Steps to improving Library Services Through Artificial Intelligence in Nigerian Libraries.

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Abstract
Latest technological development in the twenty-first century has brought a dramatic change in every field, and library science is no exception. Like any other fields, Librarianship is also incorporating many fascinating technologies into their armories. This research looked into the conceptual background of artificial intelligence (AI), library services, and the application of AI in library services. The study also reviewed existing literatures on the impact of AI on library services and the extent of its application in Nigeria libraries. The findings show that AI can improve library services like; circulation and reference services, book shelving and shelve reading, cataloguing of library materials, analyzing big data, creating metadata, interpreting search items among others. The research goes on to discuss some of the factors that affect the use of AI in academic libraries such as funding, lack of maintenance, lack of experts in AI, erratic power supply as well as possible strategies to solve the problems: developing policy for AI, consultation, adequate funding, employment of AI experts among others.

Keywords: Artificial Intelligence, Academic Libraries, Utilization, Library Services, Nigeria

Introduction

The twenty-first century is a field of rapid transformation and technological advancements, organizations must adapt to evolving technologies to meet consumer demands. The use of Artificial Intelligence (AI) in libraries can be seen as a collection of technology enabling machines to sense, comprehend, act and learn, perform administrative functions. Recently, many different attributes of artificial intelligence have been adopted by many leading organizations such as Google, IBM, Amazon, Netflix, Expedia and so on to improve their products and services. Almost all major sectors like; health, education, weather, business, stock, agriculture, government, and nongovernment agencies of different countries are also showing interest and using these technologies to simplify and neutralize workload, increase, and speed up

productivity, reduce human interaction and most importantly lead the digital-world in a smart and sophisticated way.

Like any other field, Librarianship is also incorporating many fascinating technologies. This is because of the presence of ever-increasing volumes of data, which is often referred to as big data; the requirement of real-time data processing and generating results; and the need to meet the needs of diverse library   patrons. On the other hand, major advances in computer technology, such as increased processing speed and capacity, popularity in networked environments, use in data processing, and so on, are some of the major potential combinations that create the possibility of mining real-time data and delivering information outputs accordingly. (Johnson, et.al., 2015).

It can be argued that the introduction of AI has created a new horizon in revolutionizing both technical and user services in academic libraries. That been said, Self-learning and self-doing ability of AI can help libraries for better interaction among machine-automated intelligent technologies for the effectiveness and cocreation of all library services and one of such services include customer service. AI, can better improve the efficiency of readers in finding, borrowing and returning books to the library. It goes further to help keep records of missing books and statistics of a book in frequent use by patrons. With AI, 24 hours services will be effective. Artificial intelligence technologies are now being used in libraries to achieve the organic integration of readers and libraries. With this, readers interact on the same platform, track and acquire the personalized needs and information of users so that users can access information accurately, and humanized services, at a reduced cost to rationally utilize library resources. Tella   (2020) stressed that libraries in the developed countries have accepted and use AI technologies virtually in all spheres of life whereas those in developing countries including Nigeria are still struggling to find their feet.

Concept of Library Service
Libraries in the 21st century (whether academic, public, school or special) are service institutions set up to cater for the educational, cultural, research, recreational and information needs of their users. In other for libraries to attain their mandate, many activities are performed by the library which translates to library services. Therefore, the core of the existence of any library is to provide quality and timely service to patrons (Eze, 2017; Chinwendu, 2019). These among other motives are why most libraries use various means to improve access to information. Library services are all those intangible offers given by a library to her patrons to ensure the full exploration of the resources of the library in meeting their information needs. In other word, these are range of events and facilities directed at providing information in numerous formats so as to fulfill the broad and changing information needs of library patrons within a community or society (Alabi & Sani 2013; Hussaini, Vashistha, Jimoh & Jimah, 2017).

Library services are the vital responsibilities of the librarians as they offer unrestricted access to needed resources for educational, economic, research and cultural

advancement. Libraries are erected and maintained to offer information resources. Library services bring together the documents or information sources and the users together by personal efforts of the library staff thereby bridging the gaps among persons, information and technology. Libraries, since ages are known for their capacity to stored ideas, knowledge and experiences to be passed on from generation to generation. Libraries build collections tailored to the needs and goals of their users. Libraries provide a variety of library services to fulfill different information desires of users and these services are of numerous levels.

Likewise, Hjorland (2018) reiterated that libraries deliver a range of services, which are mostly classified into Reference services and Information services. Reference services are concerned with direct personal assistance offered by the librarians to the user seeking information. It covers direct services such as support to the user in the use of the library and its tools, assistance in searching and locating documents, ready reference and long range reference service, literature search and compilation of bibliography, helping in research, selection, organization and maintenance of library material for reference service, and other tasks of reference section such as keeping a record of reference queries, preparation of publicity material, evaluation of reference section etc. While information services are those services provided in anticipation of various needs of the users of libraries such as Current awareness services, indexing and abstracting service, etc. which are sometimes provided on demands from the users. Also, Mayega (2008) stated that the services in libraries and information centers in any society are generally classified to reveal the numerous sections of a library which includes: technical services (such as collection development, cataloguing and classification, indexing and abstracting services, etc.) Circulation or Customer services, Serials services, Documents services, Reference and information services, Digital/Electronic services, etc.

Ezeabasili (2018) highlighted that library services are of various types ranging from circulation service or readers services, reference and information service, document delivery services, online reservation of books, current awareness service, Selective Dissemination of Information (SDI) services, inter library loan service, online database services, photocopying/printing service, audiovisual and multimedia services, serials services, etc. Therefore, the essence of improved library services is to help advance an informed and egalitarian society where peace and development thrive.

Concept of Artificial Intelligence (AI)
Artificial Intelligence has dominated the academic world over the years. Naturally, the human intelligence as described by Merriam-Webster Online Dictionary (2022), has the ability to learn, understand, and to deal with new or difficult situations through the application of reason. It also has the ability to apply knowledge to manipulate one's environment, or the ability to think abstractly. Artificial Intelligence is created to model and apply the intelligence of human mind. With the increased research and

development in technology AI is progressing rapidly. From mere voice recognition to robots with human-like characteristics.

Artificial intelligence (AI) is the ability enabled by a digital computer or computer-controlled machine or software replicating intellectual characteristics like intelligent organisms (human) in their functionality. Major AI scholars and textbooks define this field as the design and development of "a fully conscious, intelligent, computer-based entity. It involves developing computer programs to complete tasks which would otherwise require human intelligence. According to European Commission (2018) it is a system that displays intelligent behavior by analyzing their environment and taking action – with some degree of autonomy – to achieve specific goals. AI has the ability to think and act like a human without any human interference, it can help in the evolution of an intelligent library with latent intelligent roles to perform without the intrusion of human support (Massis, 2018). Self-learning ability of AI can prove very important to libraries in terms of user handling, networking and communication (Huang and Rust, 2018). AI technologies also could be used to provide innovative real-time virtual reference services through mobile and social networking environments, by combining the existing library resources and third party contents (Das and Islam, 2021). Additionally, some other promising areas of AI in libraries include natural language processing, indexing systems, and application of robotics in library activities. The goals of AI are to learn how to make intelligent computers or systems, to replicate human intelligence activities and to advance the science of human intelligence. Artificial intelligence can be divided into three types: symbolism, connectionism, and behaviorism. Artificial intelligence can be used in the library to provide knowledge-based services to users of the library system and end-users and can make intelligent decisions for the retrieval and use of information resources.

Academic Libraries' Utilization of Artificial Intelligence for improved Library Services
According to CILIP (2021) new technologies are changing global practices and creating a paradigm shift in all domains of life in addition to having an impact on people's daily experiences. Traditional roles are experiencing important changes that call for new skills, opportunities, and challenges. In the current day academic library setting, this new change is affecting the overall service provision, the librarians and their purposes.
Artificial intelligence (AI) has made it possible to offer way out to pressing challenges facing libraries, such as shelving of books and other library materials, cataloguing and acquisition of library materials, among others. As a result, library services can be done in more effective and well-organized ways for improved user satisfaction. Consequently, library users can access timely and precise information rapidly and promptly. Fernandez (2016) noted that using AI in academic libraries will help to analyze big data, create metadata, and improve search translation. This means that using AI in academic libraries will make library materials more accessible and available, and allow the staff to answer users' queries on AI use. Tella (2020)

emphasized the need for academic libraries to re-position themselves to take essential benefit of artificial intelligence's potentials by taming the quality of library services in this era of the information age. Talley (2016) likewise stressed the need for university librarians to embrace AI technologies to deliver better services to researchers and other library users.

Grant and Camp (2018) perceived that many academic libraries particularly in developed countries have accepted AI for numerous library operations, such as circulation and reference services such as the US Library of Congress. Presently, as opined by Yusuf et.al (2022) University of Lagos is the only institution in Nigeria that has introduced the use of AI to some of the library services and operations Sagarjit et al. (2001) maintained that the use of AI such as chat bots and voice assistants have improved user engagement in many developed countries in the world. Access to timely information can only happen in a state where AI is being used to guide and support, and at the same time user friendly, mostly in information search. For example, a friendly AI technology will help users search for information with ease, help retrieve information across various collections, and help with users' queries. Similarly, Asefeh and Asemi (2018) list numerous ways in which AI technologies can be used to improve library services to comprise the followings: circulation and reference services, shelving of books, cataloguing of library materials, among others. AI technology can also be used to assign metadata and to assist in the non-textual search. Fernandez (2016) notes the likely opportunities of AI in library operations, mainly in analyzing big data, creating metadata, interpreting search items, and integrating search items across contents.

Academic libraries are most likely to see beneficial changes in information service delivery as a result of the integration and use of AI in the information business (CILIP 2021).Nowadays, many libraries in wealthy nations use robotics and AI directly in their daily operations. With the aid of automatic arm or robot in the library, books can be retrieved from the shelf, on the other hand it can also retrieve resources online. According to Echedom and Okuonghae, (2021) robots can also be helpful for automated storage and retrieval systems, which have facilitated the management of library space. It increases the operational effectiveness of libraries by enhancing collection analysis, visualization, preservation, and lowering service delivery costs (Tella, 2020).

In libraries, AI are used to browse printed materials in real-time via a Web interface. A robot is dispatched to retrieve the needed object when the user activates the system (Tella, 2020). Similar to how libraries and information centers are using AI, big data and data analytics are being used for both operational and service-oriented purposes (Garoufallou and Gaitanou, 2021). With assistance from partners or funding organizations, libraries in impoverished nations can also implement all of these. This will help to improve the efficiency and effectiveness of library service operations in this information-rich and digital economy. Furthermore, (AI) software or application

known as a chatbot can simulate a conversation or a chat with a human being in natural language via a messaging app, a blog, a website, a mobile app, or a smart device in assisting library user to access the library resources (Hopkins and Maccabee, 2018; Mckie and Narayan, 2019). Chatbots can be used to inform users of new arrivals and when a book loan is due, and direct users to similar materials, among other things.

Factors affecting Artificial Intelligence Use in Academic Libraries in Nigeria
Artificial intelligence systems are generally not or low in operational use in most libraries in developing countries of today due to some cogent factors. When it comes to AI, Nigerian academic libraries are still lagging behind. Academic libraries continue to operate in the same manner as before. These factors include the following:

Funding: Insufficient funding of academic libraries pose a great challenge in the integration and utilization of artificial intelligence in library. In the face of the decreasing funding of libraries, it is very difficult to integrate and use artificial intelligence because incorporating AI and sustaining it is extremely capital intensive (Sridevi & Shanmugam, 2017). Apparently, money is essential to sustain and upgrade the equipment and Software's, pay for software license fee, pay for subscription to electronic databases and internet connections, etc. Therefore, deficiency of adequate funding to develop or acquire artificial intelligence systems in libraries is a grave concern since the funds for hardware and software are frequently tight, there is always constrain to the type of system the library can acquire or develop.

Lack of Support from the Institutional Management: The authority of the parent institutions or management and users of libraries are to first of all feel the need for using AI to improve library services and then support its implementation in library services. The situation of many libraries in Nigeria is so pitiable such that librarians complain of lack of support from the management of their organizations/institutions on the need for implementation of innovative library services (Alajemba & James, 2018).

Lack of Experts in AI: Mentally and technically preparing of users and library personnel at all level for remodeling of library services is most central for the successful execution of artificial intelligence in libraries. Regretfully, the overall level of knowledge, skills and ability of library personnel in this area is relatively low with likely exception of few personnel working in advanced special libraries where sufficient opportunities are offered to gain hands-on experience (Udensi & Akor, 2016). Besides, the strain in employing expatriates in the field and achieving cooperation between Library Personnel and expatriates is additional challenge encountered in libraries in most developing countries (Asemi & Asemi, 2018). Usually, there is an inadequate number of artificial intelligence expert among library automation vendors. The field of artificial intelligence is complex and hence, needs an expert knowledge in that facet far beyond the development of conventional libraries.

Erratic power supply: in as much as artificial intelligence systems are power driven for functionality and active performance, recurrent and regular power outage and epileptic with an endless sign of improvement poses a grave danger to the use of artificial intelligence in libraries. Olubiyo & Awoyemi (2021) indicated that public power supply is unreliable and the substitute is expensive and out of the reach of the poorly financed libraries in developing countries such as Nigeria. Epileptic power supply causes severe damage to the computer hardware and crashing of vast databases (Omame& Alex-Nmecha, 2020). This is one of the reasons why many information professionals are not passionate about computer-based library system and artificial intelligence. Significantly, regular power outages remain a problem in the country and create a serious difficulty to automation.

Strategies for Enhancing the Utilization of Artificial Intelligence in Academic Libraries

Developing Effective Artificial Intelligence Policy: After the purpose for deploying AI is established, it ought to be gazette in a formal document referred to as artificial intelligence policy. The central document should outline the library's purposes and rules that guides the adoption and use of numerous types of AIs appropriate for the library. The policy should address problems such as specification issues, suitable ethical or legal issues, as well as copyright and privacy rules, etc. According to Morley and Joshi (2019) to mitigate the challenges that associates with the use of AI, outdated governance mechanisms (policies, standards and regulations) need to be updated and key questions answered.

Consultations: to implement and improve the effective use of artificial intelligence in academic library, ample consultations by all stakeholders of libraries from the expatriates in the area is extremely vital. The consultation will determine the numerous features of artificial intelligence that are appropriate for the library based on some cognate elements such as the acceptance and support for implementation of AI by all stakeholders and user community based on the dynamic information needs of user community, the disposal of AI experts, funds for the project, management and maintenance plans, among many others.

Adequate Funding: Application of artificial intelligence in library is extremely monetary demanding. The government financing alone cannot afford it. Therefore, libraries and their parent organizations must seek for other ways of financing such innovative project such as soliciting for donations from multinational companies, organizations, ICT firms and good spirited individuals. Funding of academic libraries for the full application of AI should be the worry of all stakeholders.

Employment of AI Experts: the use of AI to enhance effective information service delivery in academic libraries demands the skills of specialists. Hence, libraries must

make sure that skilled hands are engaged to successfully implement and guarantee the effective management for the sustenance of this innovative project in their libraries.

Consistent Training and Retraining: Training and retraining programmes to guarantee full operation and use of AI in libraries is very vital. To guarantee the sustenance of the presentation of libraries should hire qualified personnel and ensure they are effectively trained in the area of artificial intelligence deployed in the library. Libraries and librarians are to constantly update their competences through constant training such as conferences, capacity building workshops, in-house trainings, advanced studies, etc.

Creating Awareness: As libraries consider the application and use of artificial intelligence for enhanced effective library service delivery, it is utmost that the user community should be aware of such innovations and also trained on how to use artificial intelligence systems to satisfy their information needs. Therefore, libraries and librarians should embark on an aggressive awareness promotion if they must get their user community easily adapted to the use of artificial intelligence in their libraries.

Conclusion

The application of artificial intelligence in libraries is an emerging trend that has captured the attention of relevant practitioners and academics. The application and use of AI technology in academic libraries is setting a new level of efficient and effective library services delivery. Also, the utilization of AI affords libraries the opportunity to render improved and dynamic services to library patrons. Academic libraries will greatly benefit from the new development of artificial intelligence systems in their technical services, circulation and reference services, shelving of books, cataloguing of library materials, resource management and information retrieval/dissemination.

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