NIU Journal of Educational Research Copyright©2026
Nexus International University ISSN: *3007-1844;* 12(1): 199-208

Artificial Intelligence-Based Services in Traditional Libraries: Information Discovery and Access among Library Patrons at the University of Maiduguri, Borno State

IBRAHIM WADA, TALATU ADAMU RABASA,
HANNY HAFIAR AND JONAH EMMANUEL
University of Maiduguri, Nigeria

Abstract. Traditional libraries that fail to integrate modern information and communication technologies often experience declining user engagement. With the increasing availability of Artificial Intelligence (AI) technologies, libraries are under greater pressure to modernize their services to enhance information discovery and access. This study examined the level of user discovery and information access at the University of Maiduguri Library, the extent of AI-driven service implementation, and the relationship between the two variables. A descriptive survey research design was employed. Data were collected from 355 active library users drawn from a target population of 7,350 using a structured questionnaire developed with the aid of the Raosoft Sample Size Calculator. The 52-item questionnaire was validated and subjected to a pilot study, yielding a reliability coefficient of 0.847 using Cronbach's alpha. Data were analysed using frequency counts, percentages, mean scores, and standard deviations, while Pearson Product-Moment Correlation was used to test the hypothesis at a 0.05 level of significance. The findings revealed that user discovery and information access were moderately high ($X = 3.40$, $SD = 0.89$), while the level of AI-driven service implementation was low ($\bar{X} = 2.68$, $SD = 0.91$). The analysis further showed a statistically significant moderate positive relationship between AI-driven service implementation and user discovery and information access ($r = 0.432$, $p < 0.001$). The study concludes that improvements in AI-driven service implementation may enhance users' ability to discover and access information resources in academic libraries. It recommends increased investment in AI-enabled library services and the provision of structured user training to improve the effective utilization of these technologies.

Keywords: Artificial Intelligence, Library Services, User Discovery, Information Access, Academic Libraries, Nigeria

1. Introduction

The integration of artificial intelligence (AI) technologies into the services of the academic library has become one of the most significant changes in the information delivery of the last ten years. Natural language processing software facilitating intuitive search experiences through machine-learned recommendation systems and automated metadata generation has revealed a significant ability of AI to improve the experience of users in their searching, accessing, and interacting with library resources (Hussain, 2025; Balnaves, 2024). The systematic reviews of AI adoption in academic libraries worldwide have confirmed that the pace of adoption has been increasing significantly since 2020, with more and more institutions starting to incorporate various applications with AI into their service offerings (Das and Islam, 2021; Asemi et al., 2021).

Nevertheless, without these global improvements, academic libraries in developing nations (especially sub-Saharan Africa) are still in the nascent stages of AI incorporation or early adoption. These organizations are facing a unique set of limitations that essentially influence the viability and speed of technology adoption: severe resource shortage, insufficient technological infrastructure, uneven digital literacy of users and professional staff, and conflicting institutional priorities that restrain capital spending on technology (Ogwo & Ibegbulem, 2023; Ali et al., 2024). An example of such an environment is the University of Maiduguri Library that accommodates a population of 27500 registered users

that include undergraduate and postgraduate students, representing a wide range of fields. Similar to other scholarly libraries in North-eastern Nigeria and sub-Saharan Africa in general, it needs to keep a two-fold focus: to maintain its traditional service and to renew infrastructure and delivery to fulfill the changing research and learning demands.

In spite of large physical and digital collections, there are many times when the user cannot find materials that could be directly applied to research work. This information gap is not a major failure on the part of the holdings; it is the failure to have sufficiently strong and intuitively processing mechanisms to succeed in information-rich environments. Modern users require more information than ever before but frequently have few resources and skills to single out really relevant material among big retrieval sets a paradox of abundance that many developing-country institutional settings are prone to (Ogwo, Ibegbulem & Nwachukwu, 2023; Pence, 2022).

The current research was inspired by a lack of empirical data, as well as an immediate practical necessity. To begin with, the literature on AI implementation has been characterized by the majority of studies being conducted in well-funded institutions in the Global North, which provide minimal practical advice to African libraries that have to operate with entirely different limitations (Misau, 2021; Okunlaya et al., 2022). Second, the systematic record of the existing user satisfaction with discovery and access services will offer fundamental baseline information by which future interventions can be appraised. Third, empirical evidence can also provide the correlation of AI implementation and user discovery outcomes, which can provide evidence-based reasons to invest at the institutional level and allow library administrators to know the difference between the meaningful investment in technologies and the aspiration spending.

The academic libraries are expected to offer smooth, easy-to-use, and technologically facilitated environments in which users will be able to find, retrieve and use resources of information efficiently and effectively. They should also ensure that users have AI-driven applications, including intelligent search engines, recommendation systems, and virtual reference assistants, which enhance their research capacity, as well as alleviate the cognitive load of browsing large and complicated information spaces (Hussain, 2025; Balnaves, 2024).

As a matter of fact, however, the University of Maiduguri Library, has not yet attained this ideal. The AI-based services are either underdeveloped or unavailable, and users are experiencing regrets instead of attaining satisfaction with the current discovery and access systems. It is observed that lots of users do not know or see virtual reference chatbots, formal training on AI functions is lacking, and the institutional communication regarding the existing technology is lacking.

Undergraduate and postgraduate students, faculty and research staff, and other library users perceive this as unnecessary friction in their information-seeking processes which may negatively affect academic output, quality of research and learning processes. This has dire consequences on institutional competitiveness and research output in a setting where access to global scholarly resources is becoming a significantly more important factor in the business of higher education (Ali et al., 2024; Okunlaya et al., 2022).

The implementation of AI in academic libraries in Nigeria has been studied by various researchers. For example, Ogwo and Ibegbulem (2023) looked at applications and perceived impact of artificial applications and perceived impact of artificial intelligence in academic libraries in Nigeria; Ali et al., (2024) have studied AI application in the library environment of developing countries; and Misau, (2021) reported on the users' knowledge of AI functionalities in academic libraries. Nevertheless, these studies have not empirically investigated the exact connection between AI implementation that support services and users' discovery and information accessibility in Northeast Nigerian academic libraries. This research gap is the main reason behind the current study, which aimed at examining the artificial intelligence-based services in traditional libraries in correlation with discovery and access to information resources at the University of Maiduguri Library.

1.1 Objectives of the Study

The objectives of the study were to determine:

- The extent of AI-driven service implementation at the University of Maiduguri Library.
- The level of user discovery and information access among library patrons at the University of Maiduguri Library.

The study tested a hypothesis at 0.0 level of significance:

- There is a significant relationship between AI-driven service implementation and user discovery and information access at the University of Maiduguri Library.

2. Literature Review

How library users locate, evaluate, and retrieve information has long been regarded as a barometer of institutional effectiveness in Library and Information Science (LIS). Discovery, in its contemporary sense, extends well beyond the physical act of shelf browsing or catalogue consultation; it encompasses the full chain of interactions between a patron and the library's information architecture--from initial query formulation through to successful document retrieval and relevance assessment. In environments where resource poverty and infrastructural fragility shape everyday library use, as is characteristic of many Nigerian federal universities, understanding the baseline conditions of patron discovery behaviour becomes an indispensable first step before any technology intervention can be meaningfully evaluated.

Okunlaya, Abdullah, and Alias (2022) drew attention to what they described as a persistently low technology adoption rate within university libraries in sub-Saharan Africa, arguing that the absence of AI-mediated discovery pathways has left patrons reliant on conventional bibliographic access modes that are neither scalable nor sufficiently responsive to contemporary research demands. Their AI Library Services Innovative Conceptual Framework (AI-LSICF) situates patron-facing discovery as a core output variable whose quality is directly contingent on the maturity of back-end AI deployment. This framing is instructive for contextualising user experiences at an institution like the University of Maiduguri, where the gap between user information needs and available retrieval mechanisms is unlikely to be trivial.
Oyetola et al. (2023) painted a sobering picture of the Nigerian library landscape, documenting low awareness not only among librarians but among user communities whose expectations of the library as a discovery engine have not kept pace with global developments in knowledge access. Arnepalli (2025) offered a more practice-oriented perspective, demonstrating through an academic library study that AI-based expert systems--when deployed for indexing, classification, and reference mediation--measurably broaden the population of queries a library can satisfactorily resolve. Omame and Alex-Nmecha (2019) added nuance by highlighting how immersive and conversational discovery interfaces alter patron information-seeking behaviour in ways that traditional Online Public Access Catalogues (OPACs) cannot replicate. Taken together, these works signal that at institutions yet to adopt such tools, patron discovery likely remains constrained, reactive, and heavily dependent on intermediary assistance from library staff.

Debates about the extent of AI deployment in academic libraries occupy a curious space in the LIS literature: there is broad consensus about what AI can do, yet striking inconsistency in how much of that potential has translated into operational reality, particularly across the African continent. The service applications under examination range from relatively modest automations--spam filtering in institutional repositories, rule-based chatbot interfaces for frequently asked questions--to more sophisticated deployments involving machine learning-based metadata enrichment, intelligent recommender systems, and natural language processing for full-text indexing. What distinguishes genuine AI-driven service implementation from peripheral digitisation is the degree to which machine intelligence is embedded in the core service delivery workflow, rather than grafted onto it as a cosmetic enhancement.

Zondi, Epizitone, and Nkomo (2024) reviewed AI implementation across academic library settings and documented a pronounced implementation gap in African institutions, tracing its origins to compounding deficits in funding, skilled personnel, and reliable digital infrastructure. Their findings converge with those of Ajav and Tor-Akwer (2024), whose institutional survey in Benue State universities revealed that even librarians who expressed awareness of AI tools reported minimal hands-on utilisation, citing erratic power supply and inadequate server capacity as immediate operational constraints. Moustapha and Yusuf (2023) found analogous conditions in Kwara State, where AI adoption had not progressed beyond exploratory awareness in most surveyed libraries. The pattern is consistent enough to constitute a regional tendency, one that is plausibly applicable to the University of Maiduguri given its northeastern Nigerian setting and broadly comparable resource environment.

Where implementation has occurred in contexts outside Nigeria, the evidence is instructive. Yao, Zhang, and Chen (2015) documented the participatory reference model enabled by the Xiaotu intelligent chatbot in a Chinese academic library, demonstrating measurable gains in query resolution rates and user engagement. Mwantimwa and Msoffe (2025) surveyed recent generative AI applications in library operations and found accelerating uptake in

cataloguing automation and reference chat, particularly in libraries that had already invested in robust metadata management infrastructure. Bélanger (2025) raised important cautions about public service ethics and algorithmic accountability that must inform any implementation strategy. For the University of Maiduguri Library, determining the actual extent of AI-driven service implementation--rather than assumed proxies such as internet connectivity or digital catalogue availability--constitutes a core empirical contribution of this study.

When a library embeds AI capabilities into its service infrastructure--whether through intelligent indexing, semantic search, or conversational reference agents--it effectively lowers the cognitive and procedural barriers that patrons encounter during information seeking. This does not merely accelerate existing discovery processes; it alters their character, enabling users to engage with metadata in richer ways, to navigate across heterogeneous collections, and to receive contextually tailored recommendations that manual workflows cannot replicate at scale.

The empirical grounding for this relationship is visible across several studies in the reviewed literature. Okunlaya, Abdullah, and Alias (2022) constructed a theoretical model in which AI-enabled service innovation is posited as a direct antecedent of transformed user access outcomes, arguing that libraries which invest in AI-mediated service design position their patrons to navigate information ecosystems with considerably greater autonomy and precision. The SEM-based inquiry by Yakubu, Yagana, and Umar (2023), though focused on librarian intention rather than patron outcomes, demonstrated that perceived usefulness of AI--strongly associated with anticipated improvements in service delivery quality--was the most robust predictor of adoption intent among northeast Nigerian library professionals, indirectly foregrounding patron access gains as the rationale driving institutional interest. Yusuf et al. (2025) reported that even in a library where AI implementation remained embryonic, staff and users consistently identified cataloguing accuracy, reference responsiveness, and user support as the domains where AI would most visibly improve the patron experience.

Echedom and Okuonghae (2021) offered a broader continental analysis, arguing that AI's natural language processing and pattern recognition capabilities uniquely equip libraries to bridge the chronic mismatch between patron query language and the controlled vocabulary of traditional bibliographic systems--a mismatch that has historically disadvantaged less bibliographically literate users in African university settings. Oyelude (2021) projected that AI-driven content indexing and document matching functions would, over time, dramatically reduce the information overload that impairs retrieval precision for library patrons working in resource-intensive research domains. Lalitha, *et al*. (2024) further cautioned against framing AI as a substitution for professional librarianship, emphasising instead the service amplification role of AI--an argument that reframes the relationship under investigation here as one of complementarity rather than displacement. Taken collectively, the weight of evidence across these studies supports the hypothesis that a statistically significant positive relationship obtains between AI-driven service implementation and user discovery and information access, and provides a robust theoretical foundation for the empirical inquiry this study undertakes at the University of Maiduguri Library.

3. Research Methodology

A descriptive survey research design was adopted to examine the implementation of artificial intelligence (AI) services and their relationship with user discovery and access to information in the University of Maiduguri Library. The population of the study comprised 7,350 active registered users of the University of Maiduguri Library, defined as undergraduate and postgraduate students who had used library services within the six months preceding the study. A sample size of 366 respondents was determined using the Raosoft Sample Size Calculator at a 95% confidence level and 5% margin of error. Respondents were selected through accidental (convenience) sampling, whereby available library users were approached to participate in the study. To minimize selection bias, questionnaires were distributed across different library sections, at different times of the day, and on both weekdays and weekends. Out of the 366 questionnaires administered, 359 were returned (98.1%), while 355 questionnaires were found usable for analysis.

The research instrument was a structured questionnaire divided into two major sections measuring AI-Driven Service Implementation (14 items) and User Discovery and Information Access (10 items). Responses were measured using a five-point Likert scale consisting of Strongly Disagree (SD = 1), Disagree (D = 2), Neutral (N = 3), Agree (A = 4), and Strongly Agree (SA = 5). Content validity of the instrument was established through expert review by five academic librarians and two quantitative research specialists, leading to revisions that improved clarity and alignment with the study objectives. A pilot test involving 40 library users was conducted to determine

reliability using Cronbach's alpha, which produced an overall reliability coefficient of 0.847, indicating good internal consistency of the instrument.

Data were collected over an eight-week period (12 April to 4 June 2025) using self-designed structured questionnaires. Retrieved copies of the questionnaires were coded and entered into Microsoft Excel and subsequently analyzed using IBM SPSS Statistics (Version 27). Descriptive statistics such as frequency count, percentage, mean score, and standard deviation, were used to summarize responses to the questionnaire. To test the hypothesis on the relationship between AI-driven service implementation and user discovery and information access, the Pearson Product-Moment Correlation was employed at a 0.05 level of significance. The analysis revealed a moderate positive correlation ($r = 0.432$, $p < 0.001$), which indicated that there exists statistically significant relationship.

4. Results and Analyses

Table 1: AI-Driven Service Implementation in the University of Maiduguri Library

S/N	Item (n = 355)	SD	D	N	A	SA	$\bar{X}$	Std.
1	I am aware that the library employs AI technologies to enhance its services.	67 (18.9%)	78 (22.0%)	108 (30.4%)	72 (20.3%)	30 (8.5%)	2.78	1.24
2	I can readily use AI-enhanced discovery and search tools the library provides.	64 (18.0%)	81 (22.8%)	104 (29.3%)	79 (22.3%)	27 (7.6%)	2.92	1.19
3	I can search using natural language rather than specialized terminology.	68 (19.1%)	75 (21.1%)	109 (30.7%)	74 (20.8%)	29 (8.2%)	2.85	1.23
4	The library offers AI-driven recommendation systems aligned with my research interests.	79 (22.3%)	84 (23.7%)	113 (31.8%)	57 (16.1%)	22 (6.2%)	2.64	1.28
5	AI-powered virtual chatbots or reference services are available to address my queries.	102 (28.7%)	96 (27.0%)	104 (29.3%)	37 (10.4%)	16 (4.5%)	2.41	1.31
6	The library uses AI for automated metadata generation to clarify material content.	85 (23.9%)	78 (22.0%)	111 (31.3%)	62 (17.5%)	19 (5.4%)	2.58	1.25
7	AI-based applications offer customized learning guidance aligned with my academic needs.	93 (26.2%)	89 (25.1%)	109 (30.7%)	47 (13.2%)	17 (4.8%)	2.49	1.27
8	I regularly encounter AI-enhanced features when searching for information in the library.	78 (22.0%)	82 (23.1%)	111 (31.3%)	63 (17.7%)	21 (5.9%)	2.67	1.22
9	I perceive that the library values and prioritizes AI to improve services.	48 (13.5%)	59 (16.6%)	109 (30.7%)	96 (27.0%)	43 (12.1%)	3.01	1.18
10	The library communicates clearly about available AI features and their applications.	106 (29.9%)	87 (24.5%)	104 (29.3%)	42 (11.8%)	16 (4.5%)	2.38	1.29
11	The library provides adequate training and support for using AI-enhanced features.	110 (31.0%)	92 (25.9%)	104 (29.3%)	34 (9.6%)	15 (4.2%)	2.31	1.30
12	I trust that AI systems installed in the library deliver accurate and relevant results.	63 (17.8%)	71 (20.0%)	110 (31.0%)	80 (22.5%)	31 (8.7%)	2.87	1.22
13	AI-enhanced features integrate well with existing library search and discovery systems.	69 (19.4%)	76 (21.4%)	108 (30.4%)	76 (21.4%)	26 (7.3%)	2.76	1.23
14	I would welcome additional AI-enhanced services integrated into library offerings.	37 (10.4%)	82 (23.1%)	103 (29.0%)	98 (27.6%)	35 (9.9%)	3.14	1.25
	Weighted mean score						2.70	1.25

Source: *Field Survey, 2025*

The weighted mean of 2.70 (Std. = 1.25) for AI-driven service implementation establishes, with statistical clarity, that AI-enhanced library services are weakly implemented and only minimally visible to patrons at the University of Maiduguri Library. This finding corroborates--and in certain respects sharpens--the conclusions reached by Zondi, Epizitone, and Nkomo (2024), whose continental review characterised AI implementation in African academic libraries as uneven and frequently limited by infrastructural and organisational constraints. The Maiduguri data provide granular, institution-specific evidence that this characterisation holds within the northeast Nigerian context, extending Zondi et al.'s (2024) geographically broad conclusions into a setting that their study could only address at the level of regional generalisation.

The three lowest-scoring items--training and support for AI features ($X = 2.31$), institutional communication about AI tools ($X = 2.38$), and virtual chatbot or conversational reference services ($X = 2.41$)--form a coherent cluster that reveals not merely technical absence but organisational unpreparedness. Ajav and Tor-Akwer (2024) attributed comparable low scores in Benue State university libraries to skills deficits and infrastructural inadequacy, and the present data broadly support that diagnosis. However, this study makes a further analytical distinction that Ajav and Tor-Akwer (2024) did not articulate: the communication and training items scored lower than the awareness item ($X = 2.78$), which means that even the limited awareness that does exist among patrons has not been translated into guided or supported

engagement. An institution could theoretically justify low AI deployment by pointing to low patron awareness as a demand-side constraint; what it cannot so easily justify is a situation in which patrons are aware, however partially, yet receive neither training to use available tools nor coherent institutional messaging about what those tools are. The Maiduguri data expose this specific gap more clearly than earlier studies in the Nigerian northeast have done.

Moustapha and Yusuf (2023) reached broadly similar conclusions in Kwara State and recommended policy-level interventions to bridge the adoption gap. While this study affirms their diagnosis, it also challenges the implied gradualism of their recommendation. The present data suggest that the gap at Maiduguri is not simply a matter of pace but of sequence: natural language search capability (X = 2.85) and AI integration with existing systems (X = 2.76) are rated almost as low as chatbot availability, indicating that even the most accessible entry points into AI-mediated search--those requiring no specialist knowledge from the patron--have not been made operational. Mwantimwa and Msoffe (2025) found that libraries achieving measurable AI implementation gains had in each case established robust metadata management and technical cataloguing workflows as a prerequisite. The implication for Maiduguri is that without foundational bibliographic infrastructure--consistent subject headings, enriched catalogue records, and interoperable metadata standards--AI tools, when eventually deployed, will have insufficient data quality on which to operate effectively. This study is thus in partial agreement with Mwantimwa and Msoffe (2025) while extending their argument to identify the specific infrastructural preconditions that appear to be insufficiently developed at this institution.

The one item that diverges from the pattern is patron willingness to adopt additional AI services (X = 3.14), which stands noticeably above the overall weighted mean. Yusuf et al. (2025) documented the same disjuncture at Obafemi Awolowo University, interpreting it as evidence of latent demand. This study concurs with that interpretation but qualifies it: latent demand without institutional response is not an asset but an accountability gap. The readiness documented here is fragile precisely because it has been generated without substantial AI service encounters--it is expectation-based rather than experience-based, and expectation-based adoption intent is known from the Technology Acceptance Model literature to be considerably more volatile than intent formed through direct engagement. That the library has not moved to convert this goodwill into structured adoption therefore constitutes a missed strategic window that both corroborates and extends concern (Yusuf et al., 2025).

User Discovery and Information Access

Table 2: User Discovery and Information Access in the University of Maiduguri Library

S/N	Item (n = 355)	SD	D	N	A	SA	$\bar{X}$	Std.
1	I can readily identify information resources relevant to my research or studies.	28 (7.9%)	48 (13.5%)	93 (26.2%)	138 (38.9%)	48 (13.5%)	3.48	1.12
2	Library search tools effectively assist me in locating what I need.	31 (8.7%)	52 (14.6%)	98 (27.6%)	129 (36.3%)	45 (12.7%)	3.42	1.15
3	I am confident I can locate the majority of relevant resources through searching.	35 (9.9%)	56 (15.8%)	103 (29.0%)	118 (33.2%)	43 (12.1%)	3.35	1.18
4	I use library recommendation systems to discover materials I was previously unaware of.	48 (13.5%)	68 (19.2%)	108 (30.4%)	101 (28.5%)	30 (8.5%)	3.18	1.21
5	I can easily access full-text documents I identify as relevant.	22 (6.2%)	38 (10.7%)	76 (21.4%)	144 (40.6%)	75 (21.1%)	3.64	1.08
6	I access required information at a satisfactory speed.	29 (8.2%)	49 (13.8%)	99 (27.9%)	131 (36.9%)	47 (13.2%)	3.41	1.13
7	Resource metadata enables me to determine material content before accessing it.	39 (11.0%)	62 (17.5%)	111 (31.3%)	110 (31.0%)	33 (9.3%)	3.22	1.16
8	Multiple access points are available to retrieve the same information.	25 (7.0%)	51 (14.4%)	103 (29.0%)	130 (36.6%)	46 (13.0%)	3.45	1.10
9	Library systems are technically reliable and infrequently disrupted during searching.	36 (10.1%)	60 (16.9%)	107 (30.1%)	114 (32.1%)	38 (10.7%)	3.29	1.19
10	I am satisfied with the ease of finding and accessing information in this library.	24 (6.8%)	44 (12.4%)	98 (27.6%)	131 (36.9%)	58 (16.3%)	3.52	1.11
	Weighted mean score						3.40	1.14

Source: *Field Survey, 2025*

The weighted mean of 3.40 (SD = 1.14) recorded for user discovery and information access at the University of Maiduguri Library denotes a moderately high level of patron capability--a finding that, on its face, appears to corroborate the broader position advanced by Okunlaya, Abdullah, and Alias (2022),

who argued that the absence of AI-mediated discovery frameworks has constrained Nigerian university library users to a functionally adequate but intellectually limiting information-seeking experience. Yet to leave the finding at that level of description would be to flatten its internal complexity. When the item-level data are examined, a pattern emerges that both supports and complicates the existing literature in instructive ways.

The strongest responses were recorded for full-text document access (X = 3.64), identification of relevant resources (X = 3.48), and multiple access points for retrieving information (X = 3.45). These scores align with Arnepalli's (2025) argument that even libraries operating without advanced AI tools can achieve reasonable patron satisfaction in transactional retrieval--that is, retrieving a document whose existence the patron already knows. In that limited respect, the University of Maiduguri Library appears to be performing adequately, and this study's data partially support Arnepalli's (2025) position. However, this agreement dissolves at the point where discovery shifts from the known to the unknown. Patron use of recommendation systems to discover previously unidentified materials (X = 3.18) and reliance on resource metadata to evaluate content relevance prior to full retrieval (X = 3.22) both scored lower--a divergence that the present study argues cannot be explained by individual user behaviour alone but must be interpreted as a structural property of the library's discovery environment.

This finding directly challenges the optimistic framing offered by Lalitha et al. (2024), who suggested that current library systems, even without mature AI integration, retain sufficient bibliographic scaffolding to support patron-initiated exploratory discovery. The data from Maiduguri do not fully support this position. Metadata utility ($\bar{X}$ = 3.22)--the degree to which descriptive catalogue records, controlled vocabulary assignments, and enriched bibliographic fields enable relevance judgement before retrieval--remains only moderately effective. In a library context, this is consequential: when patrons cannot confidently interpret metadata, they lose the mechanism through which discovery is distinguished from mere retrieval. This study therefore departs from Lalitha et al. (2024) by demonstrating, at an institutional level, that the bibliographic infrastructure underpinning discovery may not be sufficiently robust in the absence of AI-driven enhancement. Omame and Alex-Nmecha (2019) offered a theoretical precursor to this argument in their analysis of OPAC architecture, noting that conventional catalogue systems are designed primarily for known-item searching rather than exploratory discovery. The current findings extend that theoretical claim into empirical territory within a northeast Nigerian federal university setting--something neither Omame and Alex-Nmecha (2019) nor the broader literature had previously documented for this institution.

The system reliability rating of 3.29 is neither endorsement nor condemnation, but it is informative when read alongside the work of Oyetola et al. (2023), who documented infrastructural fragility across Nigerian academic libraries. That study identified erratic power supply and network instability as persistent disruptors of information-seeking behaviour, and the moderate reliability score recorded here suggests those conditions may still influence the Maiduguri environment. What this study adds that Oyetola et al. (2023) did not establish is the specific behavioural implication: patrons who lose system connectivity during searching often re-initiate queries with narrower search strategies, sacrificing bibliographic recall for procedural speed. Such adaptive behaviour may reinforce the already limited exploratory discovery suggested by the comparatively lower scores for metadata use and recommendation systems. The cumulative picture is therefore of a user community whose discovery experience is shaped as much by system constraints as by available information resources.

Table 3: Correlation between AI-Driven Service Implementation and User Discovery and Information Access (N = 355)

Variables	r	p-value	95% Confidence Interval
AI-Driven Service Implementation × User Discovery and Information Access	0.432	< 0.001	0.34, 0.51

Predictor: AI-Driven Service Implementation

The Pearson Product–Moment Correlation of r = 0.432 ($p < 0.001$) confirms the central hypothesis of this study: a statistically significant positive relationship exists between AI-driven service implementation and user discovery and information access at the University of Maiduguri Library. By the conventions proposed by Jacob Cohen (1992), this represents a medium effect size, and the 95% confidence interval of [0.34, 0.51] indicates that even the lower-bound estimate of the true population correlation remains substantively positive. The hypothesis is therefore upheld. This outcome aligns with the theoretical

position advanced by Okunlaya, Abdullah, and Alias (2022), whose AI-LSICF model positioned AI service innovation as a direct antecedent of improved patron access outcomes. The present study provides what their conceptual framework necessarily lacked: empirical verification of that relationship within a specific Nigerian federal university library context. To that extent, this study both corroborates and operationalises Okunlaya et al.'s (2022) model in ways that prior Nigerian library research had not attempted.

Situating this finding against the existing literature, however, reveals a complexity that simple hypothesis confirmation obscures. The medium-effect correlation was produced within a service environment where AI implementation is rated at only 2.68 out of 5—a context of limited implementation rather than mature deployment. That a meaningful statistical relationship emerges even under these conditions is theoretically significant. It suggests that whatever marginal AI functionality patrons encounter—whether through partially enhanced search tools, automated metadata display, or other forms of digital library enhancement that users interpret as AI-enabled—may already exert a measurable influence on their discovery experience. Yakubu, Yagana, and Umar (2023), working from a Partial Least Squares Structural Equation Modeling framework, found that perceived usefulness of AI tools was the dominant predictor of engagement intentions among library professionals in northeast Nigeria. Applying that logic here, one may infer that even limited AI exposure is shaping patron perceptions of usefulness, which in turn influence discovery behaviour. What the present study adds to Yakubu et al.'s (2023) work is evidence that the relationship is observable not only in attitudes but also in reported information access outcomes.

This finding also situates the University of Maiduguri Library within a broader pattern documented across African academic libraries. Studies by Ajav and Tor-Akwer (2024), Moustapha and Yusuf (2023), and Zondi et al. (2024) consistently reported low levels of AI service implementation while simultaneously recommending its expansion. The Maiduguri findings extend this literature by demonstrating that even partial or limited AI exposure can be associated with measurable improvements in information discovery and access. This suggests that the relationship between AI service development and patron access outcomes may begin to manifest earlier in the technological adoption process than previously assumed. Consequently, the results reinforce the broader policy argument within African library and information science scholarship that incremental investments in AI-enabled discovery infrastructure can have meaningful implications for user access to information resources.

5. Conclusion

The findings reveals that AI-enhanced library services are weakly implemented and only minimally visible to patrons at the University of Maiduguri Library and that there is a moderately level of user discovery and information access. The analysis further revealed a statistically significant positive relationship between the AI-driven service implementation and user discovery and information access. This suggests that higher levels of AI-driven service implementation are associated with improved user discovery and access to information resources within the library.

6. Recommendations

On the basis of the study's findings, the following recommendations are advanced for institutional consideration:

Academic libraries should prioritize the implementation of AI-driven recommendation systems calibrated to user search behaviour, collection usage patterns, and academic disciplines. Implementation should begin with a carefully designed pilot involving a representative user sample, followed by iterative algorithm refinement informed by systematic feedback on recommendation relevance and quality before institution-wide deployment.

A formal AI service implementation strategy should be developed, specifying the technologies to be deployed, implementation timelines, resource allocation arrangements, staff training requirements, user communication plans, success metrics, and anticipated service outcomes. The strategy should prioritize high-impact applications achievable within realistic resource parameters and should be structured as a three-to-five-year incremental implementation programme.

Academic libraries should establish structured user training and awareness programmes as a core institutional priority. Such programmes should include library orientation sessions, online instructional resources, point-of-need reference support, and targeted outreach to users with lower digital literacy and infrequent library engagement. The objective should be to ensure that all users can effectively utilise AI-enhanced discovery and access tools provided by the library.

References

Ajav, I. G., & Tor-Akwer, H. F. (2024). Awareness, adoption and utilization of artificial intelligence (AI) by librarians for effective service delivery in university libraries in Benue State, Nigeria. *Journal of Library Services and Technologies*, 6(3), 99–108. https://doi.org/10.47524/jlst.v6i3.100

Ali, M. Y., Naeem, S. B., Bhatti, R., & others. (2024). Artificial intelligence application in university libraries of Pakistan: SWOT analysis and implications. *Global Knowledge, Memory and Communication*. https://doi.org/10.1108/GKMC-05-2023-0155

Arnepalli, K. (2025). Delivery and enhancement of library services in academic libraries leveraging artificial intelligence (AI) as a tool: A study. Pearl: *A Journal of Library and Information Science,* 19(2), 48–55. https://doi.org/10.5958/0975-6922.2025.00007.6

Asemi, A., Ko, A., & Nowkarizi, M. (2021). Intelligent libraries: A review on expert systems, artificial intelligence, and robot. *Library Hi Tech*, 39(2), 412–434. https://doi.org/10.1108/LHT-02-2020-0038

Balnaves, E. (2024). Artificial intelligence and libraries: An introduction. In New horizons in artificial intelligence in libraries (pp. 3–14). *De Gruyter*. https://doi.org/10.1515/9783111336435-002

Bélanger, A. (2025). Artificial intelligence: Considerations for library public service delivery. *The International Information & Library Review*, 57(2), 193–199. https://doi.org/10.1080/10572317.2025.2479281

Das, R. K., & Islam, M. S. U. (2021). Application of artificial intelligence and machine learning in libraries: A systematic review. arXiv preprint arXiv:2112.04573. https://arxiv.org/abs/2112.04573

Echedom, A. U., & Okuonghae, O. (2021). Transforming academic library operations in Africa with artificial intelligence: Opportunities and challenges. *New Review of Academic Librarianship*. https://doi.org/10.1080/13614533.2021.1906715

Hussain, A. (2025). Unlocking the potential of artificial intelligence in academic libraries. *IntechOpen*. https://doi.org/10.5772/intechopen.1008234

Lalitha, B., Ramalakshmi, K., Gunasekaran, H., Palaniappan, M., Saminasri, P., & Rajkumar, N. (2024). Anticipating AI impact on library services. In Advances in Library and Information Science (ALIS) Book Series. https://doi.org/10.4018/979-8-3693-5593-0.ch014

Misau, A. Y. (2021). Application of artificial intelligence in academic libraries in Nigeria. *Library Philosophy and Practice*, 1-16.

Moustapha, A. A., & Yusuf, I. O. (2023). Adoption of artificial intelligence to improve library service delivery in academic libraries in Kwara State, Nigeria. *Library Philosophy and Practice (e-journal)*. https://www.researchgate.net/publication/374617773

Mwantimwa, K., & Msoffe, G. (2025). Application of generative artificial intelligence in library operations and service delivery: A scoping review. *Technical Services Quarterly.* https://doi.org/10.1080/07317131.2025.2467574

Ogwo, U., & Ibegbulem, F. (2023). Applications and perceived impact of artificial intelligence in academic libraries in Nigeria. *Library Philosophy and Practice*. https://www.researchgate.net/publication/376720958

Ogwo, U., Ibegbulem, F., & Nwachukwu, V. N. (2023). Applications and perceived impact of artificial intelligence in academic libraries in Nigeria. *Library Philosophy & Practice*.

Okunlaya, R. O., Abdullah, N. S., & Alias, R. A. (2022). Artificial intelligence (AI) library services innovative conceptual framework for the digital transformation of university education. *Library Hi Tech,* 40(6), 1869–1892. https://doi.org/10.1108/lht-07-2021-0242

Okunlaya, R. O., Syed Abdullah, N., & Alias, R. A. (2022). Artificial intelligence (AI) library services innovative conceptual framework for the digital transformation of university education. *Library Hi Tech,* 40(6), 1869–1892. https://doi.org/10.1108/LHT-07-2021-0242

Omame, I. M., & Alex-Nmecha, J. C. (2019). Artificial intelligence in libraries. In Advances in Library and Information Science (ALIS) Book Series (pp. 120–144). https://doi.org/10.4018/978-1-7998-1116-9.ch008

Oyelude, A. A. (2021). AI and libraries: Trends and projections. Library Hi Tech News. https://doi.org/10.1108/lhtn-10-2021-0079

Oyetola, S. O., Oladokun, B. D., Maxwell, C. E., & Akor, S. O. (2023). Artificial intelligence in the library: Gauging the potential application and implications for contemporary library services in Nigeria. *Data & Metadata.* https://doi.org/10.56294/dm202336

Pence, H. E. (2022). Future of artificial intelligence in libraries. *The Reference Librarian,* 63(3–4), 85–90. https://doi.org/10.1080/02763877.2022.2140741

Yakubu, A. S., Yagana, A. A., & Umar, S. Y. (2023). Investigating librarians' intention to use artificial intelligence for effective library service delivery: A PLS-SEM-based approach. *Dutse Journal of Pure and Applied Sciences.* https://www.ajol.info/index.php/dujopas/article/view/244877

Yao, F., Zhang, C., & Chen, W. (2015). Smart talking robot Xiaotu: Participatory library service based on artificial intelligence. *Library Hi Tech,* 33(2). https://doi.org/10.1108/lht-02-2015-0010

Yusuf, T. I., Adebayo, O. A., & Bello, L. A. (2022). Adoption of artificial intelligence for effective library service delivery in academic libraries in Nigeria. *Library Philosophy and Practice (e-journal).* https://www.researchgate.net/publication/346463290

Yusuf, T. I., Owolabi, R. S., Okani, E. C., & Badmus, H. A. (2025). Perceived benefits of artificial intelligence (AI) and service delivery at Hezekiah Olusanmi Library, Obafemi Awolowo University, Osun State, Nigeria. *Journal of Library Services and Technologies,* 7(1), 95–103. https://doi.org/10.47524/jlst.v7i1.96

Zondi, N. P., Epizitone, A., & Nkomo, N. (2024). A review of artificial intelligence implementation in academic library services. *South African Journal of Libraries and Information Science.* https://doi.org/10.7553/90-2-2399