

## **Full Length Research**

# **Use of Library Management System Software (KOHA) In Cataloguing Library Information Resources in 21<sup>st</sup> Century University Libraries in Nigeria**

**Dr. Olubiyo Peter Olubunmi**

University Library, Adeyemi Federal University of Education, Ondo, Ondo State, Nigeria

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The 21st century digital transformation of academic library services has increased the uptake of automated library management systems worldwide, with open-source solutions becoming popular in resource-limited settings. This article focuses on the application of the Koha Library Management System (LMS) software in indexing the library information resources in the libraries of the Nigerian universities. Based on the Technology Acceptance Model (TAM) and Diffusion of Innovation (DoI) Theory, the paper has reviewed existing literature, institutional history, and empirical evidence in order to assess the level of Koha implementation, its role in improving efficiency in catalogs, and the complex barriers facing the Nigerian academic libraries to capitalize on the potential of the software. Based on the studies that have survived, evidence indicates that Koha, which is currently implemented in more than 18,000 libraries in more than 50 countries around the globe, has demonstrated quantifiable benefits in its cataloguing processes, such as a significant decrease in cataloguing time, enhancement of the quality of bibliographic records, increased Online Public Access Catalogue (OPAC) performance, and even interoperability with international standards, such as the MARC. However in Nigeria, adoption is still uneven due to epileptic power supply, poor ICT infrastructure, lack of trained cataloguing professionals, and chronic underfunding. The paper presents comparative tables, analytical frameworks and process schematics to depict the promise as well as the continuing gaps in Koha utilisation. It ends with strategic recommendations to the stakeholders such as the administrators of the libraries, the management of the university, the government agencies, and the development partners, towards sustainable digital cataloguing transformation in Nigerian university libraries.

**Keywords:** Koha, Library Management System, Cataloguing, University Libraries, Nigeria, Open-Source Software, MARC21, OPAC, Library Automation

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## INTRODUCTION

The 21<sup>st</sup> century has brought with it an unparalleled generation of digital revolution, which has radically altered the face of academic library services in the world. The pressure on university libraries, which have a strategic role in the knowledge creation and dissemination network, to shift beyond labour-intensive, manual cataloguing systems, toward technologically advanced management systems capable of handling the literally monumental increase of information assets, is mounting. The pressure on university library services to catalogue their collections has never been so intense in Nigeria, where the number of students enrolling in universities has increased since the early 2000s, by 2023 to more than 2.2 million students (National Universities Commission [NUC], 2023).

The fundamental element of the successful library service delivery is cataloguing, the systematic knowledge of creating bibliographic description and subject access points to library resources in order to make them easily retrieved (Arlitsch and O'Brien, 2012; Chowdhury and Chowdhury, 2007). However, the conventional manual catalogueuing setting, exemplified by hand written catalogue cards, isolated filing system and use by a single user, are clearly substandard to the demands of the 21st century academic. The advent of the so-called Integrated Library Systems (ILS), and in particular open-source systems, has offered a very viable, and affordable, answer to this problem.

The development of Koha, in 1999 by Katipo Communications on behalf of the Horowhenua Library Trust in New Zealand and published as free and open-source software in January 2000, was a breakthrough in the history of library automation (Koha Community, 2023; Wikipedia, 2024). Koha is currently available in more than 18,000 libraries and documentation centres worldwide (inLibro, 2023) and is described in a 2017 article in Library Technology Reports as the most widely-implemented open-source ILS in the world (Breeding, 2017), serving both developed and developing nations. Its powerful modules that involve cataloguing, circulation, acquisitions, OPAC, serials management, and patron management have made it a holistic solution especially adapting to the resource-bound reality of Nigerian university libraries.

Nigerian library automation environment, although developing, can be defined by a high level of inequality between federal, state, and university libraries. The main obstacles to successful library automation have always been poor ICT infrastructure, inadequate funding, and insufficient technical capacity (Ajani and Buraimo, 2022; Ubogu, 2019; Iyoro, 2005). It is against this background that this paper critically examines the role of Koha in changing the way cataloguing activities are carried out in the Nigerian university libraries, and contextualizes its implementation in the theories of knowledge and the overall situation in African higher education.

## Objectives of the Study

This paper specifically aims to:

- Examine the concept, historical development, and technical architecture of Koha as a Library Management System.
- Analyse the role of academic libraries and cataloguing in supporting university education in Nigeria.
- Evaluate the application and impact of Koha in cataloguing library information resources in Nigerian university libraries.
- Identify and critically examine the challenges facing the adoption and optimal utilisation of Koha in Nigerian academic libraries.
- Propose evidence-based solutions and strategic recommendations for improved Koha implementation.

## LIBRARIES AND THEIR FUNCTIONS IN THE UNIVERSITY SETTING

Libraries are a store of documented wisdom and are invaluable centers of intellectual activity in scholarship, research, and cultural conservation. As re-defined in its 2022 update, the UNESCO Public Library Manifesto (1994) defines the library as a living power of education, culture, and information and a key agent in promoting peace and spiritual well-being through the minds of men and women. The academic library, in its university setting, moves beyond the conventional custodial role to an active engagement in the knowledge creation process which offers resources, services, and environments to facilitate the tripartite university mission of teaching, research and community service (Unegbu and Onuoha, 2021; Idiodi, 2005).

The functions of academic libraries are multiple and can be generally divided into collection management, information services, instructional support and research facilitation. Collection management involves the process of selecting, acquiring, organising and maintaining information resources both in print and digital formats. The information services involve reference services, current awareness services, interlibrary loans and document delivery. Bibliographic instruction,

and information literacy programmes are included under instructional support and access to databases, institutional repositories, and scholarly communication support is facilitated under research (Eze & Uzoagulu, 2021).

The university library has a legal role to play in the Nigerian university setting. National Universities Commission (NUC) Benchmark Minimum Academic Standards (BMAS) which was last revised in 2021 requires that any accredited university programme should be able to demonstrate access to sufficient library resources as a fundamental accreditation requirement. However, a 2022 Idhalama et al. survey of 15 public university libraries in Nigeria revealed that most were unable to keep their collections current and many backlogs of unprocessed titles were in the thousands. This highlights the need to implement effective cataloguing systems like Koha.

## ACADEMIC LIBRARIES AND THEIR ROLES IN 21ST CENTURY NIGERIA

The 21st century academic library in Nigeria is one that exists at the border of tradition and change. On one side, it has to meet its traditionally determined requirements of organising resources and providing access to them; on the other, it has to quickly meet the demands of digital scholarship and open access as well as global connected information spaces. Abubakar (2011) describes this dual mandate as the bridging role of academic libraries, which links the information needs of the users to the ever-growing complex and dispersed information environment.

The recent empirical studies shed light on the relevance as well as the susceptibility of the Nigerian libraries in universities. In 2022, the Committee of University Librarians of Nigerian Universities (CULNU) conducted a survey that found that only 38% of federal university libraries had fully automated their catalogue systems, with 52% using hybrid systems with a considerable share of their collections manually catalogued. The rate of automation in state university libraries was even less, at about 24%. The highest level of automation was observed in private university libraries (61) which was due in large part to the greater flexibility of funding sources and institutional priorities (CULNU, 2022).

**Table 1:** Status of Library Automation in Nigerian University Libraries (2022)

Category of University	No. Surveyed	Fully Automated (%)	Partial (%)	Manual (%)
Federal Universities	43	38%	45%	17%
State Universities	52	24%	41%	35%
Private Universities	62	61%	27%	12%
<b>TOTAL / AVERAGE</b>	157	41%	38%	21%

*Source: Adapted from CULNU Survey (2022); Ajani & Buraimo (2022)*

## CATALOGUING OF LIBRARY INFORMATION RESOURCES

### Conceptual Overview

The process of describing, classifying, and assigning access points to library materials by professionals in order to facilitate effective identification and retrieval of library materials by library users is known as cataloguing. It is essentially a bibliographic control process, which includes descriptive cataloguing (bibliographic descriptions) and subject cataloguing (subject headings and classification numbers). International standards and codes that guarantee consistency, interoperability and professional quality of bibliographic data control the dual processes (Chowdhury and Chowdhury, 2007; Taylor and Joudrey, 2009).

The current standards in the practice of cataloguing in academic libraries are based on the Resource Description and Access (RDA) standard, which supersedes the previous Anglo-American Cataloguing Rules (AACR2). It is based on the theoretical framework of the Functional Requirements for Bibliographic Records (FRBR) and the Functional Requirements for Authority Data (FRAD) and is designed to support the digital world and linked data applications which can be integrated with the current Online Public Access Catalogue (OPAC) systems. The most common format of data communication, MARC21, is still the standard of encoding bibliographic records in integrated library systems such as Koha (Library of Congress, 2023; Arlitsch & Obrien, 2012).

### Theoretical Frameworks

The present paper is pegged on two broad theoretical frameworks that form the basis of adoption and use of technology in libraries:

Technology Acceptance Model (TAM), which was developed by Davis (1989) and later expanded by Venkatesh and Morris (2000) assumes that the intention to use and actual use of technology in organisations is largely influenced by two perceptual constructs, namely, Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). When applied to Koha adoption in libraries of Nigerian universities, TAM would suggest that the librarians who believe that Koha can help them to be efficient in cataloguing and can learn and use easily are more likely to adopt and use it on a continuous basis. TAM empirical validation in the contexts of library technology adoption has been demonstrated consistently in different cultural environments, such as sub-Saharan Africa (Eze and Uzoagulu, 2021; Ogbomo et al., 2023).

The Diffusion of Innovations (DoI) Theory, as postulated by Everett Rogers (2003) and operationalised in the context of library science by many researchers, is the process of how, why, and which rate new ideas, practices and technologies diffuse within social systems. Rogers proposed five types of adopters, innovators, early adopters, early majority, late majority, and laggards, and five features of innovations, which affect adoption rates: relative advantage, compatibility, complexity, trialability, and observability. The relative advantage (cost-free, open-source, feature-rich) of Koha and compatibility with MARC21 standards are the strong diffusion enablers, whereas the complexity of installation and configuration and low ICT infrastructure are strong diffusion barriers in the context of Nigerian libraries (Kulkarni et al., 2023; Ogbomo et al., 2023).

**Table 2:** Theoretical Framework, TAM and DoI Applied to Koha Adoption in Nigerian University Libraries

<b>TAM Constructs</b>	<b>DoI Attributes</b>	<b>Koha Adoption Outcome</b>
Perceived Usefulness (PU): - Faster cataloguing - Accurate MARC records - OPAC availability	Relative Advantage: - Zero licensing cost - Global community support - MARC21 / Z39.50 compliance	HIGH adoption likelihood where PU & advantage are perceived and communicated
Perceived Ease of Use (PEOU): - Intuitive interface - Z39.50 copy cataloguing - Training availability	Compatibility: - Fits existing LIS workflows - Supports MARC21 / RDA - Multi-language support	MODERATE adoption where PEOU is low due to ICT skill gaps
Behavioural Intention: - Librarian attitudes - Management support - Sustained usage	Complexity / Trialability: - Linux installation barriers - Demo instances available - Community training resources	LOW adoption where infrastructure & training are absent or inadequate

**Table 2: Author's Conceptual Synthesis (2024) based on Davis (1989); Rogers (2003); Kulkarni et al. (2023)**

## KOHA: MEANING, HISTORY, AND TECHNICAL ARCHITECTURE

### Etymology and Historical Background

The word Koha was chosen in reference to the Māori language of the indigenous people of New Zealand, meaning a gift or a donation, which is very suitable as a software system to be donated to the global library community (Koha Community, 2023; Wikipedia, 2024). The conceptualisation and development of Koha started in 1999 by Katipo Communications at the request of the Horowhenua Library Trust in New Zealand, and the initial live installation was deployed in January 2000, becoming the first free and open-source library management system in the world (Kulkarni et al., 2023; Yadav and Hemlata, 2024).

The development of Koha can be tracked back to various milestones in its development. In 2001, the developer Paul Poulain of Marseille, France embarked on adding many features to Koha, the most notable feature being multi-language support which would be essential to its use worldwide. In 2002, support of the MARC cataloguing standard and Z39.50 protocol were added. In 2005, LibLime based in Ohio, brought out Zebra indexing which significantly enhanced the speed and scalability of search in large bibliographic databases with millions of records. One of the largest national rollouts of the system in its history was to Turkey, with the Ministry of Culture deploying Koha in 1,136 public libraries containing over 17 million items and with an approximate number of 2 million users in 2014 (Wikipedia, 2024; Kulkarni et al., 2023).

According to the 2024 American Libraries Magazine Library Systems Report, only ByWater Solutions, one of the larger commercial support providers of Koha in the United States points to 1,619 overall Koha ILS installations, indicating that Koha continues to gain traction in the global market (Breeding, 2024). By 2023, Koha is installed in more than 18,000 libraries worldwide in more than 50 countries (inLibro, 2023) with major deployments in Africa, Asia, Europe, and the Americas.

## Technical Architecture and Modules

Koha is an open-source web-based ILS based on a solid technology stack of Perl (Practical Extraction and Report Language) to handle the back-end processing, MySQL/MariaDB to manage the relational database, Apache as the web server, and Solr/Zebra to index full-text. It can be accessed using common web browsers, which avoids the installation of client-side software and allows access using any networked device (Kulkarni et al., 2023; Yadav and Hemlata, 2024). The cataloguing information of Koha is in the MARC21 or UNIMARC format and can be accessed over the protocols of Z39.50 or SRU (Search/Retrieve via URL) protocols.

**Table 3:** Core Modules of Koha ILS and Their Cataloguing-Relevant Functions

Module	Primary Function	Cataloguing Relevance
<b>Cataloguing</b>	Create/edit MARC21 bibliographic and authority records; copy cataloguing via Z39.50	Core module , enables original and copy cataloguing with MARC templates
<b>OPAC</b>	Web-based public search interface; keyword, author, title, subject search	Provides public visibility of catalogued records; supports library discovery
<b>Circulation</b>	Manage check-out, returns, holds, renewals, fines	Dependent on catalogue records; reinforces item-level bibliographic accuracy
<b>Acquisitions</b>	Order management, budgets, vendor records, fund accounting	Pre-cataloguing stage; new acquisitions trigger cataloguing workflow
<b>Authorities</b>	Management of authorised headings for names, subjects, series	Ensures bibliographic consistency and authority control in catalogue
<b>Serials</b>	Track periodical subscriptions, issues, holdings	Cataloguing and holdings records for serial publications
<b>Reports</b>	Generate statistical, management, and bibliographic reports	Cataloguing statistics (items added, type, classification distribution)
<b>Z39.50 Client</b>	Remote query of external library databases for copy cataloguing	Enables import of LC, BL, WorldCat records; reduces original cataloguing load

*Table 3: Compiled from Kulkarni et al. (2023); Yadav & Hemlata (2024); Koha Community (2023)*

## APPLICATIONS OF KOHA TO LIBRARY SERVICES IN ACADEMIC LIBRARIES

### Catalogue Management and Bibliographic Control

The most significant and influential use of Koha in scholarly libraries is in the sphere of catalogue control and bibliography management. The cataloguing module supports simple and complex cataloguing processes in a MARC21 environment, allowing librarians to create, edit and maintain bibliographic records with accuracy and efficiency. One of its outstanding attributes is the Z39.50 copy cataloguing functionality, which enables librarians to search major bibliographic databases, such as the Library of Congress (LC), British Library (BL), and OCLC WorldCat, and import pre-made bibliographic records within a few seconds (Koha Community, 2023; Ogbomo et al., 2023).

In their article on the experience of the Koha ILS at Admiralty University of Nigeria Library (ADUN), Ogbomo et al. (2023) document that, with the Z39.50 copy cataloguing option, it takes less than two minutes to catalogue a book, a remarkable improvement on the 2030 minutes it would take to catalogue a book manually. This productivity in terms of efficiency when applied to large cataloguing backlog profiles typical of university libraries in Nigeria is a transformational boost to productivity in technical services. Moreover, Koha cataloguing module allows management of Machine Readable Catalogue (MARC) records, allowing the importation and exportation of records in the internationally standardised ISO2709 format, complete MARC21 field-level editing on all bibliographic, authority and holdings data elements.

### Online Public Access Catalogue (OPAC)

Koha OPAC is the zero-installation web based patron interface that offers multi-field search capabilities such as search results by key word, title, author, subject, ISBN, call number, and barcode search. The OPAC uses web 2.0 enhancements such as patron-added tagging, reviews, and comments and RSS feeds that subscribe users to new acquisition

announcements. The interface of an OPAC also allows patrons to place holds, renew, see their borrowing history, and place acquisition suggestions (Kulkarni et al., 2023; Yadav and Hemlata, 2024).

The presence of a functional and accessible OPAC is a qualitative improvement in the Nigerian university context of the old and obsolete card catalogues and printed shelf lists that define much of the unautomated libraries. A study by Adegboro (2021) across seven South-West Nigeria federal university libraries revealed that students who used the OPAC of Koha recorded significantly higher scores (mean = 4.1/5.0) in satisfaction than students who used manual catalogues (mean = 2.3/5.0), highlighting the transformative user experience Koha offers in the form of its catalogue discovery interface.

### Circulation and Resource Tracking

The circulation module of Koha is closely connected to the cataloguing module, in such a way that proper bibliographic records can lead to proper management of items. The system also helps in the barcode check-out, check-in, management of holds, renewal, and calculation of fines on outstanding items. The report generation facility of Koha allows the librarians to create statistical reports on the circulation events, patron category analysis, overdue lists, and inventory status, which are dependent on the quality of cataloguing records (Bowen University Library Reports, cited in Egunjobi and Awoyemi, 2012; Ogbomo et al., 2023).

## USE OF KOHA IN CATALOGUING OF INFORMATION RESOURCES IN NIGERIAN UNIVERSITY LIBRARIES

### Extent of Koha Adoption for Cataloguing

Since early in the 2010s, when some of the first Nigerian university libraries started to adopt Koha, as a cataloguing tool, the adoption of Koha by university libraries increased steadily over the years, with some of the first adopters of the tool including Redeemer University and Babcock University. In a survey of public university libraries in North-Central Nigeria, Omopupa and Abdulraheem (2019) discovered that Koha produced important beneficial outcomes in cataloguing and classification processes, and that the use of the Koha software by librarians was largely appreciated due to the ability to standardize bibliographic records and reduce human error in catalogue data.

In a more recent bibliometric analysis of 238 articles addressing Koha and the Dewey Decimal Classification (DDC) published in 2000-2024, Kulkarni et al. (2023) verified a steep increase in the amount of scholarly literature on Koha, in line with worldwide digital transformation efforts. A survey of 20 federal university libraries, carried out to complete this paper (2024), found that 14 (70) were currently using Koha to some extent to catalog, 3 (15) were fully deployed, 7 (35) were partially deployed with some automated cataloguing, and 4 (20) were not using Koha beyond the cataloguing unit.

**Table 4:** Levels of Koha Utilisation for Cataloguing in Selected Nigerian Federal University Libraries (2024)

Level of Utilisation	No. of Libraries	Percentage (%)	Key Characteristics
Full Deployment	3	15%	All modules operational; OPAC publicly accessible; Z39.50 active
Intermediate/Partial	7	35%	Cataloguing & circulation active; acquisition/serial modules dormant
Cataloguing Unit Only	4	20%	MARC record entry only; no OPAC; minimal staff trained
Planning/Installation Phase	3	15%	Koha installed but not yet live; staff training ongoing
No Koha Adoption	3	15%	Manual cataloguing; using proprietary or no ILS
<b>TOTAL</b>	<b>20</b>	<b>100%</b>	

*Table 4: Author's Survey Data (2024); cf. Ogbomo et al. (2023); Omopupa & Abdulraheem (2019)*

### The Koha Cataloguing Workflow, A Process Schematic

To better appreciate the usefulness of Koha, as well as its implementation needs, it is important to understand how it is operationalised within the cataloguing process. The schematic (Figure 2) below outlines the typical Koha mediated cataloguing workflow within the context of a Nigerian university library, including the acquisition of a resource to its availability in the OPAC:

**Table 5: Koha Cataloguing Workflow in a Nigerian University Library Setting**

Step	Process Stage	Koha Functionality Engaged	Output
1	<b>New Resource Receipt</b>	Acquisitions module , order record created; item received and marked	Acquisition record; item flagged 'on order'
2	<b>Z39.50 Search</b>	Z39.50 client queries LC, BL, OCLC databases for matching MARC record by ISBN/Title	Retrieved MARC record or trigger for original cataloguing
3a	<b>Copy Cataloguing</b>	Librarian imports retrieved record; edits local holdings fields (852, 942); adds call no.	Edited MARC21 bibliographic record
3b	<b>Original Cataloguing</b>	Librarian creates new MARC template; populates 100, 245, 260/264, 300, 650, etc.	New MARC21 bibliographic record
4	<b>Authority Control</b>	Authorities module validates headings against authorised name/subject authority files	Authorised headings applied; bibliographic consistency assured
5	<b>Item Record Creation</b>	Item-level data entered: barcode, collection code, location, item type, call number	Item record linked to bibliographic record
6	<b>Physical Processing</b>	Barcode label printed via Koha label module; spine label generated; item stamped	Physically processed, shelf-ready item
7	<b>OPAC Publication</b>	Record published to OPAC; indexed by Zebra/Solr; publicly searchable	OPAC record visible; item available for patron discovery

**Table 5: Author's Process Schematic (2024); adapted from Ogbomo et al. (2023); Kulkarni et al. (2023)**

### Impact of Koha on Cataloguing Efficiency: Evidence from Nigerian Libraries

The effect of Koha on Cataloguing Efficiency: Nigeria Library Evidence.

Empirical research on the subject has been performed in libraries of various universities in Nigeria, and recorded that the efficiency in cataloguing improved dramatically after the adoption of Koha. The survey of 354 library staff in five public university libraries in North Central Nigeria by Omopupa and Abdulraheem (2019) with Koha revealed that 64% of respondents said that staff could use Koha to do cataloguing and classification to a very high degree, with 24% saying they could use Koha to a very high degree, and 88% of everyone answered that they The study by Ogbomo et al. (2023) on the library of Admiralty University of Nigeria introduced Koha catalogue reported that copy cataloguing with Z39.50 saved time spent on individual items (around 25 minutes) and saved over 92 percent of time on individual item cataloguing (under 2 minutes) in comparison with individual item cataloguing without Z39.50.

The library of the institution where the author of this paper was based, Adeyemi College of Education Library (since it became Adeyemi Federal University of Education Library), Ondo, has also reported transformative effects following upgrading to the use of Koha to automate its library. The literature cited a case study to describe library automation at Adeyemi College of Education where automation enhanced relevance of libraries to the academic community because library staffs enjoy working in an automation facility and patrons like the services provided (Egunjobi and Awoyemi, 2012). Whereas there have been infrastructure difficulties in some of the cataloguing units, the institutional trend has been towards complete integration of Koha as a strategic priority.

### CHALLENGES TO THE USE OF KOHA IN CATALOGUING OF INFORMATION RESOURCES IN ACADEMIC LIBRARIES

#### Infrastructure Deficits

The most ubiquitous and fundamental threat facing the adoption and continued usage of Koha in libraries within the Nigerian universities is the insurmountable lack of ICT infrastructure. The World Bank reported that Nigeria has a gap of about 100 billion a year in infrastructure investments, which were listed in the 2019 evaluation (NCC, 2021). In the case of academic libraries, this infrastructure shortage is most evident in three forms: unreliable power supply, poor internet connectivity, and lack of server and computer hardware.

Unpredictable and intermittent power supply is probably the biggest operational risk of any system that relies on

technology in Nigeria. A large number of university libraries face 8-16 hours of power cuts per day, which makes always-on server systems, which Koha relies on, extremely sensitive to data corruption, system crashes, and service failure. Although generator backup is a common practice, the fuel costs incur extra costs that put extra pressure on already stretched library budgets (NCC, 2021; Abu and Okafor, 2023). According to a study by the Nigerian Communications Commission (NCC, 2021), approximately 65.5% of the surveyed libraries did not have separate bandwidth connections to offer internet services to their clientele because of insufficient funding, which is also reflected in a study conducted by Iyoro (2019) on university libraries in North-West Nigeria.

### Financial Constraints

Although Koha has the advantage of zero licensing costs, its successful implementation is quite costly in terms of financial investments, which includes server hardware, network cabling and infrastructure, technical implementation and configuration services, employee training programmes, and system maintenance. These implementation costs pose prohibitive barriers to the implementation of the solution to many Nigerian public universities libraries, whose recurrent budgetary allocations often do not exceed 0.5% of the total university budgets, which is significantly less than the UNESCO recommended range of 5-10% of institutional budgets (Ajani and Buraimo, 2022; Abubakar, 2011).

The ICT facilities in the chosen Nigerian university libraries, Adeyemi et al. (2025) discovered, were restricted to bare minimum facilities like computers, printers, scanners and photocopiers, with libraries having to adapt solar energy usage in powering ICT facilities as a workaround to epileptic grid power, which is a costly yet requisite investment. Nigeria, because of its financial pressures, is heightened by greater economic strain on Nigeria in the form of inflation and currency devaluation that makes imported technology equipments even more expensive.

### Human Capacity Gaps

The effective implementation and support of Koha involves the presence of a corps of library professionals possessing a set of competencies that range both in the traditional cataloguing expertise (MARC21, RDA, DDC, LCSH, authority control) and the modern ICT expertise (Linux server administration, database management, network configuration). Studies reveal that there is a notable human capacity gap in the combined skill set of the Nigerian academic librarians (Abu and Okafor, 2023; Ahmed and Ibrahim, 2023).

According to a study by Idhalama et al. (2022), the majority of libraries in Nigeria did not have a robust policy to support the use, access, retrieval, and utilisation of e-resources, and the primary reasons given to the lack of ICT integration related to lack of skilled IT personnel and low bandwidth. This lack of human capacity is further exacerbated by the fact that the official curriculum element of Koha or open-source ILS management does not exist in many Nigerian Library and Information Science (LIS) degree courses, establishing a structural gap that is not easily bridged by informal on-the-job training only (Ahmed and Ibrahim, 2023; Ogunche, 2017).

**Table 6: Summary of Key Challenges to Koha Adoption in Nigerian University Libraries**

Challenge Category	Specific Manifestation	Documented Evidence / Source
<b>Infrastructure</b>	Epileptic power supply; poor internet bandwidth; inadequate hardware	NCC (2021); Abu & Okafor (2023); Adeyemi et al. (2025): 65.5% of libraries lacked separate internet bandwidth
<b>Funding</b>	Low library budgets; high cost of imported ICT equipment	Ajani & Buraimo (2022); CULNU (2022): most libraries receive <0.5% of institutional budget
<b>Human Capacity</b>	ICT skill gaps; inadequate Koha/Linux training; LIS curriculum gap	Ahmed & Ibrahim (2023); Idhalama et al. (2022); Abu & Okafor (2023)
<b>Policy/Governance</b>	Absence of automation policy; poor management support; bureaucratic bottlenecks	Idhalama et al. (2022); Ajani & Buraimo (2022); CULNU (2022)
<b>Technical Complexity</b>	Complex Linux-based installation; configuration customisation difficulty	Ogbomo et al. (2023); Kulkarni et al. (2023); GR Tech (2023)
<b>Data Migration</b>	Legacy catalogue conversion to MARC21/Koha format; MarcEdit use required	Ogbomo et al. (2023); University of Nebraska (2022) case study documentation

**Table 6: Author's Synthesis (2024)**

## **PREFERRED SOLUTIONS AND STRATEGIC RECOMMENDATIONS**

Based on the empirical evidence analysis and frameworks used to analyze them, this paper can suggest the following Koha-based strategic solutions to sustainable cataloguing transformation in Nigerian university libraries:

### **Infrastructure Development and Maintenance**

The management of universities and other government agencies should focus on investing in consistent ICT infrastructure as the condition of Koha sustainability. In particular, libraries are to be fitted with special solar-powered server rooms, battery backup systems, ensuring 24/7 off-line, fibre-optic internet connectivity and specific library bandwidth allocation, and periodic hardware upgrades in line with Koha version upgrades. The NUC ought to include minimum ICT infrastructure requirements to automate libraries in its BMAS accreditation requirement, which would establish regulatory motivation to the university management to invest in library technology (Adeyemi et al., 2025; Ajani and Buraimo, 2022).

### **Capacity Building and Training**

There must be a multi-level capacity building programme that is systematic. On institutional level, libraries ought to create special Koha training departments, produce local installation documentation and training manuals, and design formal on boarding programmes to new library employees. Professional associations like the Nigerian Library Association (NLA) and CULNU should also hold regular Koha workshops, webinars and annual training conferences at the sectoral level. On the education side, the NUC must make ILS administration, including Koha, part of undergraduate and postgraduate courses in LIS in Nigerian universities (Ahmed and Ibrahim, 2023; Ogunche, 2017).

### **Inter-Library Koha Consortia**

Nigerian university libraries with Koha are encouraged to form formal consortia to allow to share hosting facilities, cost sharing of technical support, joint cataloguing (union catalogues), and knowledge sharing. The consortium Koha deployment model has demonstrated a great success in the US (e.g., in the VOKAL consortium of Vermont) and has strong potential benefits to the Nigerian situation where a single library technical capacity might not be adequate to manage an individual server (Wikipedia, 2024; Ogbomo et al., 2023).

### **Government and Donor Funding**

The NUC and the Tertiary Education Trust Fund (TETFund) of the Federal Government of Nigeria need to set up separate funds to fund the automation of libraries, such as the implementation of Koha and training. Partners in development such as UNESCO, Bill and Melinda Gates Foundation Global Libraries initiative, and IFLA must be actively involved in helping Koha to build capacity in Nigerian university libraries. The Zero licensing cost benefit of Koha must be clearly conveyed to funding agencies as an argument of cost-efficiency in investing in the implementation, as opposed to licensing (CULNU, 2022; Abubakar, 2011).

## **CONCLUSION AND RECOMMENDATIONS**

The paper has discussed how Koha Library Management System is applied in the 21st century Nigerian university libraries in cataloguing library information resources. All the evidence gathered through empirical research, institutional history, and theoretical constructs points to a few things: Koha provides provenly greater efficiency in cataloguing than traditional systems; its uptake in Nigerian university libraries is increasing yet incomplete and patchy, and a set of infrastructure, financing, and human capacity and policy issues still limits its use to optimal performance.

The revolutionary nature of Koha in the Nigerian university library cataloguing cannot be doubted. The thing that is needed is a multi-stakeholder response that will provide the enabling conditions, infrastructure, capacity, funding, and policy without which even the mightiest open-source software will fail to provide its dividends. Specific recommendations are presented below:

- The NUC is recommended to ensure library automation (including the presence of OPAC through Koha) is a mandatory accreditation requirement, with phase-in schedules and compliance monitoring procedures.
- TETFund ought to establish special intervention fund on library automation of universities with grants made on Koha hardware, installation and training.
- University Vice-Chancellors are advised to make University Library automation a strategic five-year institutional priority, with its own budgetary allocations.
- The NLA and CULNU ought to build a national Koha support system, which would offer technical support, shared hosting and peer learning opportunities to member libraries.
- LIS schools need to update their curricular to incorporate Koha administration, MARC21 cataloguing and ILS management as essential skills in undergraduate and postgraduate courses.
- Libraries need to use MarcEdit and Z39.50 protocol to systematically convert legacy catalogue records, focusing on high circulation and newly acquired materials.

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