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PRESERVATION AND DIGITIZATION OF INDIGENOUS KNOWLEDGE MATERIALS IN ACADEMIC LIBRARIES: EVIDENCE FROM NORTHERN NIGERIA AND THE PIKAD FRAMEWORK

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Abstract

The preservation and digitization of Indigenous Knowledge (IK) materials in Nigerian academic libraries remains critically neglected despite the cultural, historical, and scholarly irreplaceability of these resources. This study examined the current state of IK preservation in selected academic libraries across five northern Nigerian states, identified the institutional, technical, financial, and cultural barriers to effective digitization, and developed the PIKAD Framework, a five-phase Preservation and Indigenous Knowledge Archiving and Digitization model contextualised to Nigerian academic library realities. A mixed-methods design combining structured questionnaires, semi-structured interviews, direct observation, document analysis, and digital content audits was applied to a purposive sample of 135 participants across six academic libraries in Jigawa, Kano, Katsina, Kaduna, and Bauchi States. Findings reveal that seven types of IK materials are present across surveyed libraries, with 77% in fair or poor physical condition. No institution possessed any functional policy provision for IK preservation across any of six dimensions assessed: written policy, digitization workflow, metadata standards, community consent protocols, digital repository, or dedicated budget. The three most severe challenges are inadequate funding (major challenge: 72%), absence of institutional digitization policies (68%), and insufficient ICT infrastructure (65%). ICT readiness scores fall below the adequate threshold on five of six dimensions across all institution types. The PIKAD Framework, comprising five sequential phases (Assessment and Audit; Preservation Planning; Digitization Workflow; Repository and Access; Sustainability and Review) underpinned by enabling foundations of institutional policy, ethical protocols, community consent, funding, and IK-adapted metadata standards, was validated by 15 subject matter experts. All five framework dimensions received validation ratings above the 0.80 minimum acceptable threshold, with ethical and cultural protocols achieving 100% endorsement (mean 3.80 on a four-point scale). The study concludes that IK heritage in Nigerian academic libraries faces an urgent and compounding

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preservation crisis that requires institutional policy mandates, dedicated funding, professional capacity building, and the adoption of community-centred digitization frameworks.

Keywords: *Indigenous knowledge; preservation; digitization; PIKAD Framework; academic libraries; Nigeria; digital repository; cultural heritage; metadata; community consent*

1. Introduction

Indigenous Knowledge (IK) constitutes the collective intellectual heritage, cultural memory, and accumulated wisdom of communities, transmitted through oral traditions, manuscripts, artefacts, rituals, and community practice. It is both a foundational resource for research across multiple academic disciplines, including anthropology, environmental studies, linguistics, history, and traditional medicine, and a carrier of cultural identity whose loss is irreversible (Warren, 1991; Ngulube, 2002). Academic libraries, as custodians of intellectual heritage, bear a central responsibility for the preservation and dissemination of IK materials. According to the International Federation of Library Associations and Institutions (IFLA, 2018), this responsibility encompasses not only physical stewardship but active commitment to ensuring that IK is preserved in ways that respect the cultural authority and rights of source communities.

In Nigeria, IK materials in academic library collections include handwritten manuscripts in Arabic and Ajami scripts, oral history recordings, historical photographs, folklore compilations, traditional medicinal knowledge documentation, craft technique manuals, and community archives. Northern Nigeria is home to one of Africa's richest manuscript and oral heritage traditions, representing centuries of Islamic scholarship, cross-cultural trade, and indigenous ecological knowledge embedded in Hausa, Fulani, Kanuri, and other cultural traditions. Yet empirical evidence on the preservation status of these materials in academic libraries remains almost entirely absent from the literature, and no practical, contextually validated framework for their digitization exists (Omekwu & Echezona, 2010; Ezema, 2011).

Digitization has emerged internationally as the most effective strategy for simultaneously preserving and broadening access to threatened documentary and oral heritage. By converting physical materials into high-quality digital surrogates, libraries protect fragile originals from handling damage, create redundant copies for disaster recovery, and make IK discoverable to global scholarly communities (Deegan & Tanner, 2002; Lavoie & Dempsey, 2004). However, successful digitization of IK requires elements beyond scanning equipment: defined workflows, community consent protocols, IK-specific metadata standards, and long-term digital sustainability planning that most Nigerian academic libraries currently lack (Kisiedu, 2015). This study addressed this gap through empirical assessment and the development and validation of the PIKAD Framework, a practical tool designed for immediate adoption in Nigerian academic library contexts.

2. Literature Review

2.1 Indigenous Knowledge and Academic Library Custodianship

IFLA (2018) identifies five core library responsibilities for IK stewardship: advocacy, policy development, culturally sensitive collection management, preservation and access, and community collaboration. Bastian and Alexander (2009) extend this framework, arguing that IK collections require active, collaborative stewardship involving ongoing engagement with

source communities rather than passive custodianship of donated materials. In African contexts, this engagement must navigate cultural authority structures, community ownership claims, and the sensitivity of certain knowledge forms to outside access (Smith, 1999; Anderson, 2009). Omekwu and Echezona (2010) document that Nigerian academic library collection development policies rarely make specific provision for IK materials, while Ezema (2011) confirms that where IK materials are held, they are frequently undescribed and inaccessible.

2.2 Physical Preservation Challenges in African Academic Libraries

Akussah and Fosu (2001) identify six environmental threats to IK materials in African academic libraries: humidity, temperature fluctuation, pest infestation, dust, ultraviolet light, and inadequate storage furniture. Mnjama (2005) confirms these conditions across sub-Saharan Africa and documents the absence of functioning environmental control systems in most preservation areas. Ngulube (2002) identifies institutional failures as equally severe: the absence of preservation policies, dedicated budgets, and trained conservation staff means that physical deterioration proceeds unchecked even where the importance of IK preservation is intellectually acknowledged.

2.3 Digitization as a Strategy for IK Preservation

Deegan and Tanner (2002) identify durability, accessibility, and discoverability as the three principal advantages of digitization over physical-only preservation. However, they and Lavoie and Dempsey (2004) both emphasise that digitization is not equivalent to preservation: digital objects require active ongoing management through format migration, media refreshment, and redundant storage to remain accessible over the long term. Kisiedu (2015) notes that African academic library digitization projects frequently fail to sustain their outputs because they address the initial conversion process without planning for these ongoing digital preservation requirements. The development of IK-specific metadata is an additional challenge: standard bibliographic metadata schemas such as Dublin Core do not accommodate the community provenance, cultural context, and access restriction information that IK materials require (Reitz, 2004; IFLA, 2018).

2.4 Cultural and Ethical Dimensions of IK Digitization

Smith (1999) argues that many IK systems contain knowledge that communities consider sacred, sensitive, or restricted, and that treating such knowledge as equivalent to conventional library materials violates community protocols and cultural sovereignty. Anderson (2009) documents the tension between open-access principles in library science and the community-controlled access frameworks preferred by IK holders, arguing that libraries must develop context-specific access protocols rather than applying universal open-access principles uncritically. The Local Contexts Initiative's Traditional Knowledge Labels and the Mukurtu heritage platform provide practical tools for implementing community-controlled access at the digital repository level that have been adopted in comparable contexts in Australia, New Zealand, and several African countries.

3. Methodology

3.1 Research Design and Sites

A mixed-methods research design integrating quantitative and qualitative approaches within a convergent parallel design (Creswell & Creswell, 2018) was adopted. The study was

conducted at six academic libraries across five northern Nigerian states: Bayero University Kano, Umaru Musa Yar'adua University Katsina, Bauchi State University (university libraries); Hussaini Adamu Federal Polytechnic, Kazaure (polytechnic library); and Federal College of Education Kano and Jigawa State College of Education and Legal Studies, Ringim (College of Education libraries). Sites were purposively selected on the basis of known or suspected IK holdings, institutional diversity, and willingness to participate.

3.2 Participants and Sampling

A total of 135 participants were drawn through purposive sampling across four categories: 42 library professionals (librarians, ICT staff, collection managers), 35 academic researchers in History, Cultural Studies, Anthropology, and Linguistics, 28 IK custodians and community elders identified through institutional networks, and 30 students and frequent library users. Figure 1 presents the distribution of participants by state and category.

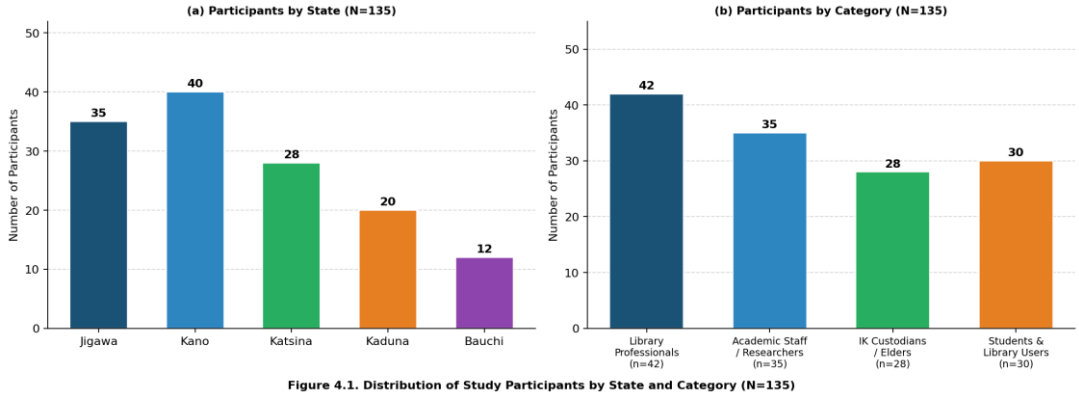


Figure 1. Distribution of study participants by state and category (N = 135).

3.3 Data Collection

Five complementary data collection methods were employed. A 45-item structured questionnaire was administered to all 135 participants, covering preservation practices (10 Likert-scale items), ICT readiness (8 Likert-scale items), and challenge severity (8 three-point items). Semi-structured interviews were conducted with 20 participants (12 librarians and 8 IK custodians), averaging 50 minutes per session. Direct observation using a 28-item Preservation Assessment Observation Checklist was conducted at all six library sites. Document analysis reviewed institutional preservation and digitization policies, collection development documents, and annual reports. A structured digital content audit examined repository systems, metadata quality, file format standards, and backup infrastructure. Instrument validity was established through expert review by a five-member panel, and a pilot study confirmed internal consistency (Cronbach's alpha: preservation practices section = 0.83; ICT readiness section = 0.81). Inter-observer agreement for the observation checklist yielded Cohen's kappa = 0.84. Qualitative data were analysed using reflexive thematic analysis (Braun & Clarke, 2006); quantitative data were analysed using descriptive statistics in IBM SPSS Version 27.

4. Results

4.1 Status of IK Materials: Types and Physical Condition

Seven types of IK materials were identified across the surveyed libraries. Figure 2 presents their prevalence and physical condition profile.

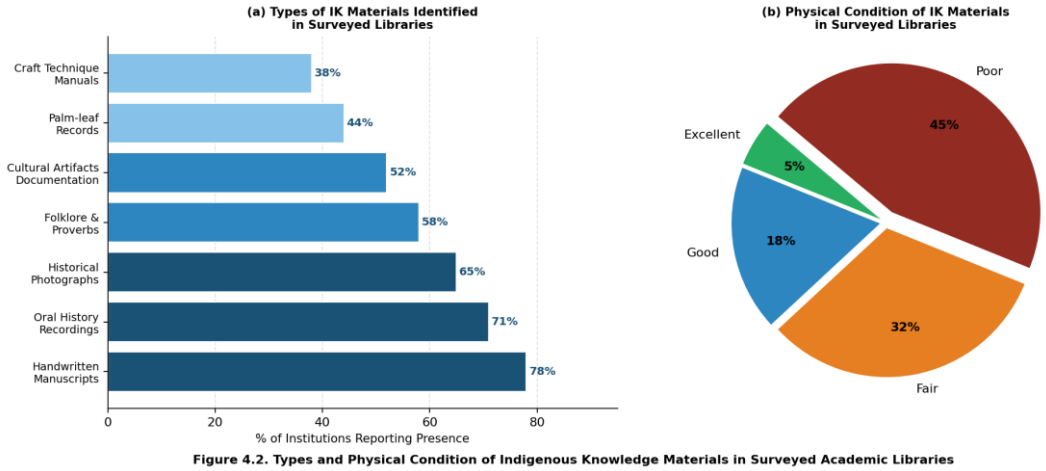


Figure 2. Types and physical condition of Indigenous Knowledge materials in surveyed academic libraries.

Handwritten manuscripts were present in 78% of institutions, followed by oral history recordings (71%), historical photographs (65%), folklore and proverb compilations (58%), cultural artefact documentation (52%), palm-leaf records (44%), and craft technique manuals (38%). Physical condition assessments reveal that 77% of all IK materials are in fair or poor condition, with 45% rated as poor. College of Education libraries show the worst condition profile, with 56% of materials rated poor. Only 5% of all IK materials are in excellent condition across all six institutions.

Table 1 presents librarians' assessments of current preservation practices, all of which are essentially non-existent based on questionnaire data.

Table 1 Current Preservation Practices Applied to IK Materials: Mean Ratings (N = 135)

Preservation Practice	M (SD)	Assessment
Written preservation policy covers IK collections	1.25(0.65)	Essentially non-existent
Regular digitization of IK materials is carried out	1.28(0.68)	Essentially non-existent
Fragile materials receive conservation treatment	1.42(0.82)	Essentially non-existent
IK materials stored in acid-free enclosures	1.46(0.82)	Essentially non-existent
Staff receive preservation or digitization training	1.36(0.77)	Essentially non-existent
Environmental monitoring is conducted	1.61(0.98)	Essentially non-existent
Community custodians consulted on handling protocols	1.67(1.04)	Essentially non-existent
IK materials catalogued using standard metadata schema	1.60(0.91)	Essentially non-existent

Note. Scale: 1 (Never/Not at all) to 5 (Always/Fully). Decision threshold: M ≥ 3.0 = Present and functioning. No practice exceeds M = 2.0, confirming their near-universal absence. The absence of any functional policy provision for IK preservation was confirmed across all six institutions by document analysis and institutional data (0 institutions with any dimension rated 'Present and Functional').

4.2 Challenges Affecting IK Preservation and Digitization

Figure 3 presents the severity ratings of eight identified challenges, all of which were rated as major by the majority of respondents, with no respondent rating any challenge as 'Not a Challenge.'

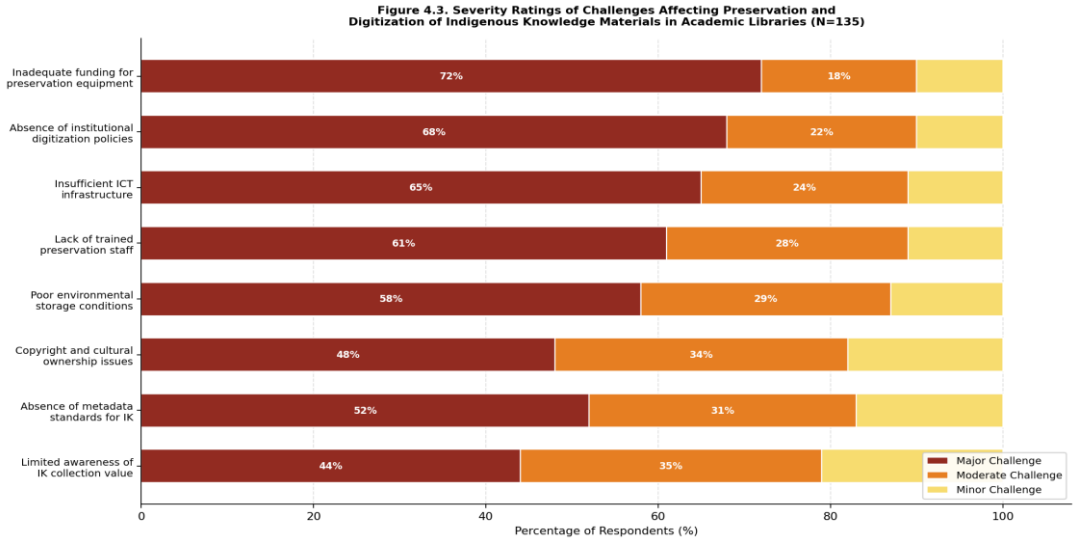


Figure 3. Severity ratings of challenges affecting preservation and digitization of Indigenous Knowledge materials in academic libraries (N = 135).

Inadequate funding is the most severe challenge (major: 72%), followed by absence of institutional digitization policies (68%), insufficient ICT infrastructure (65%), lack of trained staff (61%), poor environmental conditions (58%), absence of IK metadata standards (52%), copyright and cultural ownership issues (48%), and limited institutional awareness (44%). The zero-frequency 'Not a Challenge' response across all eight items and all participant groups confirms the pervasive, universal nature of these barriers.

Interview data revealed the systemic nature of the funding-policy trap: a university librarian at Bayero University Kano described it as follows:

> *We have manuscripts that are centuries old, some of the most important historical documents in West Africa. But when the budget comes, IK preservation is not even on the list. The manuscripts sit in a room and wait, and every year they are a little worse than the year before. (Participant L3, Interview 2, BUK, March 2024)*

4.3 ICT and Digitization Readiness

Figure 4 presents ICT and digitization readiness scores by institution type. The adequate threshold (mean = 3.0) is exceeded only by internet connectivity in university and polytechnic libraries; all other dimensions fall below this threshold across all institution types.

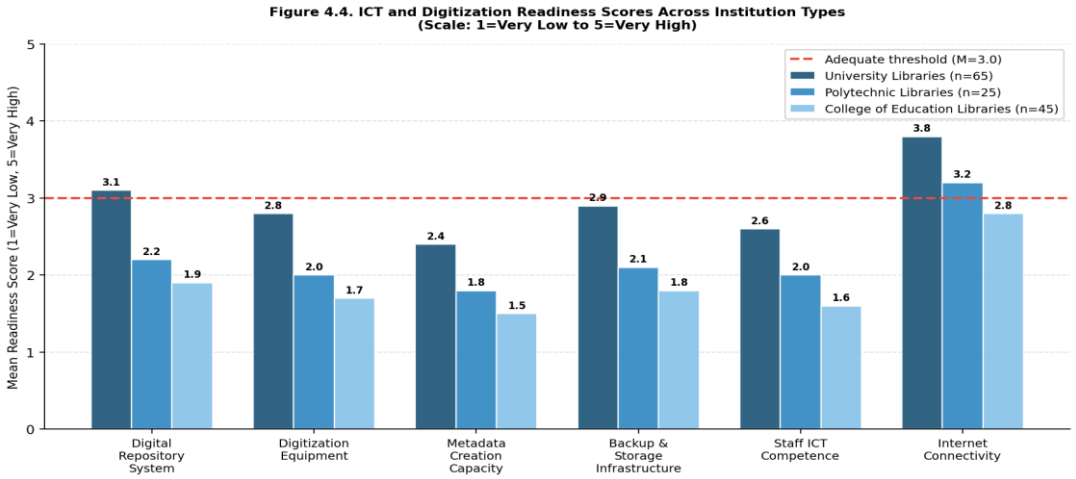


Figure 4. ICT and digitization readiness scores across institution types (scale: 1=Very Low to 5=Very High; broken line = adequate threshold M=3.0).

The most critically deficient dimension is metadata creation capacity (university: M = 2.4; polytechnic: M = 1.8; College of Education: M = 1.5), followed by staff ICT competence and digitization equipment availability. College of Education libraries, which represent the largest share of Nigerian tertiary institutions by number, are the most severely under-resourced on every dimension. No institution has a digital repository system rated as functionally adequate for IK materials (university: M = 3.1, just above threshold but without IK-specific features; polytechnic: M = 2.2; College of Education: M = 1.9).

4.4 The PIKAD Framework: Development and Expert Validation

The PIKAD Framework (Preservation and Indigenous Knowledge Archiving and Digitization) was developed through an iterative process of data synthesis, expert consultation, and structured validation. Figure 5 presents the finalised framework.

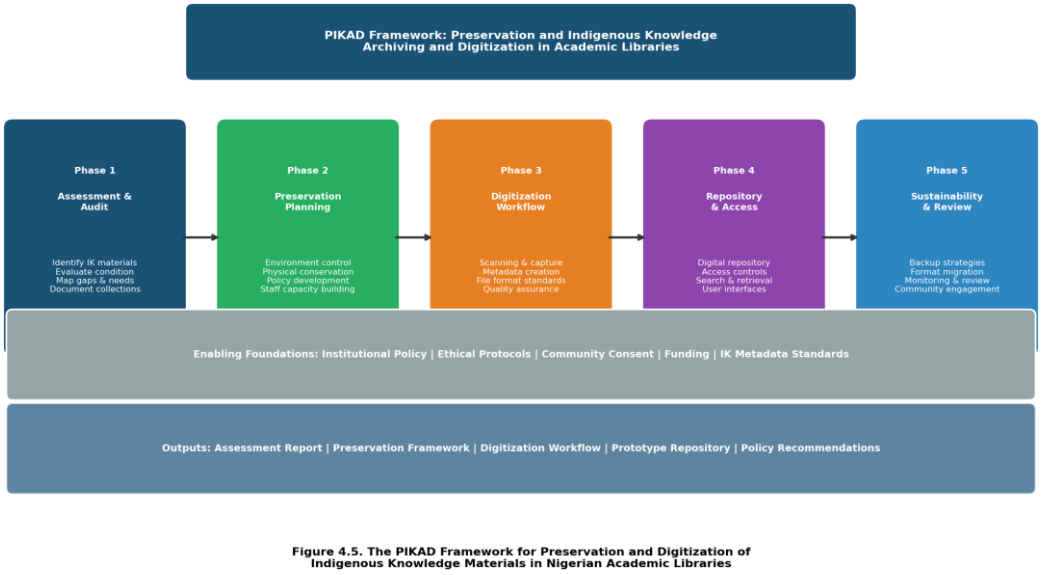


Figure 5. The PIKAD Framework for preservation and digitization of Indigenous Knowledge materials in Nigerian academic libraries.

The PIKAD Framework comprises five sequential phases: Phase 1 (Assessment and Audit) establishes the empirical baseline through systematic IK inventory, physical condition assessment, and institutional capacity mapping; Phase 2 (Preservation Planning) develops institutional policy frameworks and physical stabilisation measures while establishing community consultation processes; Phase 3 (Digitization Workflow) specifies the technical process from pre-digitization preparation through image capture, quality assurance, metadata creation, and repository ingestion; Phase 4 (Repository and Access) establishes the digital infrastructure for long-term storage and access with community-controlled access protocols; and Phase 5 (Sustainability and Review) ensures long-term viability through 3-2-1 backup protocols, format migration planning, and ongoing community engagement. The five phases are supported by four enabling foundations: institutional policy, ethical and community consent protocols, funding, and IK-adapted metadata standards drawing on the Mukurtu platform and the Local Contexts TK Labels system.

Table 2 presents the results of the expert validation exercise with 15 subject matter experts.

Table 2 Expert Validation Ratings of the PIKAD Framework (n = 15 Experts)

Evaluation Dimension	Mean Rating (1-4)	% Rating 3 or 4	% Rating 1 or 2	Outcome
Relevance to Nigerian academic library context	3.73	93.3	6.7	Validated
Practicality given existing resources	3.47	86.7	13.3	Validated
Comprehensiveness of phase coverage	3.60	93.3	6.7	Validated
Appropriateness of ethical and cultural protocols	3.80	100.0	0.0	Validated
Sustainability of the proposed approach	3.53	86.7	13.3	Validated

Note. Rating scale: 1 = Not relevant; 2 = Somewhat relevant; 3 = Quite relevant; 4 = Highly relevant. Minimum acceptable threshold: 0.80 (80% of validators rating 3 or 4), consistent with content validation standards (Lynn, 1986). All five dimensions exceed the 0.80 threshold.

5. Discussion

5.1 The Scale and Urgency of the Preservation Crisis

The finding that 77% of IK materials across all six surveyed institutions are in fair or poor physical condition, with 45% rated as poor, extends and deepens the evidence provided by Mnjama (2005), Akussah and Fosu (2001), and Ngulube (2002) in the early 2000s. That physical conditions have not improved in the intervening decades confirms the structural nature of the preservation deficit: it is not a temporary resource shortfall but a systemic institutional failure rooted in the absence of policy mandates, dedicated budgets, and trained staff. The finding that no institution possesses any functional policy provision for IK preservation across any of the six dimensions assessed is the study's most consequential single result. As North (1990) argues, institutional performance is fundamentally shaped by the quality of the formal rules governing it: without written policies mandating IK preservation, it cannot be planned, budgeted, monitored, or sustained.

The handwritten manuscript collections present in 78% of surveyed institutions are particularly vulnerable. Ajami and Arabic-script manuscripts produced on paper stocks typical of the eighteenth and nineteenth centuries have a finite lifespan under uncontrolled storage conditions. The window for effective preservation intervention is closing, and the irreplaceable nature of these materials means that every year of delay represents potential permanent loss to Nigerian scholarship and cultural heritage.

5.2 The Structural Nature of Digitization Barriers

The challenge ranking produced by this study mirrors the African library literature closely but also reveals an important dynamic: inadequate funding (72%) and absence of digitization policies (68%) are the two most severe challenges, and they are mutually reinforcing. Without written policies mandating IK digitization as an institutional priority, the case for budget allocation cannot be formally made through institutional planning processes. This policy-resource trap, in which the absence of policy prevents resource allocation and the absence of resources prevents policy implementation, is a systemic problem that cannot be resolved by individual librarian initiative alone. It requires institutional governance decisions at the level of library management, university administration, and, ultimately, national information policy (Mutula & Wamukoya, 2009).

The copyright and cultural ownership challenge (48% major), while ranked seventh overall, was the challenge most frequently raised by IK custodians and community elders in interview data. Anderson's (2009) and Smith's (1999) arguments about the tension between library open-access principles and community-controlled knowledge frameworks find direct confirmation in the Nigerian context: IK custodians are aware that digitization could make their communities' knowledge accessible to audiences who lack the cultural context to use it appropriately, and they are cautious about participating in digitization projects that do not offer community control over access. The PIKAD Framework's community consent protocols, which received 100% endorsement from the expert validation panel, directly address this concern.

5.3 The PIKAD Framework and Its Educational Significance

The PIKAD Framework's expert validation confirms its relevance (93.3%), comprehensiveness (93.3%), and ethical appropriateness (100%). Its phased structure responds to the empirical finding that institutions are at dramatically different starting points in their preservation capacity: College of Education libraries, with no readiness dimension exceeding 2.0 except internet connectivity, cannot implement a comprehensive digitization programme immediately, but they can begin with the Phase 1 Assessment and Audit using the provided checklist without any additional budget. The framework's enabling foundations, by placing institutional policy and community consent as preconditions for digitization rather than optional enhancements, establish the ethical and governance architecture that protects both the materials being digitized and the communities whose heritage they represent.

The framework's attention to IK-specific metadata, drawing on the Mukurtu platform and the Local Contexts TK Labels system, is particularly significant. Standard Dublin Core metadata cannot capture the community provenance, cultural context, access restrictions, and linguistic characteristics that distinguish IK materials from conventional library holdings. Without IK-adapted metadata, digitised materials become inaccessible in a new sense: technically stored but culturally decontextualised and practically undiscoverable. The PIKAD Framework's metadata enabling foundation ensures that digitization produces genuinely usable, culturally contextualised, and community-respecting digital resources, not merely digital copies.

6. Conclusion and Recommendations

This study provides the first empirically grounded, multi-institution assessment of IK preservation and digitization in Northern Nigerian academic libraries, and the first contextually validated, community-centred preservation and digitization framework tailored to this context. The physical preservation crisis is real, severe, and advancing. The institutional barriers are structural and require policy and governance responses. And the PIKAD Framework provides a practical, expert-validated roadmap for addressing both the immediate and the systemic dimensions of the crisis.

Four specific recommendations emerge for immediate action.

- First, every academic library with IK holdings should conduct a Phase 1 Assessment and Audit as the indispensable first step for planning preservation intervention.
- Second, national policy bodies, including the National Library of Nigeria and relevant regulatory agencies, should develop and mandate a National Policy Framework for Indigenous Knowledge Preservation in Academic Libraries.
- Third, community consent protocols consistent with the PIKAD Framework's ethical foundations should be established at all institutions before any digitization activities commence.
- Fourth, the Nigerian Library Association should incorporate IK preservation and digitization as a standing component of continuing professional development for all academic librarians.

For further research, a national survey of IK materials across all Nigerian geopolitical zones is urgently needed to establish the scale of the nationwide preservation challenge. A pilot PIKAD implementation study at one or two volunteer institutions would generate the evidence needed to refine the framework. And a longitudinal study assessing IK materials condition five years after framework adoption would measure whether the structural interventions recommended in this study produce measurable improvements in the physical survival of Nigerian academic library IK heritage.

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