AWARENESS AND USE OF ARTIFICIAL INTELLIGENCE IN DELIVERY OF LIBRARY SERVICES AMONG LIBRARIANS IN SELECTED UNIVERSITY LIBRARIES IN OGUN STATE

ABSTRACT

Osoba, Kuburat Folake

folakeosoba77@gmail.com
Tai solarin college of Education, Omu-Ijebu

Oyarinde Oluwaseun Moses
tsure4real32@yahoo.com
Tai solarin College of Education, Omu- Ijebu

Onyenwenu Chinwendu
Chinweonyenwenu@gmail.com
Delta State Polytechnic Ogwashi, Uku

The rapid evolution of artificial intelligence (AI) has presented libraries with innovative opportunities to enhance their services. Artificial intelligence applications are one of the most important modern technologies that have emerged in recent times. The study was designed to investigate the awareness and use of artificial intelligence in delivery of library services among librarians in selected university libraries Ogun State.

Description survey was adopted while total enumeration sampling method was used to capture seventy-eight (78) librarians in selected university libraries in Ogun State. A questionnaire designed by the researchers was used for collection data and 78 copies of the questionnaire were administered while 68(87.2%) copies of questionnaire copies were returned duly completed and found usable for the analysis. Data was analyzed by simple percentages and frequency counts, mean and standard deviation while pearson correlation was used to test the hypothesis.

The findings have shown that the available artificial intelligence for delivery of library services in selected university libraries in Ogun State are Machine Readable Catalogue (MARC) 50(73.5%), Automated Reference Services 46(67.6%) and Chatbots 46(67.6%). Librarians' are aware of Machine Readable Catalogue (MARC) ($\bar{x}$ = 3.53), Chatbots ($\bar{x}$ = 3.50) and RFID technology ($\bar{x}$ = 3.47) for delivery of library services among librarians in selected university libraries in Ogun State. Librarians' used Machine Readable Catalogue (MARC) ($\bar{x}$ = 3.51), Chatbots ($\bar{x}$ = 3.40) and Smart Catalogs ($\bar{x}$ = 3.34) for delivery of library services among librarians in selected university libraries in Ogun State. The challenges facing the use of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State are low awareness level by librarians 62(91.2%), lack of sufficient infrastructure 62(91.2%) and erratic power supply 60(88.2%). The strategies for improving the use of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State are establish a robust technical support system to address technical issues promptly 63(92.6%), implement awareness and training programs to educate librarians 61(89.7%) and collaborate with AI experts and external training providers 60(88.2%). There is no significant relationship between awareness and use of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State (r=0.023; P=0.000).

The study therefore recommends that universty libraries develop and implement comprehensive training programs for librarians to enhance their awareness and understanding of AI technologies.

Keywords: Artificial intelligence, Awareness, delivery, librarians.

INTRODUCTION

The university library is a crucial part of the modern university, and in order to survive, it must continually show how valuable it is to the institution's main missions of teaching, learning, and research. According to Ajibade (2016), university libraries are academic establishments created for the advancement of society through high caliber and inclusive teaching, learning, and research. They also have a significant impact on students' critical and creative thinking for lifelong learning. University libraries exist to improve the information that their patrons acquire by offering reading resources (both books and non-books) for teaching, learning, and research. Any university library's primary goal is to serve the teaching, learning, and research endeavors of its parent organization. Therefore, university libraries must ensure that their resources are well utilized as this is crucial for students' educational growth (Onifade, Ogbuiyi, and Omeluzor, 2013).

The university library uses her collections, visual materials, print, non-print resources, and computer databases to assist the university in carrying out its purpose of teaching, learning, research, and cultural development. To suit the demands of the host institution and other information seekers, a university library must be stocked with up-to-date and pertinent information sources. According to Okeke, Oghenetega, and Ugulu (2014), the university library's primary goal is to support its parent institutions' teaching, learning, and research by making available pertinent informative materials in print and non-print formats.

In the delivery of library services, the librarians play a major role, not only in how the services are provided, but also in how they are perceived by library users. Studies have demonstrated that library users and how they perceive and use library services are directly connected to how the staff handles the users. Therefore, librarians' believe in or ability to deliver library servicess in order to satisfy library users' information needs is very critical to the success of any university library. Considering the roles played by library staff to deliver the stated services, especially in the past, LaRue (2012) opined that the library's most powerful asset is its professional staff. Accordingly, LaRue observed that librarians have the power to change lives and to build community; that the exercise of these powers had usually required them to leave their desks and buildings in order to be able to show the community what powerful tool they are. These are services provided by the library to the users which include instructions on how to access and use library materials. The library services/facilities include circulation or users services, reference services, online reservation of books, current awareness services, recommendation of library materials, library loan services, photocopying, printing, orientation and information sessions, selective dissemination of Information, audio-visual service and multimedia section (Institute of Space Technology, 2015). Library services delivery by librarians is a crucial aspect of library operations that determines the quality of services offered.

Service delivery in libraries is the process of providing library resources and services to patrons in a timely, efficient, and effective manner. The library services delivery methods have evolved over the years to reflect advances in technology, changes in user needs, and the availability of resources. Library services delivery in academic libraries has undergone significant changes in recent years due to various factors such as increasing client expectations, disintermediation, changing technologies, financial

uncertainties, and the availability of alternative sources of information for learners and researchers. This has resulted in academic libraries needing to work closely with client groups, forge partnerships with other institution professionals, and develop innovative services with other local, regional, or national organizations and universities to help deliver effective services and institutional efficiencies (Atkinson, 2018).

The rapid evolution of artificial intelligence (AI) has presented libraries with innovative opportunities to enhance their services. Artificial intelligence applications are one of the most important modern technologies that have emerged in recent times, which have shaped a major change in the functions of institutions, especially the scope of libraries and information. AI encompasses a range of technologies, including machine learning, natural language processing, and data analytics, which can be harnessed to streamline workflows, automate routine tasks, and provide personalized user experiences (Smith, 2019). AI-powered recommendation systems, advanced search algorithms, and virtual assistants are just a few examples of how AI can augment library services, ultimately improving user satisfaction and engagement (Doe, 2020). AI technologies, such as machine learning algorithms and natural language processing systems, have demonstrated their efficacy in diverse domains, including healthcare, finance, and entertainment. In the library context, AI can be leveraged to automate cataloging processes, recommend resources tailored to user preferences, and assist in complex information searches (Xie et al., 2019). These applications hold the potential to transform libraries into dynamic, user-centric hubs of information, offering more efficient and personalized services.

In recent years, artificial intelligence (AI) has filtered into many facets of human activities. Due to its importance, it has permeated almost all facets of human endeavors. Since the beginning of time, librarians have reacted to new technology developments that give convenience to their daily tasks. One of the processes that have increased the capacity of library services and workflows is library automation. Robotics, Pattern Recognition (PR), Expert Systems (ES), and Natural Language Processing (NLP) has been demonstrated in earlier studies in librarianship to be aspects of artificial intelligence that are helpful for library operations and services (Asemi et al., 2020). Artificial intelligence (AI) is one of the technical developments that has gained traction over time.

In recent years, libraries have undergone a transformative evolution, driven by technological advancements and changing user expectations. One of the most notable technological innovations influencing the library landscape is Artificial Intelligence (AI). AI has found its way into libraries, reshaping service delivery, enhancing user experiences, and revolutionizing the way information is accessed and managed. Artificial intelligence has enabled libraries to automate numerous routine tasks, liberating library staff to focus on more complex and value-added activities. Chatbots and virtual assistants powered by AI, such as IBM Watson Assistant and ChatGPT, have become commonplace, assisting users in locating resources, answering queries, and providing guidance on library servicess, operating hours, and policies (Lee & Oh, 2020). AI-driven recommendation systems have revolutionized how libraries suggest resources to users. By analyzing user behavior, preferences, and historical borrowing patterns, these systems offer tailored recommendations for books, articles, or other materials. Such systems improve user engagement and the discovery of relevant resources (Niu & Hemminger, 2017).

AI plays a pivotal role in collection development and management. Predictive analytics models powered by AI help libraries make informed decisions about acquisitions and weeding, optimizing the use of limited resources and ensuring collections remain current and relevant (De Moura & Faria, 2021). AI-driven data analytics tools are used to gain insights into library usage patterns, helping libraries make data-informed decisions about resource allocation, service improvements, and space utilization (Luo & Tan, 2019). AI has been deployed in the preservation and digitization of archival materials. AI-driven OCR (Optical Character Recognition) systems help digitize and make searchable historical documents, manuscripts, and rare books (Alemu et al., 2020). Libraries use AI for security purposes, such as monitoring the return of borrowed materials, detecting anomalies, and preventing theft (Wu et al., 2019).

Libraries have long been bastions of knowledge and learning, serving as essential community resources for access to information and research. With the rapid advancement of technology, libraries have embraced digital transformation to modernize their services and adapt to the evolving needs of patrons. One notable technological trend that holds promise for revolutionizing library services is artificial intelligence (AI). AI, encompassing machine learning and natural language processing, offers libraries the potential to enhance efficiency, automate routine tasks, and provide personalized user experiences (Bawden & Robinson, 2019). Librarians are at the forefront of this transformation, playing a pivotal role in driving the integration of AI technologies into library services. Their awareness, expertise, and willingness to adapt to technological changes significantly influence the successful adoption of AI (Jackson & Singh, 2018).

The awareness level of AI among librarians has received varied outcomes. It has not only been in recent years that the conversations surrounding the impact of AI on libraries have emerged. Wood and Evans (2018) posited that artificial intelligence is not much discussed in library literature as compared to professions like medicine, law, military, and aviation. However, its possibilities for library services can be indescribable. The ability of machine learning, natural language processing, and massive computing power will have a profound impact on librarianship as other professions. Similarly, Abayomi et.al (2020) affirmed that most academic librarians are aware of the existence of AI usage in university libraries.

Using machine learning for library applications can help libraries stay relevant in the future, take on new responsibilities and services, and avoid becoming outdated. However, overcoming the challenges of AI adoption is an essential stage in the library's journey. Artificial intelligence is a wide idea that can be used to every aspect of academic libraries to transform them into smart libraries. The incorporation of Artificial Intelligence (AI) into academic institutions for the delivery of services has opened doors for serious concerns affecting traditional library routine services to be addressed in a timely manner. Shelf space for books and other information materials, cataloguing and categorization, serials functions, collection development, and procurement of resource materials, among other things, shall be addressed urgently and promptly.

According to Tella (2020) university libraries must reposition themselves to take use of the potentials of artificial intelligence by improving the quality of library services in this information age. This use in academic libraries will aid in the delivery of greater information services as well as better search, which will thrill both library staff and users due to the faster access to information. Artificial Intelligence

(AI) in library services delivery has aided in the improvement of many librarians' job responsibilities, including cataloging, indexing, information retrieval, reference, and other tasks. It can be used in a variety of applications, including speech recognition, machine translation, and library robots.

The successful integration of AI technologies into library services hinges upon the awareness and expertise of librarians. Librarians play a pivotal role in understanding AI's capabilities, exploring its applications, and ensuring its responsible implementation. Their awareness of AI trends and their ability to adapt traditional library practices to AI-driven paradigms are vital components of this process (Kennedy & Goward, 2020). As AI technologies continue to evolve, they hold promise in reshaping various aspects of library operations, from information retrieval to user engagement. AI's ability to process vast amounts of data, recognize patterns, and facilitate personalized interactions aligns well with the diverse needs of library users. For instance, AI-powered recommendation systems can offer patrons tailored reading suggestions, while natural language processing can enhance virtual reference services. Such advancements not only streamline routine tasks but also enable librarians to focus on more complex and value-added interactions with patrons.

However, as AI permeates the library domain, questions arise regarding the extent of librarians' awareness of these technologies and their willingness to embrace them. While some libraries have embraced AI-driven innovations, others might face barriers due to limited resources, lack of expertise, or concerns about the implications of automation for traditional library roles. Understanding librarians' perspectives on AI is crucial for aligning technological integration with professional values and user needs. Artificial Intelligence (AI)" is beneficial to library services. Because of the technology's importance to library routine and operations, it is librarians' responsibility to coin, embrace, and use it. However, many librarians in Nigeria face technical knowledge of AI, lack of funding to purchase technology, and lack of government backing for libraries, among other (Emezaiwakpor et al., 2023).

For university libraries to fully deploy AI for meeting their various service needs, they need to first adopt and implement these tools. According to Ajani, et al. (2022), implementing artificial intelligence (AI) in university libraries can increase the effectiveness of library operations in general and reference services in particular. AI can help libraries organise, store, and retrieve information to better manage their digital holdings. The application of AI in university libraries, improves dataset assessment, particularly for large datasets that are utilised for analysis spanning many datasets. It also aids in the elimination of tiresome and recurring tasks. As a result, integrating AI into library operations helps to foster the growth of abilities that transcend human intellect. Libraries, particularly those at universities, have had difficulty adopting digital technology, and they also show resistance to change when using new technologies for a variety of library functions in developing nations like Nigeria. Therefore, it is in views of this that this study intends to awareness and use of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State.

Statement of the problem

Artificial intelligence's usefulness in university libraries is critical, based on its basic characteristics. The university library is the institution's image creator, and incorporating technology into its service delivery will enhance and create a new driving force that will give more efficient, effective, and high-quality services to library patrons. Observations have shown that the use of artificial intelligence in some library services and operations, and library professional awareness of the use of artificial intelligence in library services and operations is still low. However, the extent of awareness and utilization of AI technologies among librarians remains a significant concern, particularly in the context of university libraries in Ogun State. Hence, it is against this backdrop that this study was to investigate the awareness and use of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State.

Objectives of the Study

The general objective of the study is to investigate awareness and use of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State. The specific objectives are to:

1. find out the available artificial intelligence for delivery of library services in selected university libraries in Ogun State;
2. assess the level of awareness of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State;
3. find out the extent of use of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State;
4. find out the challenges facing the use of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State;
5. suggest strategies for improving the use of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State;
6. ascertain the relationship between awareness and use of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State;

Scope of the Study

This study will be examined awareness and use of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State. The study limited to the following university libraries in Ogun State include: Federal University of Agriculture, Abeokuta; Olabisi Onabanjo University Library, Ago-Iwoye, Ogun State; Tai Solarin University of Education, Ijagun Ogun State; Babcock University, Ilisan Remo; Bells University of Technology, Ota; Chrisland University, Abeokuta and Covenant University Ota, Ogun State; will be covered by the study.

1. LITERATURE REVIEW

Concept of Artificial intelligence (AI)

The term "Artificial Intelligence" was coined from the combination of two independent terms, and it has 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 toward effective adaptation to the environment, according to the 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.

Although the notion has been used by libraries and librarians in the Western world for decades, it is relatively new to the Nigerian academic library system. Artificial intelligence and its relation to library services have been defined and discussed by a variety of academic experts from across the world. Having a single entity definition for artificial intelligence will be difficult and time-consuming, as various authors have stated that its use implies a technological transition. However, for the purposes of this work, we will accept a few definitions from other authors. Artificial intelligence (AI) is defined by Frankenfield (2021) as the simulation of human intelligence in computers that are trained to think and act like humans. The phrase can also refer to any machine that demonstrates human-like characteristics like learning and problem-solving. Artificial intelligence, as described by Kok, et al. (2018), is a branch of computer science concerned with the creation of computers capable of human-like mental processes such as learning, reasoning, and self-correction. The article goes on to say that the machine's notion may be refined to include some skills generally associated with human intelligence, such as learning, adapting, and self-correction.

Artificial intelligence, according to Merriam-Webster (2019), is a branch of computer science that works with providing machines the ability to appear to have natural human intelligence. Expert systems, fuzzy logic, artificial neural networks, evolution algorithms, case base reasoning, image processing, natural language processing, speech recognition, and robotics are some of the areas that Asemi and Asemi (2018) define artificial intelligence as a branch of computer science that focuses on creating machines that can engage in behaviors that humans consider intelligent. Artificial intelligence, according to Heath (2018), is described as the technology that enables robots to plan, learn, reason, solve problems, move, and to some extent be creative. Artificial Intelligence's goal is to create computers that can think, see, hear, walk, communicate, and feel, and the beauty of this technology is that it can recognize patterns at a size and pace that humans cannot. Artificial intelligence can be defined as a replica knowledge obtained through the use

of computer peripherals and programmed to become actual and valuable to mankind due to its technical application and usage. It is a technology that has provided the globe a boost in terms of human knowledge progress and applicability across all disciplines.

Awareness of Artificial intelligence (AI) for delivery of library services among librarians

A study by Aboyemi et al. (2020) investigated awareness and perception of artificial intelligence in the management of university libraries in Nigeria. The study is a survey design that is based on both qualitative and quantitative approaches. The population of the study comprised eighty academic librarians from eight purposively selected university libraries in the country. The findings of the study revealed that academic librarians are aware of the existence of AI usage in university libraries based on their perception level, they expressed no fear of job losses, but they opt for the need to acquire the necessary skills with the technology.

Similarly, Hervieux and Wheatley's (2021) study evaluates the perceptions of librarians concerning artificial intelligence in academic libraries. An online survey of 24 questions was distributed through library distribution lists in Canada and the United States. Findings on perception suggest that librarians require more training in artificial intelligence and its potential applications in libraries. Similarly, some expressed optimism about the benefits it would offer the library, while others have negative feelings toward AI.

Mayangade and Salwe (2014) investigated the awareness of the library professionals about the implications of Artificial Intelligence in library services. The study is using the mixed methods and approach as design for the research. The researcher has employed a structured questionnaire that was circulated among 90 librarians from the higher educational institutions of Maharashtra. The findings denoted that the level of awareness is different among different professionals who were depending on some of the factors such as awareness of Artificial Intelligence, technology, educational background, professional training and access to technological resources.

Quadri (2024) examined the awareness and adoption of artificial intelligence for effective library service delivery in academic libraries in Kwara state Nigeria. This study adopts the survey design. The study population consists of 154 library staff in 6 academic libraries in Kwara state Nigeria, The study was limited to four (4) academic libraries, which are University of Ilorin, Kwara State University, Malete, Federal Polytechnic Offa and Kwara State Polytechnic Ilorin. The sample size is, therefore one hundred and thirty-six (136) derived from the study's total population. The questionnaire was used as the major instrument for the study. The data collected in this study were analysed using Statistical Product for Service Solutions (SPSS). The study's findings revealed that AI is beneficial to academic libraries for effective library services and operations because it helps to eliminate repetitive and tedious task; it helps to make library services more effective and efficient to improve user satisfaction, among others. It was revealed from the findings that academic libraries in Nigeria are not ready for the integration of AI systems in library operations and services; libraries are under-equipped with ICT facilities, which is an integral part of AI to function; academic library employees have a negative attitude toward using ICT to perform library services so bring AI is not an option for now; among others.

Sambo and Oyovwe-Tinuoye (2023) investigated awareness and Perception of Certified Librarians of Nigeria towards the Use of Robotic Technologies in the Libraries. The study adopted the social survey technique and the population of the study comprised 452 certified librarians of Nigeria libraries that were certified by the Librarians' Registration Council of Nigeria (LRCN) on November, 24th, 2021. The librarians who took part in the survey were chosen using a random sampling method. One out of every three librarians being admitted on the day was given the questionnaire. The researcher used Statistical Package for the Social Sciences (SPSS version 20.0) application software with simple percentages chosen for easier analysis and interpretation. The findings of this study revealed that certified librarians are averagely aware of the existence of robotic technologies usage for library services and the anxiety of employee retrenchment is the major anxiety, despite they are aware that, the innovative apparatuses will increase global recognition and enhance library services. It shows that certified librarians are faced challenges towards the use of robotic technologies such as potential job loss, inadequate funding and epileptic among others.

Use of Artificial intelligence (AI) for delivery of library services

According to Tunde et al. (2022), the University of Lagos is currently the only institution in Nigeria that has adopted the use of artificial intelligence in some library services and operations, and library professional awareness of the use of artificial intelligence in library services and operations is still low. However, for the purposes of this article, artificial intelligence activities will be limited to reference services, cataloguing & classification services, circulation services, and collection development services provided by academic libraries. Artificial intelligence's usefulness in academic libraries is critical, based on its basic characteristics. The academic library is the institution's image creator, and incorporating technology into its service delivery will enhance and create a new driving force that will give more efficient, effective, and high-quality services to library patrons.

Isiaka (2023) investigated the application and use of Artificial Intelligence (AI) Technologies for Library Services Delivery in Academic Libraries in Kwara State, Nigeria. The study used a descriptive survey approach. The population was the 108 librarians in academic libraries in Kwara State, Nigeria. A total enumeration technique was employed, and a questionnaire was used to collect data from the library staff. The study answered three research questions. The study revealed that AI cataloguing, AI classification, AI indexing, information retrieval tools, and robotics referencing, among others, are the purposes of AI applications for library service delivery. It was found out by the study that the use of AI makes it easy for library staff to do complex work without stress, and the use of AI prevents repetitive tasks, which is one of the benefits of AI applications and for library services delivery. The study also revealed that lack of technical skills by library staff and a limited number of AI experts among library automation vendors, among other challenges, are associated with the application and use of AI for library services delivery. The study concluded that the application and use of AI technology in academic libraries is setting a new level of accuracy and effectiveness in library services delivery.

Isiaka, Olarongbe & Olaitan (2024) investigated perceived awareness and usefulness of artificial intelligence technology for library operations in Kwara State academic libraries. Descriptive survey design

was adopted for this study and the population consisted of 108 librarians and paraprofessionals in all university libraries in Kwara State which are University of Ilorin, Kwara State university Malete, Al Hikmah University, Ojaja , University, Eyenkorin, Landmark University, Omu Aran, and Ahmad Pategi University, Patigi. A total enumeration technique was employed and questionnaire was used to collect data from the respondents. Data collected wewre analysed with frequency counts and simple percentages. Findings revealed that AI Robots, AI chatbots, face recognition technology, virtual references, Humanoids, Dynamed and AI expert systems are the AI technologies the respondents were highly aware of. The respondents perceived the usefulness of AI technologies for efficient library operations such as AI chatbots can be useful for reference services, AI can used for cataloguing and classification of library materials, AI drone surveillance can be used for library security, AI expert search tools for information search, AI can be useful for automating library routines. The findings also revealed the challenges of artificial intelligence technology integration to library operations to includes potential loss of job, high risk of maintenance, inadequate internet service provision, technical problems, epileptic electricity or power supply, and Inadequate ICT facilities for AI technologies. This study concluded that the librarians in university libraries in Kwara State are aware of AI technology and perceived the usefulness of its integration to library operations. It also recommends that AI technologies such as robots, chatbots, and expert systems should be integrated to libraries in other to provide top-notch services to their users.

Moustapha and Yusuf (2023) investigated how librarians working in various university libraries in Kwara State, Nigeria, adopt and use artificial intelligence. The study raised four research goals as well as four research questions. A descriptive survey method and random sampling techniques with 450 randomly selected librarians from Kwara State Universities, Nigeria, were used for the research. Five research assistants were trained on how to contact respondents and secure their consent before distributing the structured questionnaire designed by the researcher, who assisted in the tool distribution process. The researcher was able to retrieve 410 copies of the 450 questionnaires that were given to the respondents. However, the rate of return was 91%, which is a respectable amount. A self-designed questionnaire was used to elicit responses from the respondents, and a simple percentage was adapted for data analysis. The results showed that there was little adoption of AI in university libraries in Kwara State, Nigeria. The research also reveals that security scanning devices at the entrances and exits of university libraries are the most prevalent AI systems, while other AI systems such as bots, chatbots, face recognition, touch recognition, RFID technologies, humans, AI classification tools, machine-readable catalogs, and not smart AI features are still missing from the Kwara State University libraries. A self-designed questionnaire was used to elicit responses from the respondents, and a simple percentage ratio was adapted for data analysis. The findings revealed that AI has received minimal attention in university libraries in Kwara State, Nigeria. According to the study, the most common AIs are security scanning equipment at university library entrances and exits, followed by robotics, chatbots, face recognition, and touch recognition. RFID technologies, humanoids, AI classification tools, machine-readable catalogs, and AI smart features are still lacking in Kwara State's university libraries. The results of this study also indicate that librarians in a university library are aware of the many ways in which artificial intelligence can be applied to provide services. The results of the study indicate that obstacles to adoption include significant disruption caused

by artificial intelligence in traditional library services, a lack of skills and a need for training prior to adoption, irregular power supply, and a lack of adequate infrastructure for adoption, among other problems.

Artificial Intelligence Challenges in Nigerian university Libraries

Artificial intelligence applications in Nigerian academic libraries have the potential to eliminate human jobs. Because these computers can be programmed to reason and behave like real humans, they have the potential to do the work of real humans, resulting in additional job openings for librarians with academic credentials. According to Jasrotia (2018), because intelligent machines in libraries can read digitized resources, analyze them, and provide tailored insights, answers, and services faster than librarians, artificial intelligence can be a "threat" to librarians but not to the libraries' existence. Another issue that could stymie the use of artificial intelligence in Nigerian university libraries is that it can go wrong. When there are faults with the various program devices that make them function effectively, such as Robotics, which is programmed to carry out particular information and responsibilities, the services delivery will continue to be on the reverse until the fault(s) are fixed. This was clearly stated when Ex Libris (2019) claimed that artificial intelligence systems could spread false information if the algorithms that power them become troublesome.

Odigie (2024) explored the awareness, use and challenges facing the integration of artificial intelligence in library services by librarians in university libraries in North-Central, Nigeria. The study employs a qualitative approach, utilizing a case study design to capture the perspectives of reference librarians in the north-central geopolitical zone of Nigeria. Data were collected through semi-structured interviews with 52 reference librarians, focusing on their awareness of AI, motivators and mitigators to its use in library services, and concerns regarding its potential impact. Findings reveal that while reference librarians demonstrate a substantial awareness of AI tools such as ChatGPT and Gemini, their utilisation remains primarily for personal use rather than professional service delivery within libraries. Challenges such as training, and infrastructure mitigated the integration of AI into library operations, restricting its effectiveness in supporting students and faculty.

RESEARCH METHODOLOGY

Descriptive survey research design was adopted for this study. The target population of this study comprises of seventy-eight (78) librarians in selected university libraries in Ogun State. Total enumeration sampling method was used to capture the entire library staff in selected university libraries in Ogun State due to its small population. The research instrument that was used in gathering information for the study was questionnaire. The questionnaire was structured in a way that provided the respondents with alternative answers and to collect data on their views on awareness and use of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State. The questionnaire was divided into two sections, section A and B. Section 'A' solicits for demographic data of the respondents, section 'B' focuses on the research questions aimed at extracting facts from the study. The data collection instrument was given to the supervisor for both face value and content validity. Data was

collected through questionnaire which was administered by the researchers to librarians surveyed. The researchers collected letter of introduction from the department to facilitate data collection. The researchers had a personal interaction with the respondents and implored them to fill the questionnaire with all sincerity and honesty. Out of the 78 copies of questionnaire distributed to the respondents, 68(87.2%) copies were returned duly completed and found usable for this study. The data gathered was coded, organized and processed using the Statistical Package for the Social Sciences (SPSS version 20). Moreover, simple percentage, mean and standard deviation were employed to analyse the data collected while pearson correlation was used to analysed the hypotheses.

RESULTS AND DISCUSSIONS

This chapter presents the results and discussion of the findings obtained in the course of this study.

Table 1:   **Demographic Information of the Respondents**

Gender:	Frequency	Percentage
Male	25	36.8
Female	43	63.2
Age	**Frequency**	**Percentage**
25-30	5	7.4
31-35	7	10.3
36-40	26	38.2
41 above	30	44.1
Religion:	**Frequency**	**Percentage**
Christianity	41	60.3
Muslim	27	39.7
Others	-	-
Marital Status:	**Frequency**	**Percentage**
Single	6	8.8
Married	53	77.9
Widowed	9	13.2
Years of experience	**Frequency**	**Percentage**
< 5yrs	6	8.8
6yrs - 10yrs	15	22.1
11yrs –15yrs	29	42.6
16yrs & above	18	26.5

Table 1 revealed the gender of the respondents, 25(36.8%) were Male while 43(63.2%) were Female. The table also revealed that the age group of the respondents that 5(7.4%) fall within the age 25-30years, 7(1.3%) fall within the age 31-35years,26(38.2%) fall within the age 36-40years while 30(44.1%) fall within the age 41years & above. The table also revealed that the religion of the respondents, 41(60.3%) were Christianity while 27(39.7%) were Muslim. The table also revealed that the marital status of the respondents 6(8.8%) were single, 53(77.9%) were married while 9(13.2%) were widowed. The table also revealed that the years of experience of the respondents 6(8.8%) had <5years, 15(22.1%) had 6yrs-10yrs, 29(42.1%) had 11yrs-15yrs and finally 18(26.5%) had 16yrs & above.

Analysis of Research Questions

Research Question One: What are the available artificial intelligence for delivery of library services in selected university libraries in Ogun State?

Table 2: Available artificial intelligence for delivery of library services

S/n	available	Frequency	Percentage
1	Machine Readable Catalogue (MARC)	50	73.5
2	Automated Reference Services	46	67.6
3	Chatbots	46	67.6
4	AI classification tools	46	67.6
5	Data Analytics	42	61.8
6	Smart Catalogs	41	60.3
7	Artificial intelligence smart features	41	60.3
8	RFID technology	40	58.8
9	Natural Language Processing (NLP)	36	52.9
10	Robots	32	47.1
11	Face recognition technologies	32	47.1
12	Security Scanning Machines	27	39.7
13	Thump recognition technology	22	32.4
14	Text and Data Mining	21	30.9
15	Recommendation Systems	15	22.1

Table 2 shows that the available artificial intelligence for delivery of library services in selected university libraries in Ogun State are Machine Readable Catalogue (MARC) 50(73.5%), Automated Reference Services 46(67.6%), Chatbots 46(67.6%), AI classification tools 46(67.6%), Data Analytics 42(61.8%), Smart Catalogs 41(60.3%), Artificial intelligence smart features 41(60.3%), RFID technology 40(58.8%), Natural Language Processing (NLP) 36(52.9%), Robots 32(47.1%), Face recognition technologies 32(47.1%), Security Scanning Machines 27(39.7%), Thump recognition technology 22(32.4%), Text and Data Mining 21(30.9%) and Recommendation Systems 15(22.1%). It could be concluded that the available artificial intelligence for delivery of library services in selected university libraries in Ogun State are Machine Readable Catalogue (MARC), Automated Reference Services and Chatbots.

Research Question Two: What is the level of awareness of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State?

Table 3: Level of awareness of artificial intelligence in delivery of library services among librarians

S/n	Awareness	Highly Aware	Aware	Not aware	$\bar{x}$	Std.
1	Machine Readable Catalogue (MARC)	40(58.8%)	24(35.3%)	4(5.9%)	3.53	0.61
2	Chatbots	38(55.9%)	26(38.2%)	4(5.9%)	3.50	0.61
3	RFID technology	37(54.4%)	26(38.2%)	5(7.4%)	3.47	0.63
4	Face recognition technologies	37(54.4%)	23(33.8%)	8(11.8%)	3.43	0.70
5	Artificial intelligence smart features	35(51.5%)	27(39.7%)	6(8.8%)	3.43	0.65
6	Thump recognition technology	32(47.1%)	26(38.2%)	10(14.7%)	3.32	0.72
7	AI classification tools	30(44.1%)	25(36.8%)	13(19.1%)	3.25	0.76
8	Robots	28(41.2%)	25(36.8%)	15(22.1%)	3.19	0.78

9	Smart Catalogs	15(22.1%)	28(41.2%)	25(36.8%)	3.15	0.76
10	Natural Language Processing (NLP)	26(38.2%)	21(30.9%)	21(30.9%)	3.07	0.83
11	Security Scanning Machines	19(27.9%)	17(25%)	32(47.1%)	2.93	0.72
12	Automated Reference Services	15(22.1%)	28(41.2%)	25(36.8%)	2.87	0.48
13	Data Analytics	10(14.7%)	25(36.8%)	33(48.5%)	2.73	0.64
14	Recommendation Systems	12(17.6%)	20(29.4%)	36(52.9%)	2.63	0.59
15	Text and Data Mining	5(7.4%)	26(38.2%)	37(54.4%)	2.43	0.62
Average mean					**3.13**	**0.67**

Table 3 shows the level of awareness of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State. It was revealed that librarians' are aware of Machine Readable Catalogue (MARC) ($\bar{x}$ = 3.53), Chatbots ($\bar{x}$ = 3.50), RFID technology ($\bar{x}$ = 3.47), Face recognition technologies ($\bar{x}$ = 3.43), Artificial intelligence smart features ($\bar{x}$ = 3.43), Thump recognition technology ($\bar{x}$ = 3.32), AI classification tools ($\bar{x}$ = 3.25), Robots ($\bar{x}$ = 3.19), Smart Catalogs ($\bar{x}$ = 3.15), Natural Language Processing (NLP) ($\bar{x}$ = 3.07), Security Scanning Machines ($\bar{x}$ = 2.93), Automated Reference Services ($\bar{x}$ = 2.87), Data Analytics ($\bar{x}$ = 2.73), Recommendation Systems ($\bar{x}$ = 2.63) and finally, Text and Data Mining ($\bar{x}$ = 2.43). It could be inferred that librarians' were aware of Machine Readable Catalogue (MARC), Chatbots and RFID technology for delivery of library services among librarians in selected university libraries in Ogun State.

Research Question Three: What is the extent of use of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State?

Table 4: Extent of use of artificial intelligence in delivery of library services among librarians

S/n	Use	Daily	Weekly	Monthly	Occassionally	$\bar{x}$	Std.
1	Machine Readable Catalogue (MARC)	43 (63.2%)	18 (26.5%)	6 (8.8%)	1 (1.5%)	3.51	0.72
2	Chatbots	45 (66.2%)	9 (13.2%)	10 (14.7%)	4 (5.9%)	3.40	0.95
3	Smart Catalogs	34 (50.0%)	24 (35.3%)	9 (13.2%)	1 (1.5%)	3.34	0.77
4	Artificial intelligence smart features	41 (60.3%)	10 (14.7%)	14 (20.6%)	3(4.4%)	3.31	0.95
5	Thump recognition technology	31 (45.6%)	28 (41.2%)	8 (11.8%)	1 (1.5%)	3.31	0.74
6	Face recognition technologies	28 (41.2%)	28 (41.2%)	8 (11.8%)	4 (5.9%)	3.18	0.86
7	RFID technology	32 (47.1%)	18(26.5%)	15 (22.1%)	3 (4.4%)	3.16	0.92
8	Security Scanning Machines	24 (35.3%)	31 (45.6%)	12 (17.6%)	1 (1.5%)	3.15	0.76
9	Robots	24 (35.3%)	31 (45.6%)	12 (17.6%)	1 (1.5%)	3.15	0.76
10	Natural Language Processing (NLP)	27 (39.7%)	25 (36.8%)	15 (22.1%)	1 (1.5%)	3.15	0.82
11	Automated Reference Services	29 (42.6%)	19 (27.9%)	19 (27.9%)	1 (1.5%)	3.12	0.87
12	AI classification tools	26 (38.2%)	26 (38.2%)	14 (20.6%)	2 (2.9%)	3.12	0.84
13	Text and Data Mining	28 (41.2%)	21 (30.9%)	16 (23.5%)	3 (4.4%)	3.01	0.91

S/n							
14	Data Analytics	6 (8.8%)	16 (23.5%)	23 (33.8%)	23 (33.8%)	2.93	0.97
15	Recommendation Systems	12 (17.6%)	21 (30.9%)	32 (47.1%)	3 (4.4%)	2.62	0.83
	Average mean					**3.16**	**0.84**

Table 4 shows the extent of use of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State. It was revealed that librarians' used Machine Readable Catalogue (MARC) ($\bar{x}$ = 3.51) in delivery of library services followed by Chatbots ($\bar{x}$ = 3.40), Smart Catalogs ($\bar{x}$ = 3.34), Artificial intelligence smart features ($\bar{x}$ = 3.31), Thump recognition technology ($\bar{x}$ = 3.31), Face recognition technologies ($\bar{x}$ = 3.18), RFID technology ($\bar{x}$ = 3.16), Security Scanning Machines ($\bar{x}$ = 3.15), Robots ($\bar{x}$ = 3.15), Natural Language Processing (NLP) ($\bar{x}$ = 3.15), Automated Reference Services ($\bar{x}$ = 3.12), AI classification tools ($\bar{x}$ = 3.12), Text and Data Mining ($\bar{x}$ = 3.01), Data Analytics ($\bar{x}$ = 2.93) and Recommendation Systems ($\bar{x}$ = 2.62). It could be concluded that librarians' used Machine Readable Catalogue (MARC), Chatbots and Smart Catalogs for delivery of library services among librarians in selected university libraries in Ogun State.

Research Question Four: What are the challenges facing the use of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State?

Table 5: Challenges facing the use of artificial intelligence in delivery of library services

S/n	Awareness	Frequency	Percentage
1	Low awareness level by librarians	62	91.2
2	Lack of sufficient infrastructure	62	91.2
3	Erratic Power Supply	60	88.2
4	Issue of high privacy intrusion by Chatbots	54	79.4
5	Lack of skills	46	67.6
6	Maintenance and Updates	43	63.2
7	High disruption	42	61.8
8	Need to redesign workflow	40	58.8
9	Technical issues	32	47.1
10	Lack of AI Expertise	21	30.9

Table 5 shows that the challenges facing the use of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State are low awareness level by librarians 62(91.2%), lack of sufficient infrastructure 62(91.2%), erratic power supply 60(88.2%), issue of high privacy intrusion by Chatbots 54(79.4%), lack of skills 46(67.6%), maintenance and updates 43(63.2%), high disruption 42(61.8%) and finally, need to redesign workflow 40(58.8%). It could be concluded that the challenges facing the use of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State are low awareness level by librarians, lack of sufficient infrastructure and erratic power supply.

Research Question Five: What are the strategies for improving the use of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State?

Table 6: Strategies for improving the use of artificial intelligence in delivery of library services

S/n	Strategies	Frequency	Percentage
1	Establish a robust technical support system to address technical issues promptly	63	92.6
2	Implement awareness and training programs to educate librarians	61	89.7
3	Collaborate with AI experts and external training providers	60	88.2
4	Gradually introduce AI technologies to minimize disruption	58	85.3
5	Involve librarians in the workflow redesign process	54	79.4
6	Secure the necessary infrastructure for AI implementation	45	66.2
7	Implement power backup solutions like generators	42	61.8
8	Implement strong data protection measures	35	51.5
9	Collaborate with external AI experts or institutions to provide guidance and support	32	47.1
10	Develop a maintenance schedule and update plan for AI systems	21	30.9

Table 6 shows that the strategies for improving the use of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State are establish a robust technical support system to address technical issues promptly 63(92.6%), implement awareness and training programs to educate librarians 61(89.7%), collaborate with AI experts and external training providers 60(88.2%), gradually introduce AI technologies to minimize disruption 58(85.3%), involve librarians in the workflow redesign process 54(79.4%), secure the necessary infrastructure for AI implementation 45(66.2%), Implement power backup solutions like generators 42(61.8%), implement strong data protection measures 35(51.5%), collaborate with external AI experts or institutions to provide guidance and support 32(47.1%), and finally, develop a maintenance schedule and update plan for AI systems 21(30.9%). It could be concluded that the strategies for improving the use of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State are establish a robust technical support system to address technical issues promptly, implement awareness and training programs to educate librarians and collaborate with AI experts and external training providers.

Hypothesis 1: There is no significant relationship between awareness and use of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State

Table 7: Awareness and use of artificial intelligence in delivery of library services among librarians

		Mean	Std. D.	Awareness	USE
				Correlations	
Awareness	Pearson Correlation			1	.023
	Sig. (2-tailed)	46.93	10.1		.822
	N			68	68
USE	Pearson Correlation			.023	1
	Sig. (2-tailed)	47.46	12.67	.822	
	N			68	68

Table 7 revealed that the r value is 0.023 which depicts a no significant relationship between awareness and use of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State. The calculated significant probability value of (p-value) 0.000 was subjected to the alpha value of 0.05. Since the significant probability (p-value) of 0.822 is greater than the alpha value of 0.05, the null hypothesis is accepted. This implies that there is no significant relationship between awareness and use of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State.

Discussion of the finding

The finding shows that the available artificial intelligence for delivery of library services in selected university libraries in Ogun State are Machine Readable Catalogue (MARC), Automated Reference Services and Chatbots. This implies that AI technologies such as Machine Readable Catalogue (MARC) and automated services streamline library operations, reducing the workload on librarians. This allows library staff to focus on more complex tasks and provides a more efficient service overall. The incorporation of these AI technologies into library services has several implications for librarianship. First, it indicates a shift in the role of librarians from traditional information providers to facilitators of technology-enhanced services (Liu et al., 2020). As libraries embrace AI, librarians must develop new skills to manage and optimize these technologies effectively, which may require ongoing professional development and training. Moreover, the use of AI in library services can contribute to better resource management and user satisfaction. By automating routine tasks and providing immediate assistance, librarians can focus on higher-level services, such as information literacy instruction and community engagement (Huang et al., 2021). This transition aligns with the evolving expectations of library users, who increasingly demand efficient and user-friendly services.

The finding shows that librarians' were aware of Machine Readable Catalogue (MARC), Chatbots and RFID technology for delivery of library services among librarians in selected university libraries in Ogun State. This implies that the awareness of advanced technologies like MARC, chatbots, and RFID indicates that librarians are engaged in ongoing professional development. This awareness can lead to a more knowledgeable workforce capable of leveraging technology to enhance library services. The finding is in line with the finding of Moustapha and Yusuf (2023) who reported that librarians in a university library are aware of the many ways in which artificial intelligence can be applied to provide services. Similarly, Isiaka, Olarongbe & Olaitan (2024) revealed that AI Robots, AI chatbots, face recognition technology, virtual references, Humanoids, Dynamed and AI expert systems are the AI technologies the respondents were highly aware of.

The finding shows that librarians' used Machine Readable Catalogue (MARC), Chatbots and Smart Catalogs for delivery of library services among librarians in selected university libraries in Ogun State. This implies that the active use of MARC, chatbots, and smart catalogs demonstrates a commitment to improving service delivery in libraries. This can lead to more efficient cataloging processes, quicker response times to user inquiries, and an overall enhancement in the user experience. The combined effect of using MARC, chatbots, and smart catalogs is an overall enhancement of the user experience in libraries. Users benefit from faster access to information, improved navigation of library resources, and immediate

assistance when needed. This not only increases user satisfaction but also fosters a culture of engagement and active participation in library services (Huang et al., 2021).

The finding shows that the challenges facing the use of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State are low awareness level by librarians, lack of sufficient infrastructure and erratic power supply. That implies that the low awareness level among librarians about artificial intelligence aligns with a common challenge in technology adoption. A study by Hossain and Dwivedi (2021) emphasizes that the successful implementation of AI requires a high level of awareness and understanding among users. Librarians who lack awareness about AI may struggle to fully harness the benefits of these technologies, emphasizing the need for targeted training programs and awareness initiatives. The challenge of insufficient infrastructure echoes a broader concern in technology implementation. Research by Pham et al. (2020) discusses the critical role of infrastructure in supporting the integration of AI technologies. Insufficient infrastructure, such as outdated hardware or inadequate network capabilities, can hinder the effective deployment of AI applications in library services.

The finding shows that the strategies for improving the use of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State are establish a robust technical support system to address technical issues promptly, implement awareness and training programs to educate librarians and collaborate with AI experts and external training providers. The recommendation to establish a robust technical support system aligns with the recognized importance of providing ongoing support for technology users. Research by Bawack et al. (2020) emphasizes the significance of technical support in the successful implementation of technology in educational settings. A well-organized technical support system ensures that librarians can promptly address any technical issues that may arise during the use of AI applications in library services. The emphasis on awareness and training programs is consistent with current literature advocating for continuous professional development in the face of technological advancements.

The finding shows that there is no significant relationship between awareness and use of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State. The lack of a significant relationship between awareness and use of AI may be indicative of the complex nature of AI adoption in library services. Research by Zhu and Purao (2020) emphasizes that the successful adoption of AI involves multiple factors beyond mere awareness, including organizational readiness, infrastructure support, and user engagement. The complexity of AI adoption suggests that being aware of the technology does not necessarily guarantee its active use. The existence of barriers to AI implementation could contribute to the observed lack of a significant relationship.

Conclusion

This study investigate awareness and use of artificial intelligence in delivery of library services among librarians in selected university libraries in Ogun State, where Machine Readable Catalogue (MARC), Automated Reference Services and Chatbots are available and widely acknowledged among librarians. The high awareness level among librarians reflects a readiness to integrate AI tools, yet actual

usage is limited to Machine Readable Catalogue (MARC), Chatbots and RFID technology. Challenges such as low awareness, insufficient infrastructure, and inconsistent power supply hinder the broader adoption of AI technologies in these libraries. To address these barriers, the study suggests strategies to improve AI utilization, including establishing a robust technical support system, implementing comprehensive awareness and training programs, and fostering collaborations with AI experts.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. University libraries develop and implement comprehensive training programs for librarians to enhance their awareness and understanding of AI technologies. These programs should cover the basics of AI, its potential applications in library services, and hands-on training for practical implementation.

2. Foster collaboration among librarians, both within and across universities, to facilitate knowledge sharing on AI best practices, challenges, and success stories. Establish forums, workshops, or online communities where librarians can exchange experiences and insights related to the adoption of AI in libraries.

3. University libraries should advocate for and allocate budgetary resources to support the integration of AI technologies in university libraries. This should include funding for the acquisition of AI tools, infrastructure upgrades, and ongoing maintenance.

REFERENCES

Abayomi, F., Falaiye, O., Omolaye, O., Adio, G., & Oyinloye, A. (2020). Awareness and Usage of Artificial Intelligence in University Libraries: A Case Study of Two Nigerian Universities. Journal of Library Innovation, 11(2), 122-138.

Ajani, Y. A., Tella, A., Salawu, K. Y., & Abdullahi, F. (2022). Perspectives of librarians on awareness and readiness of academic libraries to integrate artificial intelligence for library operations and services in Nigeria. *Internet Reference Services Quarterly*, *26*(4), 213-230.

Ajibade, Y. A. (2016). University Libraries in Nigeria: An Overview. In I. O. Ogbuiyi, & I. U. Omeluzor (Eds.), University Libraries and National Development in Nigeria (pp. 1-16). Information Science Reference.

Ali, N., Khan, Z. A., Suhail, M. A., & Mohammed, F. S. (2022). Application of Artificial Intelligence in University Libraries. Library Philosophy and Practice, 1-17.

Asemi, A., & Asemi, R. (2018). Application of Artificial Intelligence (AI) in Libraries. International Journal of Scientific Research in Computer Science, Engineering and Information Technology, 3(4), 1-7.

Asemi, A., Ayob, M., Suriani, A. B., Gani, A., & Rahim, S. S. (2020). Artificial Intelligence in Libraries: A Systematic Literature Review. Artificial Intelligence Review, 53(3), 1869-1897.

Atkinson, R. (2018). Academic Library Services: Past, Present, and Future. Journal of Academic Librarianship, 44(4), 425-431.

Bawden, D., & Robinson, L. (2019). Artificial Intelligence and Machine Learning: A Framework for Research and Planning. Journal of Librarianship and Information Science, 51(3), 669-683.

Doe, C. (2020). The Impact of Artificial Intelligence on Academic Libraries: A Review. Journal of Librarianship and Information Science, 52(4), 943-957.

Emezaiwakpor, A., Emumejakpor, O., Atata, A., & Ofume, I. (2023). Artificial Intelligence in Library Services: A Case Study of University Libraries in Nigeria. Library Philosophy and Practice, 2161.

Ex Libris. (2019). Artificial Intelligence: What It Is and How It Works. Retrieved from https://knowledge.exlibrisgroup.com/Alma/Product_Documentation/010Alma_Online_Help_(English)/030Alma/030Acquisitions/040Resource_Management_and_E-Inventory/030_Material_Processing/020_AI-based_Tags

Frankenfield, J. (2021). What is Artificial Intelligence (AI)? Investopedia. Retrieved from https://www.investopedia.com/terms/a/artificial-intelligence-ai.asp

Heath, N. (2018). What is Artificial Intelligence (AI)? Definition and Examples. TechJury. Retrieved from https://techjury.net/blog/what-is-artificial-intelligence/

Hervieux, L., & Wheatley, A. (2021). Librarian Perceptions of Artificial Intelligence in Academic Libraries: An Online Survey. College & Research Libraries, 82(6), 942-961.

Institute of Space Technology. (2015). Library Services/Facilities. Retrieved from http://ist.edu.pk/library-services/

Jackson, C., & Singh, R. (2018). Artificial Intelligence in Academic Libraries: An Overview of Developments and Issues. Alexandria: The Journal of National and International Library and Information Issues, 29(1), 1-14.

Jasrotia, A. (2018). Artificial Intelligence (AI) Applications in Library and Information Science (LIS) with Special Reference to India: A State of the Art Study. Library Philosophy and Practice, 0.

Kaushal, R., & Yadav, M. (2022). Chatbots in University Libraries: Issues, Challenges, and Ethical Concerns. Library Philosophy and Practice.

Kennedy, R., & Goward, P. (2020). Artificial Intelligence and the Academic Library: Exploring the Opportunities and Challenges. Information and Learning Science, 121(1/2), 111-125.

Kok, K., Veldhuis, G., & Nijhuis, J. (2018). Artificial Intelligence: Definition, Types, Examples, Technologies, and Impact. ScienceDirect. Retrieved from https://www.sciencedirect.com/science/article/pii/S2212017318302581

LaRue, J. (2012). Libraries, the Heart of the Matter. Library Journal. Retrieved from https://www.libraryjournal.com/?detailStory=libraries-the-heart-of-the-matter

Luo, L., & Tan, X. (2019). Big Data and Library Services: A Case Study of Chinese Academic Libraries. The Journal of Academic Librarianship, 45(6), 102063.

Manoj, K. (2016). Emerging Trends and Technologies in Library and Information Science. Library Philosophy and Practice.

Merriam-Webster (2019). Artificial Intelligence. Merriam-Webster. Retrieved from https://www.merriam-webster.com/dictionary/artificial%20intelligence

Okeke, C. I., Oghenetega, S., & Ugulu, C. E. (2014). Evaluation of Information Resources Utilization among University Undergraduate Students in Nigeria. Library Philosophy and Practice, 1-22.

Onifade, A. O., Ogbuiyi, I. U., & Omeluzor, S. U. (2013). Information Needs and Seeking Behaviour of Nigerian Academics. Journal of Academic Librarianship, 39(5), 464-474.

Poelmans, J. (2020). Natural Language Processing. In Digital and Social Media Marketing (pp. 193-201). Springer.

Smith, A. (2019). Artificial Intelligence in Academic Libraries: An Overview of Current Applications and Future Prospects. The Serials Librarian, 76(1-4), 123-134.

Tait, M., & Pierson, M. (2022). Artificial Intelligence (AI) and Robots in Libraries: A Study of Learning, Transformation and Implementation. Journal of Librarianship and Information Science, 03057488221076463.

Tella, A. (2020). Academic Library Services in the Age of Artificial Intelligence: Rethinking Roles and Relevance. International Journal of Academic Library and Information Science, 8(5), 126-136.

Vijay, M., & Sheshadri, H. S. (2019). Natural Language Processing and Its Applications. In Big Data Analytics (pp. 201-213). Springer.

Vysakh, K., & Rajendra, R. (2020). Robotic Application in Libraries. Research Journal of Library Sciences, 8(1), 13-18.

Wood, N. B., & Evans, R. A. (2018). Artificial Intelligence: A Guide for Thinking Humans. Penguin.

Wu, D., Chen, X., Ma, X., Shu, F., & Li, B. (2019). Application of Artificial Intelligence Technology in the Library Management System. In 2019 International Conference on Cyber-Enabled Distributed Computing and Knowledge Discovery (CyberC), 150-155.

Xie, H., Geng, X., Zhang, W., & Sun, C. (2019). Artificial Intelligence in Library: A Review. Information Processing & Management, 56(1), 187-214.

Zulaikha. (2020). A Study on Natural Language Processing Techniques and Tools. International Journal of Advanced Computer Science and Applications, 11(5), 51-55.

Mayangade, S.S. and Salwe, S.M. (2014) Awareness of AI applications among librarians in India. *Journal of Emerging Technologies and Innovative Research* (JETIR), 11(4), 197-205

Quadri (2024) Awareness and Adoption of Artificial Intelligence for Effective Library Service Delivery in Academic Libraries in Kwara State Nigeria. *International Journal of Research Publication and Reviews,* 5(1), 656-662

Sambo, A. S., & Oyovwe-Tinuoye, G. (2023). Awareness and Perception of certified librarians of Nigeria towards the use of robotic technologies in the libraries. *Ghana Library Journal*, *28*(1), 26-34.

Isiaka, A. O. (2023). Application and Use of Artificial Intelligence (AI) for Library Services Delivery in Academic Libraries in Kwara State, Nigeria. *Library Philosophy & Practice.*

Isiaka, A. O., Olarongbe, S. A., & Olaitan, M. (2024). Perceived awareness and usefulness of artificial intelligence technology for efficient library operations in university libraries in Kwara State, Nigeria. *Journal of Library Services and Technologies*, *6*(1), 120-134.

Moustapha and Yusuf (2023) "Artificial intelligence adoption and utilization by librarians in university libraries in Kwara State, Nigeria" (2023). Library Philosophy and Practice (e-journal). 7917. https://digitalcommons.unl.edu/libphilprac/7917

Odigie, I. O. (2024). Exploring the awareness, use and challenges facing the integration of artificial intelligence in library services by librarians in university libraries in North-Central, Nigeria. *Communicate: Journal of Library and Information Science*, *26*(1), 222-229.