users' queries. Furthermore, while alluding to the benefits of AI in libraries, the United Nations (2018) reports that AI would enable libraries to address the challenges of operational inefficiency and technological disadvantage.

Consequently, to examine the awareness and perception of library staff on the application of AI in university libraries in Katsina state, various theories and models available are reviewed to enable the researcher to establish theoretical foundations that would frame and guide the study. As Sohn and Kwon (2020) assert, technology acceptance theories are currently without consensus on which theory or model performs best in each study. Therefore, after examining different theories or models, the researcher selected the best that reflects the research questions and tested the hypothesis in this study. The theories or models for technology acceptance include the diffusion of innovation theory (DOI), Studies by (James, 2000; Shampa, 2018) on evaluating the diffusion of innovations in information and communications technology have existed since the emergence of the theory, but they have grown rapidly from the 1980s through the start of the new millennium. Diffusion of information and communications technologies has been found, among general populations, to relate strongly to prior knowledge and experience with these types of technologies. While the rate of diffusion has been found to vary from country to country, based on factors like information access and social practices and beliefs, adopter categories for general innovation adoption tend to be standard across geographical backgrounds.

The Unified Theory of Acceptance and Use of Technology (UTAUT) was formulated based on eight theoretical acceptance models (Venkatesh, Morris, Davis, & Davis, 2003). The UTAUT suggests that performance expectancy; social influence, effort expectancy, and facilitating conditions predict behavioural intentions, which inform use behaviour. In addition, TAM has been reported as the most widely used theoretical model in Library and Information Science in the study of acceptance and use of any information and communication technology, observably it has some limitations like skills or competency required for the application of technology (Wheatle & Hervieux, 2019; Yusuf, Adebayo, Bello & Kayode 2022). According to Al-Shafi and Weerakkody (2009), the basic strength of TAM is derived from its power and capability to predict the use of information and communication technology among individuals working in organizations globally.

Statement of the Problem

The application of AI in libraries can enhance library services and give patrons access to reliable information that can foster growth and development in this information era. AI enables librarians to provide enhanced library services and connect users to reliable information. Through AI, librarians could interact with users on a single platform, provide information based on individual needs, enable the users to obtain accurate, comprehensive, and humanized services at a lower cost and more effectively use library resources. Tella (2020) confirms that while librarians, particularly in rich nations, have accepted and applied AI, those in developing countries like Nigeria are being left behind. This may not be unconnected with the state of librarians' awareness and perceptions of librarians towards AI tools (Mansor, Hamid, Anwar, Isa & Abdullah, 2022).

However, despite all the benefits that librarians in university libraries may gain from AI, Wood & Evans (2018) and the United Nations (2018) found that librarians in developing countries like Nigeria may be hindered from applying AI because they do not exhibit much awareness and positive perceptions on AI. In addition to this, World Bank Reports (2021) and Oluwapelumi, Ayooluwa, Saheed and Usman (2022) report limited awareness, poor understanding, lack of qualified AI specialists, operational inefficiency and technological disadvantage were identified as the obstacles that affect the application of AI in libraries in developing countries. While the application of AI has been increasingly exponential in other fields, this has not been the case in university libraries (Tella, 2022). Perhaps, this might be due to low awareness and poor perceptions of library staff on AI's relevance in the university libraries in Katsina state, as research related to AI and librarianship remain relatively low and in turn, affects the state of awareness and perception of library staff on the application of AI for information service delivery in university libraries in Katsina state. Therefore, the study seeks to investigate the awareness and perceptions of library staff on the application of AI for information service delivery in university libraries in Katsina state.

Objectives of the Study

The specific objectives of the study are to:

1. Determine the awareness of library staff on the application of AI for information service delivery in the study area.
2. Determine the perceptions of the library staff on the application of AI with regards to:
 - a. Perceived usefulness of AI application in library operations in the study area
 - b. Perceived ease of AI in information service delivery in the study area.

Research Hypotheses

In an attempt to achieve the above-stated objectives, the following null hypotheses are formulated and tested:

H0₁: There is no significant relationship between the perceived usefulness of AI and the awareness of library staff on the application of AI for information service delivery in the study area.

H0₂: There is no significant relationship between the perceived ease of use of AI and perceptions of library staff on the application of AI for information service delivery in the study area.

Literature review

The term "Artificial Intelligence (AI)" was coined from the combination of two independent terms and has recently dominated the academic world of technological growth over the years. "Artificial" is defined as "anything manufactured out of imitation, something not natural, lacking spontaneity, assumed and not sincere," according to the online edition of the British Dictionary (2012). The Webster's New World Dictionary goes on to define "artificial" as something created by humans and not naturally occurring. In other terms, it refers to something that is artificial or arbitrary and does not arise from natural or essential reasons. According to Merriam-Webster Online Dictionary (2022), "intelligence" is "the ability to learn, understand, or deal with new or difficult situations through the skilled application of reason, the ability to apply knowledge to manipulate one's environment, or the ability to think abstractly as measured by objective criteria (as tests)". It is not a single mental process, but a combination of many mental processes directed towards effective adaptation to the environment (Encyclopedia Britannica, 2006). "Intelligence" is defined as the ability to adapt effectively to the environment, either by making a change in oneself or by changing the environment or finding a new one. It is not a single mental process, but a combination of many mental processes directed towards effective adaptation to the environment.

"Awareness" is the state of being conscious or knowledgeable about a certain phenomenon. However, in the context of this study "awareness" is the ability of the library staff to know, become familiar or understand the existence of AI in the libraries for information service delivery. Brynko (2018) views awareness of AI as the understanding and recognition of the capabilities and potential impact of AI technologies or tools on library operations and services. It involves library staff's knowledge of how AI can be applied to enhance user experiences, streamline processes and improve the effectiveness and efficiency of information service delivery. Similarly, awareness of Artificial Intelligence refers to having knowledge or understanding, being conscious or cognizant of AI either through education, experience, research, or exposure to AI conversations. Therefore, knowledge or awareness of AI is very vital as it will shape our future and affect all sectors across the world in general and libraries in particular.

Nevertheless, studies like Biswal's and Gouda's (2020); and Broussard's *et al.* (2019) have been done to explore the awareness and knowledge about AI in daily lives.

Their studies reveal that while adopting any technology, awareness is the first stage of applying it to any individual or organization (Broussard et al. 2019; Guanah, Agbanu & Obi, 2020). As the internet develops from a social network to an intelligent network, it has become a network of information and people and an intelligent network of everything connected with information, people, products, and services in the future. In the background of AI and intelligent networks, technologies such as virtual reality, augmented reality, algorithm recommendation, machine news, big data, speech recognition, robotics and other cutting-edge technologies come together to impact the journalism and media industry. A more sophisticated understanding of these technologies could help librarians grasp and apply these technologies more effectively (Linden, 2017 & Marconi, 2017). From this perspective, AI technology is not an aggregation of these technologies, but rather an ecological environment for the next generation of librarians.

Perceptions refer to how individuals interpret and make sense of sensory information from the environment. Therefore, perceptions of AI may be seen as how library professionals view the use of AI in library operations and services. It encompasses their understanding of AI applications, acceptance of AI tools for improving information services, challenges regarding the impact of AI on traditional library settings, readiness to integrate AI in daily library operations, and overall receptiveness towards AI advancements in libraries (Nicholas & Huntington, 2022, p.122). These perceptions include attitudes, beliefs, and behaviours related to AI application in libraries is the degree to which librarians believe that using Artificial Intelligence will help in attaining or gaining a high rate of information service delivery. In addition, perceptions of AI among librarians are the understanding, recognition and admiration of AI and its presence in library operations and services. Perceptions of AI-related technology are of interest to many researchers although only a few studies in academic forms can be found in the literature.

Nevertheless, Omane and Alex-Nmecha (2020) employed data collected from 6308 people in Spain in 2020 and built a binary logic regression model to discover the dominant factors that could predict the positive attitude and perception toward AI and robotics. In general, Spanish people had a very positive perception of AI and robotics. Demographic differences could be identified in gender, i.e., males had more of a positive perception than females. Differences in AI perception of people to demographic factors were also analyzed in some other survey studies.

Additionally, Yoon, Andrews and Ward (2022) surveyed “perceptions and prospects of AI technologies for academic libraries in North America”. The survey was quantitative in approach. The study was guided based on the theoretical constructs of the UTAUT model; a questionnaire was used to learn about the opinions of 235 respondents from North American librarians regarding the use of AI and associated technologies in libraries. The findings reveal favourable views of these technologies among academic and public librarians, with 67% of respondents saying they will change how libraries operate and 68% indicating a desire for training. In addition, the

survey revealed that 21% of librarians were already utilizing AI and related technologies, and 80% anticipated their broad acceptance during the following 30 years. Both groups showed intense curiosity about these technologies and similar perspectives on whether AI is appropriate for various library tasks.

Generally, AI is installed in machines or computers to reduce human casualties in wars, hazardous work environments, car accidents, plane crashes, fire explosions or disasters as a result of human error. Furthermore, AI facilitates human work with greater speed, efficiency and effectiveness in work environments such as the library. According to Vijayakumar and Vijayan (2011), AI and expert systems are used in the classification, cataloguing and indexing of library materials. Via the use of optical character recognition and neural networks, the system can obtain the bibliographic records of books and classify them accordingly. According to Asemi and Asemi (2018), natural language processing can be used to reduce language barriers. For instance, one has to learn Chinese to study in China. The availability of natural language processing systems in their libraries can assist foreign students to translate and understand Chinese. Moreover, natural language processing systems can also assist in searching for information in multi-language databases. In addition, expertise is needed in the provision of qualitative service delivery in libraries, as such, Artificial Intelligence and expert systems will improve the performance of library services reduce the rate of human errors and defects and perform tasks faster than a human being can most likely (Shohana, 2016).

A study on ‘Transforming Academic Library Operations in Africa with Artificial Intelligence: Opportunities and Challenges’ conducted by (Echedom & Okuonghae, 2021) explores the potential and limitations of using AI in academic libraries in Africa. The authors examine the application of AI in libraries and the challenges faced in its adoption. The paper concludes that AI has the potential to significantly improve information services and provide a new level of efficiency. However, there are still challenges, such as inadequate infrastructure and a lack of proper training. The authors recommend a collaborative effort between the government and library management to promote the use of AI in African libraries and proper policy formulations to guide its use.

Al-Aamri and Osman (2022) use a descriptive research methodology to examine the significance of AI capabilities in library services. They did this by reviewing relevant Arabic and foreign studies concentrating on AI applications in knowledge management inside information institutions. The results demonstrate that many libraries are already integrating AI technology in various services, such as technical support and reference services, to facilitate users' access to information. The research covered how AI may improve library services and underlined how having a solid technical foundation and knowledgeable staff is essential to maximizing its advantages. The authors suggested that libraries and information centres work to stay abreast of AI developments and make the required knowledge management investments.

Similarly, Romero (2018) submitted that applying AI could facilitate searching and retrieval of new media with greater efficiency and effectiveness by library patrons and introduce them to new material they may never have found otherwise. In addition to convenience and entertainment value, using Artificial Intelligence to suggest similar materials could also help library clientele who are carrying out research by combing the library database in an instant. Generally speaking, AI systems can read to you, inform you, advise you, teach you, correct your mistakes, and patiently respond to your myriad demands. Thus, AI holds great potential for library and information services. The benefits of AI in libraries can be summarized as follows:

1. Enhanced search and discovery: AI in libraries can improve the search capabilities of library catalogues and databases thereby making it easier for users to find relevant information resources. Natural language processors can help users refine their searches and receive more accurate results. This would also make research more discoverable which can boost research productivity among faculty members.
2. Bridge in Time: Round-the-clock accessibility to information resources and services just in time.
3. Bridge in Space: The space occupied by piles of books, journals, bound newspapers and other information materials has been reduced by the introduction of digitization, electronic copies and the use of robotic cranes that store and retrieve books from a compact off-site storage location.
4. Maximization of Efficiency: This refers to efficiency in library operations: selection and acquisition of materials, technical services, circulation services, references services, serial management etc.
5. Maximization of effectiveness in the form of improved service delivery and elimination of human errors in library operations.
6. Minimization of Efforts: The efforts being expended by librarians in technical services, circulation services, reference services, serial management, etc, can be minimized by the use of Artificial Intelligence systems in libraries.
7. Enhanced and immersive user experience in library service delivery.

Methodology

This study is guided by the positivists' paradigm as it explores the true behaviour of individuals about their views, perceptions and beliefs as observed on a particular phenomenon. Positivism is a philosophical view that uses the scientific method, empirical or analytical approaches and the pursuit of an objective search for fact (Creswell & Clark, 2011; Creswell, 2013). Positivists believe that reality is objective and only be studied through scientific methods. It often used quantitative research methods such as experimentation or surveys, which can be done through sampling, measurement and scaling, statistical analysis, questionnaire or structured interview to conduct the research.

The study employed a quantitative research method which explains the phenomenon through gathering data in numerical form and analyzing the data through

the use of computational, statistical and mathematical techniques (Creswell 2013 & Williams 2011).

This study, therefore, employs a Cross-sectional Survey research design which is a research design that provides a quantitative or statistical description of trends, attitudes, or opinions of a population by studying a sample of that population and analyzing the purpose of better understanding the population (Sukamolson, 2007 & Creswell 2013). The questionnaire was used as an instrument for data collection.

The target population for this study comprised all the library staff in the three selected university libraries in Katsina state.

Table 1: Distribution of the Population

S/n	Name of University Library	No. of Library staff
1.	Umaru Musa Yar’adua University Library	49
2.	Federal University Dustin-Ma Library	218
3.	Al-Qalam University Library	20
	Total	287

(Preliminary Study, 2023)

1. Sample Size

The sample size of this study is one hundred and sixty-five (165) samples which is calculated and determined proportionally based on Krejcie and Morgan's (1970) formula for determining sample size, with a margin of error of 0.05 and the level of confidence of 95%. The following formula is used: $S = \frac{N \times S}{TP}$. Where,

N = Population of Stratum, S = Calculated Sample Size TP = Total Population.

Table 2 Sample size of the study

S/N	Name of University Library	Population	Sample size
1.	Umaru Musa Yar’adua University Library	49	28
2.	Federal University Dustin-Ma Library	218	125
3.	Al-Qalam University Library	20	12
	Total	287	165

Result and Discussion

A total of 165 questionnaires were distributed to the respondents, out of which 143 questionnaires were duly filled and retrieved representing 86.7% while 22 questionnaires were not returned. This high response rate was achieved as a result of subsequent follow-ups by the researcher together with the research assistants employed for the study.

On the awareness of library staff on the application of AI the data reveal that the majority of the respondents are aware of pattern and image recognition (RFID &

CCTV) which recorded the highest frequency and percentage of 119 (83.2%) aware and 24 (16.8%) are not aware. Followed by robots which accounted for 116 (81.1%) of the respondents being aware and 27 (18.9%) are not aware of the technologies. Then followed by an awareness of Chatbots and online reference assistance with each accounting for frequency and percentage of 115 (80.4%) of the total respondents respectively. However, the data indicated the AI technologies with the lowest frequency and percentage of awareness were portable computer reader services for the handicapped with 38 respondents (26.6%), followed by intelligent document delivery service with 47 (32.9%) respondents aware, then followed by PLEXUS with frequency and percentage of 58 (40.6%) of awareness and expert system in acquisition also followed with 61 (42.7%) of the total respondents. Therefore, these findings indicated the varying state of familiarity with different technologies among the respondents, which can have implications for the adoption and use of these technologies in the libraries under study.

The main ways through which library staff in the selected university libraries in Katsina state became aware of AI for information service delivery. The data indicate that the majority of the respondents became aware of AI through social media with a frequency and percentage of 140 (97.9%) of the total respondents and 3 (2.1%) who did not. This is followed by awareness from the workshop with 121 respondents corresponding to 84.6%. Then followed by meetings with a frequency and percentage of 104 (72.7%). However, the data reveal the responses with the lowest frequencies and percentages with seminars accounting for 32 respondents which is equivalent to 22.4%, followed by peer-reviewed journals with 49 (34.3%) respondents and informal discussions accounting for frequency and percentage of 72(50.3%) of the total respondents.

The perception of library staff on the application of AI for information service delivery. The data shows that the majority of the respondents are with agreement with the statement that AI improves librarians' performance with 55 (38.5%) of the total respondents strongly agreeing and 58 (40.6%) agreeing that AI enhances librarians' productivity, reflecting the mean of 2.04 and standard deviation of 1.16. In contrast, 17 (11.9%) disagreed and 7(4.9%) of the total respondents strongly disagreed that AI enhances librarians' productivity, while the remaining respondents accounting for 6 (4.2%) of the respondents were undecided. This is followed by a perception that AI increases librarians' productivity with 50 (35.0%) of the respondents strongly agreeing and 66 (42.0%) agreeing with the statement that AI increases librarians' productivity with a mean score of 2.08 and a standard deviation of 1.12.; whereas, 19 (13.3%) of the respondents disagreed and 5 (3.5%) of them strongly disagreed, and 9 (6.3%) were undecided. This is then followed by 46 (32.2%) respondents who strongly agreed with the statement that AI causes job polarization while 66 (46.2%) agreed with the statement, reflecting a mean of 2.14 and a standard deviation of 1.17. While 19 (13.3%) of respondents disagreed with the statement and 8 (5.6%) strongly disagreed; meanwhile 4 (2.8%) of the total respondents were undecided.

In addition, the perception that AI leads to intellectual freedom theft accounts for 49 respondents which is equivalent to 34.3% strongly agreeing and 56 (39.2%) agreeing that AI is a new library innovation, reflecting 2.27 and a standard deviation of 1.33. While 0 respondents chose undecided, 26 (18.2%) disagreed and 12 (8.4%) of the total respondents strongly disagreed with the statement. However, the data reveal the responses with the highest frequencies and percentages of disagreement of which perception that AI leads to job loss accounting for 14 (9.8%) of the respondents who strongly agreed and 22 (15.5%) of the respondents agreeing that AI leads to loss of job. This is reflected in a mean score of 3.70 and a standard deviation of 1.38. While 36 (25.2%) of the respondents strongly disagreed and 57 (39.9%) of the respondents disagreed with the statement. This is followed by a perception that AI increases librarians' relevance with 14 (9.8%) of the respondents strongly agreeing and 37 (25.9%) disagreeing with the statement that AI increases librarians' relevance; this is reflected in the mean score of 3.27 and standard deviation of 1.30. In contrast, 49 (34.3%) disagreed and 27 (18.9%) strongly disagreed with the statement, while 16 (11.2%) of the total respondents remained undecided.

The response rates on the perceived usefulness of AI applications on library staff. The data indicate that the majority of the respondents perceived that the application of AI maximizes library services with a frequency and percentage of 122 (85.3%), followed by AI improving library automation with 119 (83.3%) of the respondents, then followed by AI improving librarians' productivity with 116 (81.1%) of the total respondents. However, the data also reveal that respondents only disagreed that AI maximizes library space with 93 (65.0%) of the respondents disagreeing with the statement. This study corroborates the findings of the University of Pretoria (2018); and Wood and Evans (2018) which reveals that applying AI in libraries would bring innovations; improve librarians' productivity; and maximize services which would in turn increase user satisfaction.

The response of respondents on the library sections that should apply AI for information services delivery. The data indicate the responses with the highest frequencies and percentages of Yes include the electronic section which accounts for 130 (91.0%), followed by the reference section with 105 respondents corresponding to 73.4%, then followed by research clinic with 101 (70.6%) of the total respondents. However, the administrative section accounts for the lowest frequency and percentage with 39 (27.3%) and then followed by the acquisition and technical section with 65 (45.5%) of the total respondents.

The distribution of the respondents is based on the types of information services that should be provided using AI. The data reveal that the majority of the respondents indicated that AI should be applied to provided electronic retrieval services which accounts for the highest frequency and percentage of 128 (89.5%), followed by translation support service with 124 (86.7%) of the total respondents; then followed by reference service with 123 of the respondents corresponding to 86.0% of the total respondents. On the other hand, the data indicated that indexing and abstracting

services and cloud storage services have recorded the lowest frequency and percentage with each, accounting for 50 respondents which is equivalent to 35.0% respectively; this is followed by intelligent document delivery service which stands at 78 (54.5%) of the total respondents.

Inferential Analysis

In an attempt to achieve the above-stated objectives, the following null hypotheses are formulated and tested to enable the researcher to conclude.

H0₁: There is no significant relationship between the perceived usefulness of AI and the awareness of library staff on the application of AI for information service delivery in the study area.

N= Number of responses; SD= Standard deviation; P= Probability value

Variables	N	Mean	SD	P-value
Perception of library staff	143	1.4315	.29489	
Awareness	143	2.8314	1.23629	.974

To test the hypothesis, the data was subjected to Pearson Product Moment Correlation Coefficient (PPMCC) where the probability value is 0.974 at a 95% confidence level/interval which is equivalent to 0.05 significant values. Based on this result the null hypothesis which states that there is no significant relationship between the perceived usefulness of AI and the awareness of library staff on the application of AI for information service delivery, the hypothesis was rejected. This is to say that there is a strong positive relationship between the perceived usefulness of AI and awareness of library staff on the application of AI for information service delivery in university libraries in Katsina state.

Therefore, this result has been validated by the previous empirical studies conducted such as Eriemiokhale and Sulyman, (2023); Oyekale and Zubairu, (2023); Ajani, Tella, Salawu and Abdullahi, (2022) which confirms that perceptions of librarians on AI are related to how aware librarians are about the AI. In a similar vein, the result collaborates with Aboyemi et. al, (2021) results on awareness and perception of Artificial Intelligence in the management of university libraries in Nigeria; awareness is the first step toward perceptions of AI among librarians because it is only when you become aware of something then you can perceive its benefits or otherwise. The finding suggests that awareness plays a significant role in shaping librarians' perceptions of AI in libraries.

H0₂: There is no significant relationship between the perceived ease of use of AI and perceptions of library staff on the application of AI for information service delivery in the study area.

N= Number of responses; SD= Standard deviation; P= Probability value

Variables	N	Mean	SD	P-value
Awareness	143	1.4315	.29489	

Benefits	143	2.1282	1.16812	.956
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The table above contains the data of the result of the null hypothesis stating that there is no significant relationship between the perceived ease of use of AI and perceptions of library staff on the application of AI for information service delivery in the study area. The data was also subjected to PPMCC where the P-value is 0.956 at a 95% confidence interval corresponding to a 0.05 significant value. Based on this result, the null hypothesis was rejected which hereby indicates that there is a strong positive relationship between perceived ease of use of AI and perceptions of library staff on the application of AI for information service delivery in the study area.

This study collaborates with the outcome of Hervieux and Wheatley (2021) who report that the awareness of AI among librarians would enable them to drive and leverage its positive benefits such as bringing innovation, improving librarians' working capabilities, improving librarians' productivity, increasing in user satisfaction and ability to provide AI tailored service among others and these would in turn help in its potential applications in librarians. Similarly, they expressed optimism about the benefits it can offer the library, though others have negative feelings towards AI. Therefore, the awareness of librarians on AI is important for maximizing its benefits while addressing potential challenges and ensuring responsible and ethical use of library services.

Summary of the findings

The summary is organized based on the research objectives and questions of the study.

1. The study achieves a high response rate of 86.7, meeting the benchmark for social science research.
2. The findings reveal that the majority of the library staff members are aware of the most of AI technologies. Such AI technologies include pattern and image recognition (RFID & CCTV), robots, Chatbots, online reference assistants, natural language processing, speech recognition and optical character recognition. Therefore, it can be deduced from the data that library staff are aware of AI applications for information service delivery in the university libraries in Katsina state.
3. The findings establish that the majority of library staff members in the study area have a positive perception of AI. This is due to their belief that AI may increase librarians' performance and improve productivity, increase user satisfaction as well as bring innovation to librarians and libraries in general. This is despite certain negative perceptions raised by some respondents which include fear of job loss or polarization, privacy issues and intellectual freedom theft.
4. And that the findings establish that there are many benefits library staff may drive from AI from bringing innovations to librarians; improvement in library automation; enhancing librarians' productivity; promoting better and easier access to information; improving user satisfaction; improving security of library

resources; and maximizing library services, and improving librarians' working capability.

- a) This, therefore, affirms that applying AI into library operations such as in electronic sections, reference sections, circulation sections and research clinics.
- b) The data further reveal that AI can be applied to deliver information services which include information retrieval services, reference services, translation and teaching support services as well as research clinic services all of which would be very useful and enable librarians to perform efficiently and provide unhindered access to a variety of AI-tailored information services in the university libraries in Katsina state.

Conclusion and Recommendations

In conclusion, the study explored the awareness and perception of library staff regarding the application of AI for information service delivery in university libraries in Katsina state. Subsequently, the findings reveal that most of the library staff working in the three (3) university libraries under study are aware of AI for information service delivery. The perceptions of library staff on AI are somehow positive with the anticipation of taking libraries and librarians to the next level by improving librarians' capabilities and providing easy access to AI-tailored library services. Therefore, awareness and positive perception of library staff towards AI will assist the level of preparedness (readiness) of AI and its potential adoption/application in libraries under study. The study recommended that to move towards achieving AI application for information service delivery, there is a need for library management in the three (3) university libraries under study to create more awareness of the application of AI through organizing AI awareness campaigns, workshops, sponsoring library staff to attend AI conference, and training of librarians on the basic short courses on AI. This training should essentially enhance the awareness and expertise of library staff in AI and enable them to effectively apply AI for information service delivery. Also, despite having positive perceptions of AI among library staff, libraries should create advocacy programs such as conferences, seminars and workshops to educate library staff that accepting and using AI does not necessarily translate to job loss or job polarization but would ultimately make them more relevant to the provision of information services in the library. Library staff should foster a positive attitude towards AI by emphasizing its potential benefits through collaboration and sharing of their experiences and insights in various collaborative environments such as NLA and ALA where they can learn and hear from one another, the benefits derivable through AI integrations and to develop the best practices.

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