Adoption of Artificial Intelligence in Library and Information Science in the 21st Century: Assessing the Perceived Impacts and Challenges by Librarians in Akwa Ibom and Rivers States

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ABSTRACT

The study examined the adoption of artificial intelligence in library and information science in the 21st century the perceived impacts and challenges by librarians in Akwa Ibom and rivers states. An Expost facto survey design was adopted for the study. The targeted population for the study comprised all librarians in Akwa Ibom and Rivers State. Stratified sampling technique was used to select 80 librarians in Akwa Ibom and Rivers State. This gave a total of 100 respondent used for the study. The instrument used for data collection was a structured questionnaire titled Artificial Intelligence in Library and Information Science Questionnaire (AILISQ). Face and content validation of the instrument was carried out by an expert in test, measurement, and evaluation in order to ensure that the instrument has the accuracy, appropriateness, and completeness for the study under consideration. The reliability coefficient obtained was 0.83, and this was high enough to justify the use of the instrument. The researcher subjected the data generated for this study to appropriate statistical techniques such as descriptive statistics meant to answer the research questions and simple regression analysis meant to test the hypothesis. The test for significance was done at 0.05 alpha levels. The study revealed that "Cataloging and Classification" was rated the highest among the impact of artificial intelligence in library and information science in the 21st century while "Expertise and resources" was rated as the highest challenge faced in the adoption of Artificial Intelligence in library and information science. The study concluded that artificial intelligence applications are now clearly discernible in practically every sphere of human society. In terms of adopting and using technology advancements to improve library operations and services, libraries in Akwa Ibom State and River State have not lagged behind. The study highlighted the impact and challenges faced in the adoption of artificial intelligence in library and information science. One of the recommendations made was that Academic libraries in Nigeria should fully implement artificial intelligence technology, such as chatbots, barcodes, RFIDs, and robotics, in order to provide top-notch services.

KEYWORDS: Adoption of Artificial Intelligence, Library and Information Science, Impacts, Challenges, Librarians, Akwa Ibom and Rivers States

Introduction

The subject of library and information science has also undergone revolutionary change as a result of the development of artificial intelligence (AI). Basey and Umoh (2021) define library

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and information science (LIS) as a subset of academic disciplines that broadly deals with the organisation, access, gathering, and protection or regulation of information, whether it is in physical (for example, works of art or legal documents) or digital forms. User experiences might be altered, information retrieval processes could be improved, and library operations could be made more productive and profitable. The way that traditional library work is done today has fundamentally changed as a result of advancements in digital technology. Academic and research libraries all around the world are wired for technology and have incorporated it into all of their internal operations and activities.

Over the past twenty years or more, libraries in Nigeria have not lagged behind in adopting and utilising technological innovations to enhance operations and services. Examples of these technologies include computers, scanning and printing devices, electronic resources, CCTV cameras, social media, and most recently, RFID technology. A cutting-edge technology that is not yet widely used is artificial intelligence. It is possible to view the implementation of artificial intelligence in libraries as the result of a number of innovative technological advancements that have made it possible for libraries to use equipment with these capabilities. The employment of cutting-edge technology in libraries is one new trend, and librarianship is known for it (Owolabi et al., 2022). Artificial intelligence has been dubbed the fourth industrial revolution (Park, 2019).

According to Gujral et al. (2020), artificial intelligence (AI) has apparently taken over a number of businesses. Human intellect is seen as expanding with the help of AI. The application of AI in libraries has enabled a breakthrough in the information sector. A wide range of human talents, including reasoning, reading, speaking, grasping, remembering, making judgements, and taking part in interactive learning, can be improved by technological advancements. The use of artificial intelligence in virtual reference services is thought to offer libraries a new online service paradigm. Some of the legitimate innovations that librarians are continually utilising to engage and improve services for their consumers include virtual realities, which help users become more information literate.

Artificial intelligence is now plainly present in almost every aspect of human civilisation. It has brought about changes and new competitive advantages for a number of institutions and service businesses. Artificial intelligence (AI) has thus far shown to be highly advantageous and helpful in a variety of fields, including banking and finance, marketing, running healthcare systems, and smart apps (such facial recognition, voice recognition, finding assistants, etc.). Like in many of the other industries mentioned above, artificial intelligence (AI) may assist libraries in updating and expanding their services and promoting their relevance in the contemporary digital environment. ExLibris (nd) asserts that libraries can use the practical advantages of artificial intelligence for their own objectives, such as optimising processes, improving operational efficiency, and developing new services.

Statement of Problem

The adoption of artificial intelligence (AI) in Library and Information Science (LIS) poses significant challenges for librarians in Akwa Ibom and Rivers States in the 21st century. Librarians face challenges in embracing AI due to factors such as limited technological infrastructure, a lack of AI expertise, financial constraints, and concerns regarding potential job displacement. These challenges have deluded the opportunity that the librarians' positive perspectives on AI adoption in LIS would have provided as regards valuable insights into crafting

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effective strategies for its successful integration and navigating the transformations AI brings to the profession. These perspectives and challenges prompted this study.

Objective

1. To find out the impact of artificial intelligence on library and information science in Akwa Ibom and Rivers States.

2. To examine the challenges of the adoption of Artificial Intelligence in library and information science

Research Questions

1. What is the impact of artificial intelligence on library and information science in Akwa Ibom and Rivers States?

2. What are the challenges of adoption of Artificial Intelligence in library and information science in Akwa Ibom and Rivers States?

LITERATURE REVIEW

Concept of Artificial Intelligence

Artificial Intelligence can be understood as the collection of technologies that enable machines to sense, comprehend, act, and perform several functions matching those of humans. Major components of the Artificial Intelligence bucket are machine learning, big data, natural language processing, decision logic, data visualization, and data analytics.

Artificial Intelligence (AI) refers to the development of computer systems that can perform tasks that typically require human intelligence. These tasks include understanding natural language, recognizing objects and patterns, making decisions, and learning from experience. AI has seen significant advancements in recent years, enabling it to be applied in various fields, including healthcare, finance, transportation, and entertainment (Russell & Norvig 2016). AI has been a subject of fascination and research for decades, and its applications have evolved and expanded over time. Artificial intelligence is based on the principle that human intelligence can be defined in such a way that a machine can easily mimic it and execute tasks, from the simplest to those that are even more complex. The goals of artificial intelligence include mimicking human cognitive activity.

The concept of AI can be traced back to the 1950s when pioneers like Alan Turing and John McCarthy began exploring the idea of creating machines that could exhibit intelligent behavior. Since then, AI has grown into a multidisciplinary field, drawing upon various disciplines such as computer science, mathematics, psychology, linguistics, and neuroscience. AI is important for its potential to change how we live, work and play (Nicole, 2023). It has been effectively used in business to automate tasks done by humans, including customer service work, lead generation, fraud detection and quality control. In a number of areas, AI can perform tasks much better than humans. Particularly when it comes to repetitive, detail-oriented tasks, such as analyzing large numbers of legal documents to ensure relevant fields are filled in properly, AI tools often complete jobs quickly and with relatively few errors. Because of the massive data sets it can process, AI can also give enterprises insights into their operations they might not have been

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aware of. The rapidly expanding population of generative AI tools will be important in fields ranging from education and marketing to product design.

Concept of Library

A library is a repository of information and knowledge, typically in the form of books, journals, and other printed materials, that is organised and made available for use by members of a community. Libraries are found in academic institutions, public buildings, and private organizations, and they serve a variety of functions, including supporting research and education, preserving cultural heritage, and promoting literacy and lifelong learning. The concept of a library has existed for thousands of years, with early examples including the Library of Alexandria in ancient Egypt and the libraries of the Chinese emperors. In the modern era, libraries have evolved to encompass a wide. range of materials and services, including electronic resources, multimedia materials, and specialised collections (Owushi & Udo 2023).

One of the primary functions of a library is to provide access to information and knowledge. This includes both traditional print resources, such as books and journals, as well as electronic resources, such as databases, e-books, and online journals. Libraries often have extensive collections of resources, organized according to subject matter, author, or other criteria, that can be searched using various tools and technologies. In addition to providing access to information, libraries also play a crucial role in supporting research and education. Academic libraries, in particular, are often central to the research and teaching missions of universities and colleges, providing students and faculty with access to specialized resources and services such as research consultations, interlibrary loan, and instruction on information literacy. Libraries also serve as important cultural institutions, preserving and promoting cultural heritage. Many libraries have special collections that focus on specific areas of interest, such as rare books, manuscripts, or historical documents. These collections may be housed in specialized reading rooms or archives and may be made available to scholars and researchers for study and analysis. In addition to their traditional functions, libraries have also evolved to provide a wide range of services and programmes to their communities (ALA, 2021). Many public libraries, for example, offer children's programmes, literacy classes, and community events such as author talks and book clubs. Libraries also serve as community gathering places, providing a safe and welcoming space for people to come together and learn. The role of libraries in promoting literacy and lifelong learning cannot be overstated. Libraries are often key partners in efforts to improve literacy rates, providing access to books and other materials for people of all ages and backgrounds. They also offer a wide range of educational programmes and services, such as homework help, job training, and computer literacy classes, this can help people develop new skills and achieve their goals.

Concept of library and Information Science

Library and Information Science (LIS) is an interdisciplinary field that encompasses the study of information, knowledge organization, information resources, and library services. It focuses on understanding the nature of information, its organization, retrieval, and dissemination, as well as the management and provision of library services to meet the information needs of users. LIS combines principles and theories from various disciplines such as information science, computer science, communication, management, and social sciences. LIS draws on various disciplines such as information science, computer science, psychology, and education to develop theories, principles, and practices for effective information management. It involves understanding user information needs, selecting and organizing relevant resources, and designing systems and

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services to facilitate access and retrieval. LIS professionals also contribute to the development of information policies, standards, and ethical guidelines to ensure the responsible and equitable use of information.

Library and Information Science involves several key concepts and principles Buckland, 2017). Firstly, it emphasizes the importance of information literacy, which involves the ability to locate, evaluate, and effectively use information. Information professionals assist users in developing these skills, ensuring that individuals can navigate the vast amount of information available in today's digital age. Secondly, LIS focuses on the principles of intellectual freedom and equitable access to information. It promotes the idea that everyone should have the right to access information regardless of their background or circumstances. Lastly, LIS incorporates the concept of information organization and retrieval, which involves designing efficient systems to categorize and retrieve information to meet user needs effectively. LIS aims to ensure efficient access to information, promote information literacy, and facilitate the effective use of information by individuals, organizations, and communities. LIS professionals, such as librarians, information specialists, and knowledge managers, play a crucial role in acquiring, organizing, preserving, and providing access to information resources, as well as in supporting research, education, and lifelong learning.

Prospect and Impact of Artificial Intelligence on Library and Information Science in the 21st Century

Artificial Intelligence has become the new emerging trend for libraries. Artificial intelligence has proven to be a breakthrough for information sectors. Artificial Intelligence has had positive impacts on academic libraries and has brought changes in search and retrieval methods, discovery search, chatbots, text mining, and data mining (Fernandez, 2016, p. 22). The prospect of artificial intelligence (AI) in library and information science (LIS) in the 21st century is substantial (Bawden, 2019).

The rapid advancements in technology, particularly in the field of artificial intelligence (AI), have had a profound impact on various industries. In the 21st century, libraries and information science have also embraced AI to enhance their operations, improve user experiences, and optimize information retrieval processes. The 21st century has witnessed the rapid adoption of artificial intelligence (AI) in the field of library and information science (LIS). AI technologies have revolutionized traditional library services, enhancing information retrieval, knowledge organization, and the user experience. AI-powered systems, such as natural language processing and machine learning algorithms, have significantly improved the efficiency and effectiveness of library operations, leading to improved access to information for users (Kumar & Rani, 2018). AI-based technologies in LIS have enabled advanced information retrieval techniques. Intelligent search engines, chat bots, and recommendation systems leverage AI algorithms to provide users with personalized and contextually relevant information. These systems utilize machine learning and data mining techniques to analyze user preferences, behaviors, and interactions, facilitating more accurate and tailored search results. AI also plays a crucial role in automated indexing and metadata generation, helping librarians organize and categorize vast amounts of information efficiently (O'Leary, 2020).

AI technologies have the potential to revolutionize various aspects of LIS, including information retrieval, cataloging and classification, user services, data analysis, and knowledge management (Chandrashekara, 2018). Here are some key areas where AI can make a significant impact:

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1. **Information Retrieval:** AI can enhance information retrieval systems by improving search algorithms, natural language processing, and recommendation systems. AI techniques such as machine learning and deep learning can help in understanding user preferences, context, and semantic meaning, leading to more accurate and personalized search results.

2. **Cataloging and Classification:** AI can automate the cataloging and classification process, making it more efficient and accurate. Machine learning algorithms can analyze and extract metadata from various types of documents, reducing the manual effort required for cataloging. AI can also assist in automated subject indexing and classification of resources based on their content.

3. **User Services:** AI-powered virtual assistants and chatbots can provide personalized assistance to library users. These virtual assistants can answer queries, provide recommendations, and guide users through the library's resources and services. Natural language processing and machine learning techniques enable virtual assistants to understand and respond to user queries effectively (Agrawal, 2017).

4. **Data Analysis:** Libraries generate vast amounts of data, including circulation statistics, user behavior, and resource usage. AI techniques can be applied to analyze this data and extract meaningful insights. Machine learning algorithms can identify patterns, trends, and correlations in the data, enabling libraries to make data-driven decisions for collection development, service improvement, and resource allocation (Thakur, 2019).

5. **Knowledge Management:** AI can aid in knowledge organization and management by automating processes such as text summarization, information extraction, and knowledge discovery. These capabilities can support efficient knowledge sharing and collaboration among library professionals and researchers.

Challenges in the Adoption of Artificial Intelligence in Library and Information Science in the 21st Century

Many issues and challenges prevent the full integration of cutting-edge technology, such artificial intelligence, with library and information work. These issues typically arise in Nigerian academic and research libraries. Several of the challenges associated with adopting AI in libraries have been highlighted by CILIP (2021) and other organizations. These include, lack of management / executive support, insufficient budget and funding, an inability to keep up with the increasing trend in new technologies, and the challenge of implementing new technologies. Previous studies by Korinek and Stiglitz (2017), claimed that the development of AI technology may lead to polarisation in the workforce or job losses. Automation and the usage of AI may lead to a huge rise in inequality.

The World Bank (2016) asserts that developing countries may be less inclined to accept technology due to the likelihood that it will result in significant job losses. AI has the potential to cause major employment destruction as well as job losses. Using artificial intelligence in academic libraries presents a number of difficulties, according to Yusuf et al. (2022), including a lack of suitable infrastructure, increasing skill gaps, job loss, unpredictable power supply, and

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an increase in the number of alternative sources of information. Nevertheless, the adoption of artificial intelligence would reduce the need for human involvement in a number of library tasks.

The adoption of artificial intelligence (AI) in library and information science in the 21st century presents several challenges. While AI has the potential to revolutionize library services and enhance information management, its implementation is not without obstacles. It is obvious that ethical considerations are crucial when implementing AI technologies in LIS. Privacy concerns, bias in algorithms, and data security issues pose challenges that need to be addressed, (Harinarayana& Raju, 2019).

Here are some other key challenges:

1. *Data quality and availability:* AI algorithms heavily rely on high-quality and relevant data to produce accurate results. Libraries may face challenges in obtaining and curating datasets that are comprehensive, up-to-date, and representative of their user base. Additionally, ensuring the availability and accessibility of data can be a challenge due to privacy concerns and restrictions on data sharing.

2. *Expertise and resources:* Implementing AI in libraries requires specialized knowledge and expertise in areas such as machine learning, natural language processing, and data science. Libraries may face challenges in acquiring or developing these skills within their staff. Moreover, AI projects often require substantial financial resources for infrastructure, training, and maintenance, which can be a barrier for some libraries.

3. *User acceptance and trust:* Introducing AI technologies in library services may encounter resistance from users who are unfamiliar or skeptical about AI. Libraries need to actively engage with their user communities, provide clear explanations about the purpose and benefits of AI systems, and address concerns related to privacy, security, and human oversight to gain user acceptance and build trust.

Methodology

In carrying out the study, an Expost-Facto design was adopted. The targeted population for the study comprised all librarians in Akwa Ibom and Rivers State. Stratified sampling technique was used to select 80 librarians each from Akwa Ibom and Rivers States. This gave a total of 160 respondents used for the study. The instrument used for data collection was a structured questionnaire titled Artificial Intelligence in Library and Information Science Questionnaire (AILISQ). Face and content validation of the instrument was carried out by an expert in test, measurement and evaluation in order to ensure that the instrument has the accuracy, appropriateness, and completeness for the study under consideration. The reliability coefficient obtained was 0.89, and this was high enough to justify the use of the instrument. The researcher subjected the data generated for this study to appropriate statistical techniques such as descriptive statistics meant to answer the research questions.

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Results and Discussions

Research Questions

Research Question One: The research question sought to find out the impact of artificial intelligence on library and information science in the 21st century. To answer the research question, percentage analysis was performed on the data (see table 1).

Table 1: Percentage analysis of the impact of artificial intelligence on library and information science in the 21st century

Impact	Frequency	Percentage (%)
Information Retrieval	30	18.8
Cataloging and Classification	35	21.88**
User Services	29	18.13*
Data Analysis	34	21.25
Knowledge Management	32	20
TOTAL	160	100%

** The highest percentage frequency
* The least percentage frequency
SOURCE: Field Survey

The above table 1 presents the percentage analysis of the impact of artificial intelligence on library and information science in the 21st century. From the result of the data analysis, it was observed that the tagged "Cataloging and Classification"35(21.88) was rated the greatest iimpact of artificial intelligence on library and information science in the 21st century, with the highest percentage value, while "User Services" 29(18.13) was rated the least.

Research Question One: The research question sought to find out the challenges of adoption of Artificial Intelligence in library and information science in Akwa Ibom and Rivers States?

Table 2: Percentage analysis of the challenges of the adoption of Artificial Intelligence in library and information science

USEFULNESS	Frequency	Percentage (%)
Data quality and availability	55	34.38
Expertise and resources	59	36.88**
User acceptance and trust	46	28.75*
TOTAL	160	100%

** The highest percentage frequency
* The least percentage frequency
SOURCE: Field Survey

The above table 2 presents the percentage analysis of the challenges of the adoption of Artificial Intelligence in library and information science. From the result of the data analysis, it was observed that the challenge tagged "Expertise and resources"59(36.88) was rated the highest one with the highest percentage values while the "User acceptance and trust" 46(28.75) was

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rated the least challenges of the adoption of Artificial Intelligence in library and information science.

Conclusion

The study concluded that, artificial intelligence applications are now clearly discernible in practically every sphere of human society. In terms of adopting and using technology advancements to improve library operations and services, libraries in Akwa Ibom State and River State have not lagged behind. The study highlighted the impact and challenges faced in the adoption of artificial intelligence in library and information science such that "Cataloging and Classification" was rated the highest among the impacts of artificial intelligence on library and information science in the 21st century. Finally, it was also concluded that "Expertise and resources" was the highest challenge faced in the adoption of Artificial Intelligence in library and information science.

Recommendations

1. Academic libraries in Nigeria should fully implement artificial intelligence technology, such as chatbots, barcodes, RFIDs, and robotics, in order to provide top-notch services.

2. Libraries should ensure that user data is protected and algorithms are transparent and free from discriminatory biases.

3. There should be awareness campaigns to educate librarians, library staff, and library users about the benefits of AI in libraries.

4. Besides, ethical guidelines should be developed to guide the responsible and unbiased use of AI in libraries, ensuring that the technology benefits all users without compromising privacy or perpetuating societal inequalities.

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