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THE DEPOSIT GAP: AUDITING NIGERIAN UNIVERSITY INSTITUTIONAL REPOSITORIES AS A SOURCE BASE FOR AFRICAN-GROUNDED ARTIFICIAL INTELLIGENCE

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Abstract

Institutional repositories are widely proposed as a source of African material for training artificial intelligence systems, on the assumption that what they hold is digital, open and retrievable. This paper audits that assumption for Nigerian university repositories. A census of the OpenDOAR directory was combined with direct retrieval of twelve repositories in August 2026, addressing registration, reachability, holdings, metadata quality and reuse rights. The census returned thirty-nine entries reducing to thirty-two universities, while three operating repositories were found outside the directory entirely, indicating undercounting. Five of nine sampled repositories responded to an automated agent. Holdings stood in thousands rather than millions, a quarter of academic units at one university held nothing, a fifth of records at another carried no date, and one abstract had lost all word spacing. No repository published a machine-readable licence, and one prohibited robotic harvesting. The paper concludes that the deposit gap is a sequence of compounding filters rather than a shortage of scholarship.

Keywords: Artificial Intelligence, Institutional Repositories, Nigeria, Open Access, Text and Data Mining

Introduction

The proposition that artificial intelligence should be grounded in African knowledge has become a settled commitment of continental policy, yet it rests on an

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assumption rarely examined: that African material exists in usable digital form and the remaining difficulty is one of collection. Institutional repositories are named repeatedly in this discussion because they appear to satisfy the condition. Their contents are already digital, already full text, and nominally open. More significantly, a considerable portion of what they hold exists nowhere else. A doctoral thesis on Nigerian soil chemistry, an inaugural lecture on Nigerian constitutional history, or a digitised run of a Nigerian newspaper has no duplicate on the open web, and no quantity of English-language web text can substitute for it.

An institutional repository is a digital archive through which a university collects, preserves and disseminates the intellectual output of its own staff and students. Nigerian universities began establishing such archives from about 2009, and the literature documenting that effort is now substantial. What this literature has largely measured, however, is what repository staff report rather than what an external party encounters on arrival. The distinction is consequential, because the party of interest is not a human reader but an automated agent. A corpus builder does not interview a librarian; it resolves an address, reads a robots file, follows links, extracts text and discards whatever it cannot parse, and each of those steps may fail without anyone at the institution becoming aware of it.

The term deposit gap, used throughout this paper, denotes the distance between what Nigerian universities have produced and what is actually retrievable from their repositories. That distance is not a single quantity. It is better understood as five separate variables. Registration concerns whether a repository can be found through the directories that outside parties consult, and reachability whether it answers when visited. Volume concerns how much material is held and how it is spread across departments and years. Metadata quality concerns whether the holdings are in a condition a machine can process, and reuse rights whether the material may lawfully be copied at all. Each variable generated one research question. The aim was to determine whether, and to what extent, these repositories constitute a usable source base for African-grounded artificial intelligence.

Institutional Repositories and the African Data Deficit

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The under-representation of African languages and scholarship in language technology has been measured rather than merely asserted. Joshi et al. (2020) classified the world's languages into six tiers by resource availability and demonstrated that the majority occupy the lowest tiers, which they termed the left-behinds. Their taxonomy showed that claims of language neutrality made for contemporary systems are not supported by the distribution of the resources on which those systems are built.

Quality compounds the problem of quantity. Kreutzer et al. (2022) audited two hundred and five language-specific corpora drawn from five major web-mined datasets. At least fifteen contained no usable text whatsoever, a substantial proportion contained fewer than half usable sentences, and many carried mislabelled language codes. The implication is direct. Presence in a large web-crawled dataset is not evidence of useful presence where a low-resource language or a peripheral scholarly literature is concerned. Nekoto et al. (2020), writing for the Masakhane collective, added a structural dimension, reporting that of two thousand nine hundred and sixty-five authors across five major computational linguistics conferences in 2018, only five, or 0.19 per cent, were affiliated with African institutions.

The aggregation layer determines whether repository content reaches external parties at all, since corpus builders consume aggregators rather than visiting repositories one by one. CORE describes itself as holding the largest collection of open access full-text research papers (CORE, n.d.-a). Two of its recent statements matter here. It reported in 2025 that it now locates repositories from many sources across the internet, because registries such as OpenDOAR are no longer maintained, and that it had begun applying to Nigeria and Uganda the diagnostic methods previously used in the United Kingdom (CORE, 2025). Its full-text criterion is also exacting. A record qualifies only where it carries a publicly downloadable file whose text is machine-readable without optical character recognition (CORE, n.d.-b).

Institutional Repositories in the Nigerian Context

Nigerian scholarship supplies the supply-side picture that the computational literature lacks, and its recurring finding is that repository numbers remain low relative to the size of the university system. Adewole-Odeshi and Ezechukwu (2020) analysed the OpenDOAR directory and reported twenty-five Nigerian repositories established

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between 2009 and 2019, holding sixty-eight thousand six hundred and ten items in all. The University of Nigeria, Nsukka accounted for the largest single share at twenty-three thousand three hundred and sixty-seven. Eromosele et al. (2022) reported thirty repositories in the same directory, and Salau (2024) evaluated twenty-seven functional repositories for 2020 to 2024.

Idiedo et al. (2024) approached the question differently, combining questionnaires, repository inspection and interviews to identify twenty-one university libraries that had actually developed a repository. Their interview findings bear directly on the fifth research question here: although a few respondents mentioned having access, submission, preservation or copyright policies, the majority reported no defined policy of any kind. Ezema and Eze (2024) surveyed university libraries in South-East Nigeria and found that most lacked the infrastructure and skilled staff required to operate a repository, that DSpace was the most widely adopted software, and that universities with functional repositories achieved better rankings. Bamgbose et al. (2025), surveying two hundred and sixty-two librarians in South-West Nigeria, identified authentication of authorship as the primary factor establishing trust in a digital repository.

The legal position frames what may lawfully be done with whatever proves retrievable. Section 20(1)(a) of the Copyright Act 2022 replaced the former closed list of fair dealing purposes with an open-ended formulation (Infojustice, 2023), while Section 20(1)(c) covers non-commercial research and Section 20(1)(o) transient reproductions forming part of a technological process (AANOIP, 2023). The Act contains no dedicated text and data mining exception. Odeh (2025) argues that the regime is unduly restrictive for algorithmic training and recommends a bespoke provision, and AANOIP (2023) notes that Section 20 remains largely untested before Nigerian courts. Against this, the African Union (2024) Continental Artificial Intelligence Strategy and Nigeria's national strategy both call for local datasets without addressing whether existing publicly funded scholarship can supply one (OECD.AI, n.d.).

Methodology

The study adopted a content analysis design, applied through two instruments. The first was a census of the OpenDOAR directory listing for Nigeria, retrieved on 29 August 2026. Every entry was transcribed without alteration, together with the

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repository type and software values that the directory itself assigns. That list was then adjusted to estimate distinct universities, by removing entries typed as aggregating or governmental, entries belonging to bodies that are not universities, and duplicate second entries for institutions already counted.

The second instrument was direct retrieval. Twelve repositories were visited on the same date from a single location. Nine formed the original purposive sample, selected for presence in a directory, prominence in the prior literature, and availability of a published address rather than a guessed one. Three further repositories were added after they were found to exist outside the directory. For each, the study recorded whether content was returned, the platform and version where declared, any item or community counts shown, any publication-year distribution, the most recent visible submission, and the text of any policy page. No login was attempted and nothing was downloaded in bulk. What the study records is therefore what any visitor would see on arrival.

Three constraints limit interpretation. A repository that does not respond is not necessarily defunct. The cause may lie in its robots file, in server-side filtering, or in a transient fault, and these could not be told apart, so such cases are reported here as no response obtained rather than as closure. All requests also came from a single location within one session, and Nigerian academic hosting is subject to interruptions that a one-day exercise cannot distinguish from lasting unavailability. A third limit is technical. Where a page assembles its content after loading, item counts may not appear in the retrieved source, and those cases are reported as not displayed rather than as nil holdings.

Results and Discussion

i. Registration and Directory Visibility

The OpenDOAR listing for Nigeria contained thirty-nine entries, of which thirty-seven were typed as institutional, one as aggregating and one as governmental. Thirty-four ran DSpace, so the platform accounted for 87.2 per cent of registered Nigerian repositories, confirming the software finding of Ezema and Eze (2024). That concentration operates in both directions, since any defect in a default configuration propagates across most of the sector, as would any correction.

Table 1: *Directory census adjusted to distinct universities, with coverage estimates*

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Basis of count	Number	If 255	If 309
Directory entries retrieved	39		
Less non-university and duplicate entries	−7		
Distinct universities in OpenDOAR	32	12.5%	10.4%
Plus operating repositories outside directory	+3		
Minimum, census and retrieval combined	35	13.7%	11.3%
Confirmed by survey (Idiedo et al., 2024)	21	8.2%	6.8%

Source: Authors' compilation from the OpenDOAR listing and repository websites, August 2026. The denominators of 255 and 309 derive from conflicting 2026 reports (Businessday NG, 2026; School Registry NG, 2026).

Approximately one Nigerian university in eight holds an institutional repository. The more consequential result, however, concerns the directory itself. Three universities were found operating repositories absent from the listing entirely: Kwara State University, running DSpace 7.5 with forty communities and deposits dated 2026; the University of Benin; and Michael Okpara University of Agriculture. None of the three was found through the directory. Others almost certainly exist. This supports the statement by CORE (2025) that such registries are no longer maintained, and the Kwara State University case reveals the mechanism. The university announced in April 2025 that its repository had been listed on African Digital Research Repositories (Kwara State University, 2025), maintained by the International African Institute with AfricArXiv. It joined one directory and not the other, so any party consulting only OpenDOAR would conclude that it holds no repository. This qualifies the Nigerian literature reviewed above, since every count from Adewole-Odeshi and Ezechukwu (2020) onward derives from OpenDOAR and inherits the same undercount.

ii. Reachability of Registered Repositories

Of the nine repositories in the original sample, five returned content to an automated agent and four did not.

Table 2: *Outcomes of direct retrieval, nine-repository sample*

Institution	Address retrieved	Outcome
University of Lagos	ir.unilag.edu.ng	Retrieved
University of Ibadan	ir.library.ui.edu.ng	Retrieved

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Institution	Address retrieved	Outcome
Landmark University	eprints.lmu.edu.ng	Retrieved
University of Ilorin	uilspace.unilorin.edu.ng	Retrieved
Ahmadu Bello University	kubanni.abu.edu.ng	Retrieved
University of Nigeria, Nsukka	repository.unn.edu.ng	No response obtained
Covenant University	eprints.covenantuniversity.edu.ng	No response obtained
Federal University Oye-Ekiti	repository.fuoye.edu.ng	No response obtained
University of Jos	irepos.unijos.edu.ng	No response obtained

Source: Authors' retrieval of repository websites, August 2026. The three repositories identified outside the directory also returned content, giving eight of twelve overall.

Which repositories failed matters more than how many. Adewole-Odeshi and Ezechukwu (2020) recorded the University of Nigeria, Nsukka as the largest depositor in the country, yet nothing could be read from it on the day of retrieval. The largest known collection in Nigeria returned nothing at all. Landmark University presents a subtler case, since its website responded freely while its harvesting endpoint did not. That endpoint sits in a directory which default EPrints configurations commonly exclude, leaving the repository open to dedicated harvesters and closed to general ones. These outcomes should be read against the limits noted earlier, for one day's attempt from a single location cannot establish a reliable availability rate, and none is claimed here.

iii. Volume and Distribution of Holdings

Holdings stood in the thousands rather than the millions. The University of Lagos displayed 9,888 records across twenty of its twenty-four sections, the University of Ibadan reported 9,030, and Landmark University held 3,634, giving a combined total of 22,552 across the three repositories exposing usable counts. The order of magnitude is consistent with the 68,610 items across twenty-five repositories reported by Adewole-Odeshi and Ezechukwu (2020). These are collections the size of a well-run departmental archive rather than the size at which web-mined corpora operate, and no conversion into words or tokens is offered, since that would require per-record knowledge of full-text availability which was not collected.

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Distribution proved more uneven than the totals suggest. At the University of Lagos the three largest academic units held 46.8 per cent of all displayed items, while five of the twenty displayed units held nothing at all. Among the empty units was the Faculty of Computing and Informatics, meaning that the unit most likely to produce work on Nigerian language technology contributed nothing to the open record. A comparable concentration appeared at the University of Ibadan. There the ten most frequent author strings accounted for 18.7 per cent of all records, and a single string for 543 items, which points to a collection shaped by a few digitisation projects rather than by routine self-archiving. Deposit currency showed a similar pattern at Landmark University, where annual deposits peaked at 379 records for 2019 and fell in every subsequent year to 56 for 2025, a decline of 85.2 per cent. Ordinary deposit lag explains part of this, but not six consecutive years of decline, since the 2022 figure of 151 falls below the 2015 figure of 223 seven years later.

iv. Metadata and Text Integrity

Five classes of defect were observed directly, each of which degrades the material for automated processing while leaving it apparently sound to a human reviewer.

Table 3: *Metadata and text defects observed, with consequences for machine processing*

Defect class	Scale observed	Consequence
Missing publication year	744 of 3,634 records (20.5%)	Date filtering and recency weighting silently mishandle a fifth of the collection
Impossible dates	3 records; facet extends to 2033	Indicates that no validation operates at the point of deposit
Records without attached files	22 records	Fails the full-text criterion stated by CORE (n.d.-b)
Duplicate records	2 consecutive identical records	Unfiltered ingest acquires the same text twice
Destroyed inter-word spacing	1 abstract observed	Readable by a person; fragmented into meaningless units by a tokeniser

Source: Authors' examination of repository records, August 2026.

The final defect warrants expansion because it defeats the conventional quality-control loop. One abstract presented a complete sentence as an unbroken string of letters,

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the signature of text extraction that has lost word boundaries. A repository manager inspecting that record in a browser sees ordinary text, because a human reader reconstructs the words without effort, whereas an automated filter encounters impossibly long words and discards the document. The record is present, appears sound, is counted in the repository's own statistics, and contributes nothing. This is precisely the phenomenon Kreutzer et al. (2022) measured downstream, observed here at the point where data is created. A related defect carries similar weight: two of the ten most frequent author strings at the University of Ibadan differ only by a terminal full stop and are indexed as separate authors, guaranteeing that automated entity resolution will fail silently. Read against Bamgbose et al. (2025), this is more serious than it appears.

v. Reuse Rights and the Legal Position

No repository in the sample published a machine-readable licence at item level. No rights field, Creative Commons designation or licence value was visible on any page retrieved, which means that a party attempting to act lawfully has no automated means of determining the status of any individual item. This external observation corresponds exactly to what Idiedo et al. (2024) established from within, where interviews revealed that the majority of Nigerian repository staff reported no defined policy of any kind.

Where a policy does exist, its terms may be restrictive in ways not yet examined. Landmark University Repository (n.d.) publishes a data policy providing that full items may be reproduced in single copies for personal research, study or not-for-profit purposes, then adds that they must not be harvested by robots except transiently for indexing or citation analysis. Read plainly, the policy permits robotic access for building a search index and prohibits it for building a training corpus, scoping permission to a technology generation preceding the use now under discussion. The wording is not bespoke, following the standard EPrints policy template deployed internationally over two decades, which converts an apparently local choice into a systemic constraint. Permission is therefore absent at item level, restricted at policy level and unsettled at statutory level. The effect is perverse. A party scrupulous about rights excludes this material, while a party indifferent to rights does not, so the policy works against the very interests it exists to protect.

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Taken together, the five findings describe not five parallel problems but five filters applied in sequence, whose attrition compounds rather than adds. Each filter alone is survivable. Composed, they are not. The distinction carries a practical implication that a shortage framing does not, for if the difficulty were simply a lack of material the response would be to produce more, whereas a funnel calls instead for identifying the narrowest filter and widening it. On the present evidence the narrowest are registration and rights. Both are inexpensive to widen.

Challenges

Five challenges emerge from the findings and from the Nigerian literature reviewed above.

i. **Directory Fragmentation:** Repository visibility is divided across competing directories that are inconsistently maintained, so that a well-run repository listed in one may be invisible to parties consulting another, as the Kwara State University case demonstrates.

ii. **Infrastructure and Hosting Instability:** Power and connectivity interruption, expired certificates and incomplete migrations render repositories intermittently unreachable, a condition consistent with the infrastructural constraints reported by Ezema and Eze (2024).

iii. **Absence of Deposit Culture:** Holdings are shaped by episodic digitisation projects rather than by routine self-archiving, producing collections in which a few units and a few depositors account for a disproportionate share while others hold nothing.

iv. **Metadata and Extraction Failure:** Undated records, duplicated entries, unresolved author names and corrupted text extraction degrade holdings in ways invisible to browser inspection and fatal to automated processing.

v. **Legal and Policy Uncertainty:** The absence of a text and data mining exception in the Copyright Act 2022, combined with inherited policy templates prohibiting robotic harvesting and the near-total absence of item-level licences, leaves lawful reuse undefined.

Recommendations

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The following recommendations follow directly from the findings and are ordered by cost, lowest first, since the analysis indicates that the least expensive filters are the binding ones.

i. **Revision of Repository Policies:** Repository managers should amend data policies to address machine learning explicitly, replacing inherited robots clauses with positions drafted for current technology. A clear prohibition is preferable to the present ambiguity, and clear permission preferable still.

ii. **Item-Level Licensing:** Repositories should populate a rights field with a real licence value for collections in which the institution holds the necessary rights, since the absence of any machine-readable signal obliges careful parties to exclude the material entirely.

iii. **Dual Directory Registration:** Repositories should register in both OpenDOAR and African Digital Research Repositories and update their records after any migration, because a repository listed in one directory alone is invisible to a substantial part of its potential audience.

iv. **Completion of Platform Migrations:** Institutions operating legacy and current instances concurrently should complete their migrations, since two live addresses leave external parties unable to identify the authoritative source and split the collection for any collector.

v. **Auditing of the Text Layer:** Repository managers should extract and read the text of a random sample of deposited files rather than inspecting records in a browser. Date validation, deduplication and author authority control should also be added, all of which routine batch processes can achieve.

vi. **Sustained Funding for Maintenance:** The National Universities Commission and TETFund should treat directory registration as basic infrastructure and fund maintenance rather than establishment alone, with particular attention to state universities, which were the thinnest represented group in every count reported here.

Conclusion

Nigerian university institutional repositories could serve as a source base for artificial intelligence grounded in African knowledge, but at present they largely do not,

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and the obstacles are more mundane and more remediable than the prevailing framing of the African data gap suggests. The gap is not a shortage of African scholarship. The audit located substantial and irreplaceable holdings, among them 1,177 records indexed under Yoruba proverbs and history at the University of Ibadan and a centre for language immersion and translation at Kwara State University. The knowledge exists, it is digital, and it is held in institutional custody.

What the study found instead was a sequence of filters whose attrition compounds. Seven Nigerian universities in eight hold no repository that any directory records, and the principal directory omits operating repositories. Of nine repositories retrieved, four returned nothing, among them the institution holding the largest recorded collection in the country. Among those responding, a quarter of one university's displayed units held nothing, a fifth of another's records carried no publication year, author names were split, records were duplicated, and stored text had in at least one case lost the spaces between its words. At the base of the funnel sits a policy clause, inherited from a template drafted before the technology existed, prohibiting robotic harvesting under a statute with no text and data mining exception. That point determines what should be done first. The most significant barrier identified here is not bandwidth, funding or technical capacity. It is a paragraph on a policy page that no one has had occasion to revisit, and it can be changed by a decision at no cost.

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