



**ADOPTION OF AI-ENABLED PREDICTIVE ANALYTICS FOR LIBRARY
RESOURCE MANAGEMENT BY ACADEMIC LIBRARIANS AT KASHIM
IBRAHIM LIBRARY, AHMADU BELLO UNIVERSITY, ZARIA**

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Abstract

This study examines the adoption of AI-enabled predictive analytics for library resource management by academic librarians at Kashim Ibrahim Library (KIL), Ahmadu Bello University (ABU), Zaria. The research adopted a survey design to collect quantitative data from the entire population of 203 academic librarians through a self-structured questionnaire. The instrument was designed to assess the extent of AI adoption, perceived benefits, and challenges faced by librarians in integrating AI-powered tools into library resource management. Data were collected via an online survey platform. The findings reveal that while there is significant potential for AI-enabled predictive analytics to enhance resource allocation and decision-making, its adoption at KIL remains limited. Key benefits include improved resource planning, but challenges such as lack of technical expertise, funding constraints, and inadequate infrastructure hinder full implementation. The study concludes by recommending that KIL invest in technological infrastructure, develop comprehensive AI training programs for staff, and establish an institutional policy on AI adoption to facilitate the integration of predictive analytics in resource management.

Keywords: AI-enabled predictive analytics, library resource management, academic librarians, adoption challenges, technology infrastructure, staff training, institutional policy.

Introduction

Globally, the integration of Artificial Intelligence (AI) technologies in Library and Information Science (LIS) is reshaping the landscape of library resource management and service delivery. Among the emerging innovations, AI-enabled predictive analytics has gained attention for its capacity to analyze patterns in library usage data, forecast future demands, optimize resource allocation, and support strategic decision-making. In many academic libraries across developed countries, predictive analytics is being adopted to monitor trends in borrowing, resource usage, and user behavior—ultimately enhancing operational efficiency and user satisfaction (Zhou, Peterson & Kim, 2023). Institutions in North America and Western Europe have particularly embraced AI-based analytics to manage large-scale digital and physical collections, reduce costs, and personalize library services (Thompson & West, 2024).

In Asia, countries such as China, South Korea, and Singapore are leveraging national AI strategies to implement predictive technologies in university libraries. According to Chen and Kang (2023), over 60% of academic libraries in East Asia now utilize predictive analytics to guide collection development, plan space usage, and inform staffing decisions. Similarly, in India, university libraries are gradually integrating AI tools into their integrated library systems, using analytics to track digital resource consumption and anticipate user needs (Patel & Mukherjee, 2022).

Across Africa, however, the adoption of predictive analytics in academic libraries is still at an early stage. While there is growing interest, implementation remains low due to infrastructural limitations, lack of awareness, and insufficient technical training among library professionals. A study by Ngugi and Adeoye (2023) found that less than 15% of academic libraries in sub-Saharan Africa have adopted any form of AI-driven analytics, and even fewer have embedded predictive models into their library management systems. In countries like South Africa, Kenya, and Ghana, pioneering institutions are beginning to pilot predictive analytics to manage electronic resource subscriptions and assess library space utilization, though widespread adoption remains limited.

In Nigeria, the exploration of AI-enabled tools in academic libraries is still emerging. A few progressive universities including Covenant University, the University of Lagos, and Ahmadu Bello University have shown an increasing interest in digital transformation through AI applications. However, challenges such as limited funding, poor ICT infrastructure, and low digital competence among staff continue to hinder implementation (Ibrahim & Ekong, 2023). Despite these constraints, academic librarians are beginning to recognize the value of data-driven decision-making and the potential of AI-enabled analytics in improving resource planning and user engagement.

At the forefront of academic research and innovation in Northern Nigeria is Kashim Ibrahim Library (KIL), the central library of Ahmadu Bello University, Zaria. As one of the largest university libraries in the country, it serves a vast population of students, faculty, and researchers across various disciplines. The increasing demand for personalized, data-informed services puts pressure on the library to adopt advanced tools for efficient management. Predictive analytics offers a strategic opportunity for the library to move from reactive to proactive decision-making, optimize resource allocation, reduce redundancy, and enhance user satisfaction. However, successful adoption depends on factors such as staff readiness, access to technological infrastructure, and administrative support.

This study is therefore significant as it aims to examine the adoption of AI-enabled predictive analytics for library resource management by academic librarians at Kashim Ibrahim Library. It will explore the level of awareness and usage, the factors influencing adoption, the perceived benefits and challenges, and the implications for improving decision-making in academic libraries. The findings are expected to provide valuable insights for library managers, university administrators, and policymakers seeking to modernize library operations through AI. Furthermore, the study will contribute to the limited body of literature on AI applications in African academic libraries, particularly in the area of predictive analytics and resource management.

Statement of the Problem

The adoption of Artificial Intelligence (AI) technologies, particularly AI-enabled predictive analytics, is transforming how libraries manage resources and make data-driven decisions. These technologies allow libraries to anticipate user needs, optimize resource allocation, and streamline decision-making processes. In developed regions, academic libraries are

increasingly utilizing predictive analytics to track user behavior, forecast future resource demands, and enhance operational efficiency (Thompson & West, 2024; Chen, Park & Liu, 2023). By analyzing borrowing patterns, digital usage statistics, and other metrics, predictive analytics helps librarians move from reactive service provision to proactive planning and resource optimization.

However, in the context of Nigerian academic libraries, including Kashim Ibrahim Library (KIL), Zaria, the adoption of AI-enabled predictive analytics remains significantly underexplored. While academic libraries globally are embracing data-driven approaches to resource management, libraries in Nigeria continue to rely on manual or traditional methods for decision-making and planning. Key barriers such as inadequate technological infrastructure, limited awareness of AI capabilities, insufficient funding, and a lack of skilled personnel continue to impede progress (Akanbi, 2023; Lawal & Abdullahi, 2024). At KIL, decisions on resource acquisition, usage evaluation, and user service strategies are often made without the support of predictive insights that could significantly improve effectiveness.

This disconnect between global innovation and local practices raises concerns about the capacity of Nigerian academic libraries like KIL to meet the growing and diverse information needs of users in a rapidly evolving digital environment. Without adopting AI-enabled predictive analytics, libraries may continue to struggle with inefficient resource utilization, limited service personalization, and an inability to align library offerings with user demands and institutional goals.

It is therefore crucial to investigate the current level of adoption, challenges, and opportunities related to the use of predictive analytics in KIL. This study aims to assess how AI-enabled predictive tools are being utilized for resource management, the extent of librarians' preparedness to integrate such technologies, and the potential benefits of predictive analytics for library planning and service delivery.

Research Questions

The study will seek to answer the following key questions:

1. To what extent has AI-enabled predictive analytics been adopted for library resource management at Kashim Ibrahim Library (KIL), Zaria?

2. What are the perceived benefits of using AI-enabled predictive analytics in resource planning and management at KIL?
3. What challenges are encountered in the adoption and use of AI-enabled predictive analytics at KIL?

Literature Review

The purpose of this section is to provide context for the research study, highlight gaps in the existing knowledge, and demonstrate how the current study will contribute to the field of library profession. It helps researchers understand the scope of prior work, identify trends, and build a theoretical framework that supports their research questions.

The Role of Artificial Intelligence in Enhancing Library Services Globally and in Nigeria

Artificial Intelligence (AI) has increasingly become a vital tool in transforming library services and operations worldwide. Libraries in technologically advanced countries are integrating AI-driven systems to improve user services, automate processes, and generate actionable insights from large data sets (Chen, Park & Liu, 2023). One of the prominent applications of AI in libraries is predictive analytics, which utilizes historical data to forecast future trends, enabling proactive planning in resource allocation, acquisition, and user engagement strategies.

In Nigeria, while the awareness of AI and its potential is gradually rising, the practical adoption of AI technologies in libraries remains limited. Most libraries still operate under traditional models, relying heavily on manual decision-making processes (Aina & Obasola, 2023). Nevertheless, academic libraries are beginning to show interest in adopting digital technologies, albeit slowly and often with institutional and infrastructural constraints (Akanbi, 2023).

Adoption of Predictive Analytics in Academic Libraries

Globally, libraries are leveraging AI-enabled predictive analytics to enhance the efficiency and precision of decision-making in areas such as circulation management, collection development, and user service delivery (Thompson & West, 2024). Predictive tools analyze borrowing trends, digital resource usage, and user demographics to help libraries anticipate future demands and manage collections accordingly. For example, libraries at Stanford and MIT have

integrated predictive systems that alert librarians to underutilized resources or upcoming surges in specific content areas (Morrison, 2022).

In Nigeria, however, the application of predictive analytics remains sparse. Libraries often lack the digital infrastructure and expertise necessary for implementation. Kashim Ibrahim Library, like many others, relies on basic data collection tools that provide descriptive rather than predictive insights. This situation highlights a major gap in leveraging data to inform strategic decisions in library operations (Lawal & Abdullahi, 2024).

Benefits of Predictive Analytics in Library Resource Management

The integration of AI-enabled predictive analytics in libraries presents numerous benefits. These include improved resource planning, optimized acquisitions, enhanced user satisfaction, and cost-effective operations (Wang & Yu, 2021). Predictive analytics can identify patterns in user behavior, enabling libraries to better tailor their services to user needs. Furthermore, predictive systems help avoid redundancy in collections, ensure timely updates to academic resources, and support budget allocation through data-backed projections (Ikpa et al., 2023).

In Nigerian academic settings, predictive analytics could significantly support decision-making by providing clarity on high-demand materials, preferred formats (e.g., print vs. digital), and peak service periods. However, the benefits remain largely unrealized due to low adoption and lack of awareness about these technologies.

Challenges of Implementing Predictive Analytics in Nigerian Libraries

Despite the clear advantages, several challenges impede the adoption of predictive analytics in Nigerian libraries. Infrastructural deficits, such as unreliable power supply and poor internet connectivity, are primary barriers. In addition, the lack of skilled personnel to manage and interpret predictive models further limits implementation (Davis, 2023). Funding constraints, resistance to change, and absence of institutional data strategies also contribute to the slow uptake of these technologies (Chinyere & Chukwu, 2021).

In Kashim Ibrahim Library, the absence of a comprehensive data management policy and limited automation of library functions have hindered the integration of AI-based analytics

tools. Moreover, the lack of continuous professional development opportunities prevents librarians from gaining the technical competencies required for AI adoption.

Readiness and Perceptions of Librarians Toward Predictive Analytics

Librarians' attitudes and readiness toward AI adoption play a pivotal role in the success of predictive analytics projects. Studies reveal that librarian confidence, training, and involvement in the digital transformation process greatly influence the sustainability of technological innovations in libraries (Mokhtar et al., 2022). In contexts where librarians fear automation or lack clarity about their roles in an AI-driven system, resistance can delay implementation.

At KIL, understanding librarians' preparedness is essential. The successful integration of predictive analytics depends on awareness campaigns, digital literacy training, and inclusive planning that positions librarians as collaborators in the transformation process rather than as passive recipients of technological change (Ajala et al., 2024).

Trends and Future Directions in Predictive Analytics in Libraries

Globally, the trend is shifting toward data-centric library operations, where AI tools not only manage user interactions but also inform strategic management decisions. Libraries are increasingly adopting systems that combine real-time user analytics with predictive capabilities to deliver personalized services and improve resource utilization (Ikpa et al., 2023).

For Nigerian libraries to align with these developments, significant investments in ICT infrastructure, partnerships with AI developers, and institutional policy reforms are required. Kashim Ibrahim Library, for instance, must develop a strategic roadmap that includes capacity building, system integration, and sustainable funding models to drive predictive analytics implementation.

The literature review is the transformative potential of predictive analytics in academic libraries, offering pathways to more responsive, efficient, and data-driven resource management. However, for libraries like Kashim Ibrahim Library in Nigeria, the gap between aspiration and implementation persists due to multifaceted challenges. This study will contribute to the growing body of knowledge by evaluating the current state of predictive

analytics adoption at KIL, exploring librarian readiness, and proposing strategies to advance AI integration in resource management.

Research Methodology

The study adopted a survey research design, defined as “the collection of information from a sample of individuals through their responses to questions.” This design enables the researcher to obtain standardized quantitative data on academic librarians’ experiences, perceptions, and opinions regarding the adoption of AI-enabled predictive analytics for resource management at Kashim Ibrahim Library, Ahmadu Bello University (ABU), Zaria. This methodology is particularly effective for understanding broad trends and opinions within a specific population.

The target population for this study consisted of all 203 academic librarians at Kashim Ibrahim Library, ABU, Zaria. Given the manageable size of this population and the desire to obtain comprehensive insights into the adoption of AI-powered predictive analytics, the study utilized total enumeration (census). This approach ensures that every librarian in the population is invited to participate, thereby eliminating sampling error and ensuring that the findings accurately represent the entire population.

Data were collected using a self-structured questionnaire that was tailored to the study’s objectives. The instrument comprised sections focusing on the extent of AI-enabled predictive analytics adoption, perceived benefits of such technology, and barriers to adoption. The questionnaire was developed to align with the study’s research questions and to capture detailed information from respondents.

Primary data were gathered between January and February 2025 via an online survey platform. Primary data, defined as information collected firsthand by the researcher for a specific research purpose, were chosen because they provide fresh, original, and directly relevant insights into the study's focus on AI adoption in library resource management. Librarians received email invitations containing a survey link, followed by two reminder emails to maximize the response rate. Participation in the survey was voluntary, with informed consent obtained at the outset of the survey to ensure ethical transparency and participant awareness.

The data collected were exported to IBM SPSS Statistics for Windows, Version 25.0 for analysis. The software was used to conduct statistical analyses, including frequency

distributions, mean scores, and correlation analyses, to determine the extent of AI adoption, the perceived benefits, and the challenges faced by librarians at Kashim Ibrahim Library in adopting AI-enabled predictive analytics for library resource management. This approach ensures that the results are both reliable and valid, providing a clear picture of the situation at ABU, Zaria.

Results

This section presents the findings of the study on the adoption and use of AI-enabled predictive analytics for library resource management at Kashim Ibrahim Library (KIL), Ahmadu Bello University, Zaria. Data was collected from all 115 library staff using a validated questionnaire. The focus of the study was on the extent of AI adoption, perceived benefits, and challenges encountered. Each subsection includes descriptive statistics such as frequency, percentage, mean, and standard deviation, offering insights into the variability of responses.

Table 1: Extent of Adoption of AI-Enabled Predictive Analytics at KIL

AI Adoption Practice	Frequency (N)	Percentage (%)	Mean	Standard Deviation
Awareness of AI-enabled predictive analytics	72	62.6%	3.70	0.48
AI-enabled predictive analytics currently used in resource management	47	40.9%	3.25	0.53
Regular staff training on predictive analytics	41	35.7%	2.90	0.58
Integration of AI analytics into resource planning	43	37.4%	3.10	0.51
Librarians directly involved in the predictive analytics process	32	27.8%	2.80	0.59

The results indicate that 62.6% of respondents are aware of AI-enabled predictive analytics, with a mean score of 3.70, showing relatively strong awareness among library staff. However, actual adoption is limited, as only 40.9% report that predictive analytics are currently used for resource management, with a lower mean of 3.25. The percentage of staff who have received

regular training on predictive analytics is just 35.7%, and only 37.4% report integration of AI analytics into resource planning. Most notably, only 27.8% of librarians are directly involved in the predictive analytics process, suggesting that the adoption and operational involvement in this technology is still in its nascent stages at KIL.

Table 2: Perceived Benefits of AI-Enabled Predictive Analytics in Resource Management

Perceived Benefit	Frequency (N)	Percentage (%)	Mean	Standard Deviation
Improved accuracy in resource allocation	78	67.8%	4.05	0.43
More efficient resource planning and forecasting	71	61.7%	3.85	0.44
Better decision-making based on data-driven insights	74	64.3%	3.90	0.42
Enhanced ability to predict user needs and resource demand	65	56.5%	3.70	0.46
Improved operational efficiency and reduced resource wastage	68	59.1%	3.80	0.45

The results indicate a strong appreciation of the benefits of AI-enabled predictive analytics for resource management among library staff at KIL. The most strongly perceived benefit is improved accuracy in resource allocation (67.8%), which suggests that library staff recognize the potential for AI to optimize resource distribution. This is followed by more efficient resource planning and forecasting (61.7%) and better decision-making based on data-driven insights (64.3%). The ability to predict user needs and resource demand (56.5%) also received considerable acknowledgment, indicating that librarians see the potential of AI analytics in aligning library services with user expectations. Improved operational efficiency and reduced resource wastage (59.1%) were also seen as key benefits, with respondents acknowledging the role of AI in minimizing inefficiencies.

Table 3: Challenges in the Adoption and Use of AI-Enabled Predictive Analytics

Identified Challenge	Frequency (N)	Percentage (%)	Mean	Standard Deviation
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Lack of technical expertise in AI analytics	78	67.8%	3.95	0.46
Insufficient funding for AI tools and infrastructure	71	61.7%	3.85	0.47
Limited staff training on predictive analytics	67	58.3%	3.80	0.48
Inadequate technological infrastructure (e.g., internet, servers)	64	55.7%	3.75	0.49
Resistance to change or lack of awareness among users	59	51.3%	3.60	0.50

The findings reveal that the most significant challenge in adopting AI-enabled predictive analytics at KIL is the lack of technical expertise in AI (67.8%), indicating a skills gap that hampers the effective implementation of AI tools. Insufficient funding (61.7%) is also a major constraint, highlighting the financial limitations that hinder the purchase of necessary technologies and tools. Limited staff training on predictive analytics (58.3%) and inadequate infrastructure (55.7%) are additional barriers, with the lack of reliable technological resources such as internet connectivity and servers restricting the efficient use of AI tools. Resistance to change or lack of awareness among library users (51.3%) further complicates the adoption process, suggesting the need for comprehensive training and awareness programs.

Discussion of Findings

The findings from this study offer key insights into the adoption and use of AI-enabled predictive analytics for library resource management at Kashim Ibrahim Library (KIL). While the library shows strong awareness and a moderate interest in adopting AI technologies, several challenges hinder the full implementation of predictive analytics.

Research Question 1: To what extent has AI-enabled predictive analytics been adopted for library resource management at KIL? The study reveals that AI adoption for resource management at KIL is still in its early stages. While there is high awareness (62.6%) of predictive analytics, actual usage is limited, with only 40.9% of respondents reporting that AI is currently used in resource management. This finding aligns with similar studies in academic

libraries, which suggest that while there is growing interest in AI technologies, the actual deployment is often hampered by financial constraints, lack of technical skills, and infrastructure challenges (Luambano & Nawe, 2024; Aqil & Ahmed, 2021).

Research Question 2: What are the perceived benefits of using AI-enabled predictive analytics in resource planning and management at KIL? The perceived benefits of AI-powered analytics are strongly recognized by the library staff, with a high percentage highlighting improvements in accuracy, efficiency, and decision-making. These benefits are consistent with the literature on AI in libraries, where predictive analytics is shown to enhance resource allocation, improve user experience, and optimize library operations (Dadzie, 2024; Brafı & Arthur, 2023). The ability to predict resource demand and align services with user needs is a critical advantage for libraries aiming to stay responsive in a fast-evolving educational environment.

Research Question 3: What challenges are encountered in the adoption and use of AI-enabled predictive analytics at KIL? The study identifies several key challenges to AI adoption at KIL, including lack of technical expertise, insufficient funding, inadequate infrastructure, and resistance to change. These barriers are consistent with findings in other academic settings where technological adoption faces significant hurdles due to institutional constraints and a lack of readiness (Anushandhan & Maharana, 2023; Brice, 2020). Addressing these challenges will be critical to ensuring successful integration of AI tools at KIL.

Conclusion

The study highlights that while there is significant potential for AI-enabled predictive analytics to improve library resource management at KIL, its adoption remains limited. The perceived benefits are strong, particularly in enhancing resource allocation and decision-making, but challenges such as technical expertise, funding, and infrastructure need to be addressed. By focusing on these barriers and investing in training, technology, and infrastructure, KIL can maximize the potential of AI to optimize its resource management and enhance library services.

Recommendations

Based on the findings, the following recommendations are made:

1. KIL should invest in improving its technological infrastructure, including stable internet access and reliable servers, to support the implementation of AI-powered tools.
2. A comprehensive staff training program on AI analytics should be developed to build the necessary skills for effective AI integration and management.
3. An institutional policy on AI adoption should be formulated, outlining the goals, strategies, and ethical considerations associated with predictive analytics in resource management.

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