

ROLES OF ARTIFICIAL INTELLIGENCE IN LIBRARY AUTOMATION IN SOUTH-SOUTH NIGERIA: ASSESSING ITS POTENCY IN STREAMLINING OPERATIONS AND ENHANCING USER SERVICES

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ABSTRACT

This study examines the roles of Artificial Intelligence (AI) in library automation, with a focus on its potency in streamlining operations and enhancing user services. Descriptive survey design was adopted for this study. The study was carried out in South-South, Nigeria. The target population comprised all librarians in South-South Nigeria. A stratified sampling technique was used to select 80 librarians each from Akwa Ibom State and Cross River State, giving a total sample size of 160 respondents. The instrument used for data collection was a structured questionnaire titled “entitled “Roles of Artificial Intelligence in Library Automation Questionnaire (RAILAQ).” Face and content validation of the instrument were carried out by experts in Test, Measurement, and Evaluation to ensure its accuracy, appropriateness, and completeness for the study. The reliability coefficient obtained was 0.88, which was considered sufficiently high to justify the use of the instrument. Descriptive statistics were used to answer the research question. The findings revealed that the highest percentage (37.5%) was recorded for effective service delivery and better access to information resources, while the least percentage (28.13%) was recorded for user service improvement. The results also showed that AI improves cataloguing, information retrieval, and user services (38.75%), although ease and error-free cataloguing recorded a lower percentage (25.63%). The study concludes that AI remains a powerful tool for modern library management and recommends its strategic adoption to achieve efficient, user-centered, and technology-driven library services. One of the recommendations made was that libraries should adopt AI technologies gradually, starting with essential services such as cataloguing, information retrieval, and user support systems like chatbots.

KEYWORDS: Artificial Intelligence (AI), Library Automation, Information Services, Operational Efficiency, User Services, South-South Nigeria.

INTRODUCTION

The rapid advancement of digital technologies has fundamentally transformed the operations of libraries worldwide, leading to the emergence of

library automation as a critical component of modern information management. Library automation involves the application of information and communication technologies (ICT) to perform traditional library functions such as acquisition, cataloguing, circulation, and information retrieval with minimal human intervention. This transformation has significantly improved the efficiency, accuracy, and accessibility of library services (Singh & Kaur, 2021).

In recent years, Artificial Intelligence (AI) has further revolutionized library automation by introducing intelligent systems capable of learning, reasoning, and decision-making. AI integrates technologies such as machine learning, natural language processing, and data analytics to enhance library operations and service delivery (Russell & Norvig, 2021). These technologies enable libraries to process vast amounts of information quickly, organize resources effectively, and provide more relevant and personalized services to users (Choi, Wallace, & Wang, 2020).

The role of AI in libraries extends beyond basic automation to advanced functions such as intelligent cataloguing, predictive analytics, and user behavior analysis. AI-powered systems can automatically classify and index resources, improve search accuracy by understanding user intent, and recommend relevant materials based on user preferences (Hussain, 2020; Bansal, 2019). Additionally, AI-driven chatbots and virtual assistants provide instant support to users, ensuring round-the-clock access to library services.

Despite these advancements, the integration of AI into library systems presents certain challenges, including high costs, technical complexity, and concerns related to data privacy and ethical use. However, the continuous evolution of AI technologies and increasing demand for efficient information services make its adoption inevitable (Goertzel & Pennachin, 2022). Therefore, this study explores the roles of AI in library automation and evaluates its effectiveness in streamlining operations and enhancing user services.

Statement of problem

Libraries in South-South Nigeria are increasingly expected to provide fast, efficient, and user-centered services, yet many still rely on manual or outdated automation systems that struggle to keep up with growing information demands. Routine tasks such as cataloguing, circulation, information retrieval, and user support are often time-consuming and prone to delays, limiting both staff productivity and user satisfaction. While artificial intelligence offers promising tools for improving accuracy, speed, and personalized services, its adoption in many libraries across the region remains limited or uneven due to factors such as inadequate infrastructure, low technical expertise, and uncertainty about its practical benefits. This situation creates a gap between the potential of AI-driven library automation and its actual implementation, making it necessary to assess the roles of artificial intelligence in streamlining operations and enhancing user services in libraries within South-South Nigeria

Research objective

1. To examine the roles of Artificial Intelligence in library automation in South-South Nigeria.
2. To assess the potency of Artificial Intelligence in streamlining library operations in South-South Nigeria.

Research Questions

1. What are the roles of Artificial Intelligence in library automation in South-South Nigeria?
2. What is the potency of Artificial Intelligence in streamlining library operations in South-South Nigeria?

LITERATURE REVIEW

Concept of Artificial Intelligence

Additionally, library automation facilitates the incorporation of cutting-edge technology like digital repositories, cloud computing, and artificial intelligence. These developments make it possible for libraries to handle massive amounts of data, offer individualized information services, and guarantee the long-term preservation of digital content. Automation also promotes resource sharing among libraries through consortia and interlibrary loan systems, thereby expanding access to information beyond physical boundaries (Oyelude, 2020).

AI also helps with proactive and predictive service delivery. AI systems can predict user demands and offer solutions before problems occur by evaluating user data. For instance, AI systems in the healthcare industry may keep an eye on patient data and notify healthcare professionals of possible health hazards, while AI in e-commerce can anticipate consumer wants and provide product recommendations based on those needs. This proactive approach improves service efficiency and user experience (Topol, 2020).

AI also helps with resource management and operational optimization. AI systems are utilized to optimize scheduling, shorten wait times, and enhance service delivery in industries including healthcare and transportation. AI improves logistics planning, inventory control, and forecasting accuracy in supply chain management. These improvements lead to better utilization of resources and increased organizational efficiency (Bag, Pretorius, Gupta, & Dwivedi, 2021).

AI applications are widespread, affecting healthcare, finance, transportation, and everyday life. In healthcare, AI helps diagnose diseases, predict patient outcomes, and personalize treatments. In finance, AI identifies fraud and optimizes investments, while autonomous vehicles and industrial automation improve safety and efficiency. Beyond automation, AI enhances human decision-making by providing insights and solutions to problems that are challenging for humans alone (Esteva et al., 2019).

AI can be classified into narrow AI, which focuses on specific tasks, and general AI, which aims to perform any intellectual task that a human can do. While narrow AI has achieved practical success, general AI remains theoretical. The future of AI involves developing systems capable of creativity, reasoning, and adaptability, while also addressing ethical concerns such as fairness, transparency, and privacy (Goertzel & Pennachin, 2022).

AI has also made a substantial contribution to library automation in the form of chatbots and virtual assistants for user services. AI-driven chatbots can offer library patrons round-the-clock assistance by responding to questions about library hours, resource availability, and research support. This lessens the workload for library employees and guarantees that patrons, regardless of time limits, receive prompt service. Additionally, by evaluating usage statistics and producing insights that assist librarians in enhancing collection creation and service delivery, AI can assist decision-making processes (Cox et al., 2019).

AI has several branches, each focusing on different types of intelligence. Machine Learning (ML) allows systems to improve automatically through experience, while Natural Language Processing (NLP) enables machines to understand and generate human language. Computer Vision helps systems interpret visual data, and Robotics allows machines to perform autonomous tasks. Expert systems and cognitive computing aim to simulate human reasoning in specialized domains (Goodfellow et al., 2016).

AI is also essential for making data-driven decisions. Every day, businesses produce enormous volumes of data, which AI systems can instantly analyze to spot trends, forecast results, and aid in well-informed decision-making. AI-powered predictive analytics enables businesses to efficiently manage risks, optimize supply networks, and predict demand. For instance, in manufacturing and logistics, AI-driven predictive models improve resource allocation and reduce operational disruptions (Choi, Wallace, & Wang, 2020).

AI is also essential for search optimization and information retrieval. In order to better comprehend user queries, modern library systems employ AI-driven search engines that include natural language processing. Instead than depending only on keyword matching, these systems analyze the intent behind users' queries to give more precise and pertinent search results. AI also makes it possible for individuals to receive recommendations based on their reading tastes and history, much like commercial platforms (Bansal, 2019). This encourages the usage of library resources and increases user engagement.

Concept of library Automation

Despite all of its benefits, integrating AI into business has drawbacks such high implementation costs, data protection issues, and the requirement for qualified staff. Ethical issues pertaining to bias and transparency in AI systems must also be addressed by organizations. However, it is anticipated that continued

developments in AI technology and more accessibility will further strengthen its contribution to operational effectiveness.

Enhanced accessibility and retrieval of information is another important area. AI-powered digital systems and search engines can handle massive amounts of data fast and precisely, giving users accurate results. AI improves cataloging, indexing, and search features in libraries and academic settings, making it simpler for patrons to find pertinent material. Voice recognition and language translation features further improve accessibility for diverse user groups (Liu, 2020).

Improving customer service and experience is another crucial aspect. Chatbots, virtual assistants, and recommendation systems are examples of AI technology that help businesses offer efficient and customized services. These systems may run around the clock, react quickly to consumer inquiries, and gradually get better by learning from user interactions. This not only increases customer satisfaction but also reduces operational costs associated with human support services (Huang & Rust, 2021).

In a number of industries, including business, healthcare, manufacturing, and information services, artificial intelligence (AI) has become a game-changing tool for optimizing operations. Artificial Intelligence (AI) is the application of data analytics, robotics, natural language processing, and machine learning algorithms to automate procedures, improve decision-making, and increase operational efficiency. The necessity for businesses to maximize performance, cut expenses, and adjust to quickly changing surroundings has sped up the use of AI technology since 2020.

Library automation refers to the application of information and communication technologies (ICT) to perform traditional library operations such as acquisition, cataloguing, circulation, serials control, and information retrieval with minimal human intervention. It involves the use of integrated library management systems (ILMS), digital databases, and software tools to enhance efficiency, accuracy, and accessibility of library resources. In the modern information environment, library automation is considered essential for improving service delivery and meeting the evolving needs of users.

Notwithstanding these benefits, issues including algorithmic bias, data privacy concerns, and the requirement for technical know-how continue to be major obstacles. To keep users' trust, organizations must provide ethical AI adoption, transparency, and data protection. To guarantee the efficiency and equity of AI-driven services, human monitoring and ongoing system development are equally crucial.

Personalization is one of AI's most significant contributions to user service. In order to provide personalized recommendations and services, AI systems examine user behavior, preferences, and previous interactions. Recommendation algorithms on digital platforms, for example, make recommendations for pertinent

items, content, or information sources based on user profiles. This level of personalization enhances user satisfaction and engagement by ensuring that services are relevant and user-centered (Huang & Rust, 2021).

Process automation is one of the main ways AI simplifies operations. Data entry, inventory management, customer support, scheduling, and other time-consuming and repetitive jobs can be handled by AI-powered systems. When robotic process automation (RPA) and artificial intelligence (AI) are integrated, businesses may decrease human error, boost production, and increase speed. Studies have shown that AI-driven automation significantly enhances operational efficiency and allows human workers to focus on more strategic and creative tasks (Ivanov, Dolgui, & Sokolov, 2021).

Roles of Artificial Intelligence in library Automation

Effective service delivery and better access to information resources

The adoption of library automation may encounter difficulties despite its many advantages, including insufficient finance, a lack of technological know-how, and staff opposition to change. However, the adoption of automated systems in libraries around the world is still being driven by continuous technical developments and growing investment in digital infrastructure. All things considered, library automation continues to be an essential part of contemporary library administration, facilitating effective service delivery and better access to information resources.

Improvements in efficiency and accuracy

The automation of library systems has been revolutionized by artificial intelligence (AI), which is changing the way that material is arranged, accessed, and provided to patrons. AI in the context of contemporary librarianship refers to the use of data analytics, machine learning, and natural language processing to carry out jobs that have historically been completed by human librarians. Libraries are now more sensitive to the changing information needs of society thanks to the substantial improvements in efficiency, accuracy, and user happiness brought about by the incorporation of AI into automation (Asemi & Asemi, 2018).

User service improves

Through chatbots and clever virtual assistants, AI also improves user service. Natural language processing is used by these systems to comprehend user inquiries and provide real-time responses. In customer support, chatbots are frequently utilized to respond instantly, manage several inquiries at once, and run constantly without time constraints. This reduces waiting time and improves service accessibility, especially in environments with high user demand (Adam, Wessel, & Benlian, 2021).

AI Potency in Streamlining Operations

Artificial Intelligence (AI) is the development of computer systems that can perform tasks typically requiring human intelligence, such as learning, reasoning, and decision-making. It aims to create machines that can perceive their environment, process information, and act autonomously or assist humans in complex situations. AI integrates disciplines like computer science, mathematics, and cognitive science, enabling machines to analyze data, recognize patterns, and adapt to new situations (Russell & Norvig, 2021).

Improvement of cataloguing, information retrieval, and user services

Artificial intelligence plays a vital role in enhancing library automation by improving cataloguing, information retrieval, and user services. While challenges exist, the benefits of AI in increasing efficiency, accuracy, and user satisfaction cannot be overlooked. As technology continues to evolve, libraries must embrace AI innovations while ensuring ethical standards and human-centered service delivery.

A dramatic change in library automation

As digital technology has advanced, the idea of library automation has changed dramatically. Online public access catalogs (OPACs), remote access to electronic resources, and smooth resource sharing via networks are all made possible by contemporary automated systems in libraries. These technologies eliminate errors, lessen human labor, and enable users to retrieve information more quickly. According to contemporary studies, automation has improved the overall performance of libraries by enhancing operational efficiency and user satisfaction (Singh & Kaur, 2021).

Ease and error-free in cataloging and categorization

Cataloging and categorization are two of the main functions of AI in library automation. Conventional cataloging procedures are frequently laborious and prone to human mistake. AI-driven systems are able to classify resources, create metadata automatically, and precisely arrange digital collections. For example, machine learning algorithms can evaluate book content and give relevant subject headings, improving discoverability and lightening librarians' workloads (Hussain, 2020). This guarantees uniformity in bibliographic records while also saving time.

Methodology

Descriptive survey design was adopted for this study. The study was carried out in South-South, Nigeria. The target population comprised all librarians in South-South Nigeria. A stratified sampling technique was used to select 80 librarians each from Akwa Ibom State and Cross River State, giving a total sample size of 160 respondents. The instrument used for data collection was a structured

questionnaire entitled “*Roles of Artificial Intelligence in Library Automation Questionnaire (RAILAQ)*.” Face and content validation of the instrument were carried out by experts in Test, Measurement, and Evaluation to ensure its accuracy, appropriateness, and completeness for the study. The reliability coefficient obtained was 0.88, which was considered sufficiently high to justify the use of the instrument. Descriptive statistics were used to answer the research questions, and regression analysis was used to test the hypothesis.

RESULTS AND DISCUSSIONS

The research question sought to examine the roles of Artificial Intelligence in library automation in South-South Nigeria. To answer the research question percentage analysis was performed on the data, (see table 1).

Table 1: Percentage Analysis of the roles of Artificial Intelligence in library automation in South-South Nigeria

Roles of Artificial Intelligence in library	Frequency	Percentage
Effective service delivery and better access to information resources	60	37.5**
Improvements in efficiency and accuracy	55	34.38
User service improvement	45	28.13*
TOTAL	160	100%

** **The highest percentage frequency**

* **The least percentage frequency**

SOURCE: Field survey

The above Table 1 presents the percentage analysis of the roles of artificial intelligence in library automation in South-South Nigeria. From the result of the data analysis, it was observed that the highest percentage (37.5%) was recorded against “Effective service delivery and better access to information resources”, while the least percentage (28.13%) was recorded against “User service improvement”. This finding agrees with the opinion of Asemi & Asemi, (2018)), who mentioned that the automation of library systems has been revolutionized by artificial intelligence (AI), which is changing the way that material is arranged, accessed, and provided to patrons. AI in the context of contemporary librarianship refers to the use of data analytics, machine learning, and natural language processing to carry out jobs that have historically been completed by human librarians. Libraries are now more sensitive to the changing information needs of society thanks to the substantial improvements in efficiency, accuracy, and user happiness brought about by the incorporation of AI into automation. However his opinion also aligned with that, Adam, Wessel, & Benlian, (2021), who also noted that through chatbots and clever virtual assistants, AI also improves user service. Natural language processing is used by these systems to comprehend user

inquiries and provide real-time responses. In customer support, chatbots are frequently utilized to respond instantly, manage several inquiries at once, and run constantly without time constraints. This reduces waiting time and improves service accessibility, especially in environments with high user demand.

Research Questions 2:

The research question sought to assess the potency of Artificial Intelligence in streamlining library operations in South-South Nigeria. To answer the research question percentage analysis was performed on the data, (see table 2).

Table 2:
Percentage Analysis of the potency of Artificial Intelligence in streamlining library operations in South-South Nigeria.

Potency of Artificial Intelligence	Frequency	Percentage
Improvement of cataloguing, information retrieval, and user services	62	38.75**
A dramatic change in library automation	57	35.63
Ease and error-free in cataloging and categorization	41	25.63*
TOTAL	160	100%

** **The highest percentage frequency**

* **The least percentage frequency**

SOURCE: Field survey

The above Table 2 presents the percentage analysis of the potency of Artificial Intelligence in streamlining library operations in South-South Nigeria. From the result of the data analysis, it was observed that the highest percentage (38.75%) was recorded against “Improvement of cataloguing, information retrieval, and user services”, while the least percentage (25.63%) was recorded against “Ease and error-free in cataloging and categorization”. This finding agrees with the opinion of Singh &Kaur, (2021), who noted that online public access catalogs (OPACs), remote access to electronic resources, and smooth resource sharing via networks are all made possible by contemporary automated systems in libraries. These technologies eliminate errors, lessen human labor, and enable users to retrieve information more quickly. According to contemporary studies, automation has improved the overall performance of libraries by enhancing operational efficiency and user satisfaction. His opinion also aligns with that of Hussain, (2020), who observe cataloging and categorization are two of the main functions of AI in library automation. Conventional cataloging procedures are frequently laborious and prone to human mistake. AI-driven systems are able to classify resources, create metadata automatically, and precisely arrange digital collections. For example, machine learning algorithms can evaluate book content and give

relevant subject headings, improving discoverability and lightening librarians' workloads.

CONCLUSION

In conclusion, AI possesses strong potential to revolutionize library operations and service delivery. Libraries that embrace AI technologies will be better positioned to meet the evolving information needs of users in the digital age. Artificial Intelligence has significantly transformed library automation by improving the efficiency, accuracy, and quality of library services. Through intelligent systems such as machine learning algorithms, natural language processing tools, and chatbots, libraries are now able to automate complex processes like cataloguing, classification, and information retrieval with minimal human intervention. This has not only reduced workload but also enhanced the speed and reliability of service delivery. Moreover, AI has improved user experience by enabling personalized services, predictive information delivery, and continuous user support. Users can now access relevant information more easily and efficiently, thereby increasing satisfaction and engagement with library resources. AI-driven systems also support better decision-making through data analytics and usage insights.

Recommendations

1. Libraries should adopt AI technologies gradually, starting with essential services such as cataloguing, information retrieval, and user support systems like chatbots.
2. Government and institutional stakeholders should provide adequate funding and infrastructure to support the implementation of AI in library systems.
3. Training and capacity-building programs should be organized for librarians to equip them with the necessary technical skills required to manage AI-driven systems.

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