

Universities as Engines of AI Sovereignty: Confronting Dependency and Digital Colonialism in the Global South

Akintayo Akinrinsola¹; Omowonuola Okunnu² and Ololade Periola³

¹UK Management College, Manchester, United Kingdom. ²Bournemouth University, Bournemouth, United Kingdom. ³Sheffield Hallam University, Sheffield, United Kingdom.

Corresponding author: yeniakin@gmail.com

DOI: <https://doi.org/10.62154/ajhcer.2026.023.01019>

Abstract

Artificial intelligence is reshaping governance and economic systems worldwide, yet many countries in the Global South remain dependent on technologies, infrastructures, and governance models produced elsewhere. This dependency reflects deeper patterns of digital colonialism, including data extraction, reliance on foreign cloud systems, and limited capacity to shape AI on local terms. Grounded in African empirical evidence with broader application across the Global South, this paper argues that universities are critical but overlooked institutions in efforts to strengthen AI sovereignty. While governments, firms, and civil society face persistent capability gaps, universities hold mandates that position them to build research capacity, cultivate technical and governance expertise, and coordinate innovation ecosystems. Drawing on political economy and higher education scholarship, the paper develops the Capability–Alignment–Impact (CAI) Framework to explain how universities can contribute to autonomous AI development through three pathways: strengthening foundational knowledge; improving coordination across government, industry, and civil society; and translating expertise into societal impact. The paper concludes by outlining practical implications for policymakers, development agencies, and university leaders seeking to support sovereign AI ecosystems in the Global South.

Keywords: Artificial Intelligence Sovereignty; Digital Colonialism; Higher Education; Global South; Capability–Alignment–Impact (CAI) Framework; Technology Governance.

Introduction

Artificial intelligence is reshaping economic, political and social systems worldwide, yet its benefits and burdens are distributed unevenly. Countries in the Global South, particularly in Africa, continue to rely on technologies, infrastructures and governance models produced in the Global North. This reliance is not simply a matter of technological lag; it reflects deeper structural patterns of digital colonialism and market dominance (African Business, 2023; Solon, 2017). Salami (2024) shows how Africa's digital infrastructures are increasingly shaped by foreign technology corporations, limiting local agency and embedding external control into essential systems. Nothias (2025) traces the intellectual history of these concerns, demonstrating how digital technologies often reproduce older hierarchies under the guise of innovation.

Africa contributes less than 1.3% of global AI research output, illustrating the continent's limited participation in shaping the knowledge systems that underpin contemporary AI development (UNESCO, 2021). Sub-Saharan Africa accounts for less than 1% of global commercial data centre capacity despite representing approximately 20% of the global population, leaving the region heavily dependent on foreign hyperscale providers (Africa Data Centres Association, 2026; Xalam Analytics, 2024). At the workforce level, sub-Saharan Africa has approximately 88 researchers per million inhabitants, compared with over 4,300 per million in Europe and North America (UNESCO, 2026). These gaps constrain the ability of governments, firms and civil society to shape AI on local terms.

While this paper engages the broader theoretical construct of the "Global South," it draws primarily on empirical evidence, statistical indicators, and case studies from Africa. Africa presents an exemplar case where structural dependencies, manifested through compute deficits, data extraction, and imported governance blueprints, are most acutely observed. While regional variations exist across Latin America and Asia, the systemic dynamics of technological dependency highlighted in African contexts offer crucial conceptual lessons for sovereign digital futures across the wider Global South.

As AI systems spread across public services, education, agriculture and health (Oladipo et al., 2024), these dependencies become more consequential. Birhane (2021) argues that many AI systems deployed in African contexts fail to adapt to local realities and instead reinforce reliance on foreign software, infrastructures and epistemic assumptions. Recent studies extend this critique to data extraction and algorithmic governance. Feyijimi et al. (2026) show how recommendation systems used in African settings can reproduce power imbalances and undermine local epistemologies, particularly where governance frameworks are weak or imported wholesale. Kanu and Okpokwasili (2025) warn that data extraction is becoming a new frontier of resource exploitation, with value flowing outward while local capability remains limited. Nigeria's adoption of GovGuide Nigeria, an AI-powered public information platform built in partnership with Meta, illustrates how foreign infrastructures can become embedded in core state functions (Eleanya, 2026). The platform expands access to information, yet it also highlights the absence of local research and governance capacity that could support more sovereign approaches to AI development.

Statement of the Problem

Alongside infrastructural and epistemic dependency, capability gaps remain a persistent barrier. Okolo, Aruleba and Obaido (2023) identify limited research capacity, weak regulatory systems and shortages of skilled professionals as central obstacles to autonomous AI development across the continent. These gaps restrict the ability of domestic actors to set standards, procure technologies and influence governance models, creating conditions in which external actors define the terms of AI adoption.

Despite these challenges, one institution with the mandate and legitimacy to address them receives surprisingly little attention in current debates: the university. Much of the existing

literature focuses on state capacity, private sector innovation or civil society advocacy. Universities rarely appear as strategic actors in discussions about AI sovereignty, even though they are among the few institutions capable of producing knowledge, cultivating expertise and supporting governance. Their absence from the conversation represents a significant gap. Universities hold the potential to build research infrastructure, strengthen public sector capability and anchor contextually grounded approaches to AI. They can also help countries move beyond dependency by nurturing indigenous knowledge production and supporting local innovation ecosystems.

This paper addresses that gap by examining how universities can contribute to AI sovereignty in the Global South. It asks two questions: (1) How does AI reproduce dependency and underdevelopment in the Global South? and (2) How can universities build AI sovereignty when industry and government capacity are weak? Drawing on political economy, higher education scholarship and technology governance, the paper develops a conceptual framework that positions universities as engines of AI sovereignty. The argument is relevant to policymakers, development practitioners and university leaders seeking to understand how countries can build more autonomous and contextually grounded AI ecosystems.

The paper proceeds as follows. Section 1.1 outlines the Global South epistemic standpoint that informs the analysis. Section 2 reviews the literature on AI dependency and digital colonialism. Section 3 presents the theoretical foundations, and Section 4 introduces the Capability–Alignment–Impact (CAI) Framework. Section 5 discusses implications for policy and practice, and Section 6 concludes with directions for future research.

Global South Epistemic Standpoint

Debates surrounding artificial intelligence are routinely shaped by priorities, assumptions, and problem definitions originating in the Global North. These dominant perspectives treat Western governance blueprints and technical norms as universal, obscuring how imported AI systems often fail to reflect the social realities and historical trajectories of the Global South. Confronting these dynamics requires adopting a Global South epistemic standpoint, a lens that treats AI not as a neutral tool, but as part of a broader political economy marked by structural extraction, normative mimicry, and digital dependency. Without deliberate efforts to foster contextually grounded knowledge production, foreign platforms and cloud infrastructures will continue to dictate the terms of digital adoption across African public services, education, and civic life (Rodrigues et al., 2023).

Okolo, Aruleba and Obaido (2023) show that limited autonomy in AI development is closely tied to historical patterns of extraction that concentrated technological capability in the Global North. They identify shortages of representative African datasets, reliance on external infrastructures and weak regulatory capacity as factors that restrict the ability of governments and civil society to shape AI on local terms. Similar concerns appear in analyses of algorithmic systems used in African public services.

Adopting this perspective reframes the strategic role of higher education. Rather than viewing African universities as passive consumers of global technology trends or simple pipelines for workforce training, this standpoint positions them as vital sites of epistemic resistance and institutional sovereignty. Sitting at the intersection of local research, policy engagement, and social development, universities possess the unique legitimacy required to challenge external assumptions, cultivate indigenous datasets, and design context sensitive governance frameworks. Integrating this lens establishes the rationale for evaluating how higher education can systematically counter digital colonialism and anchor sovereign AI ecosystems.

Literature Review: AI Dependency and Digital Colonialism

Concerns about AI dependency in the Global South have intensified as digital infrastructures, data flows and algorithmic systems become more deeply embedded in public institutions and markets. The literature consistently shows that these technologies do not arrive in neutral form. They are shaped by political economies that favour actors in the Global North, and they often reproduce older patterns of dependency rather than support autonomous development. Salami (2024) argues that Africa's digital infrastructures are increasingly controlled by foreign technology corporations, which restricts national agency and embeds external interests into essential systems. Over 70 percent of African internet traffic is routed through servers outside the continent, demonstrating how infrastructural dependency is embedded in the basic architecture of digital connectivity (Internet Society, 2022). This pattern reflects a wider historical trajectory in which technological capability and economic value accumulate in the North while the South remains positioned as a consumer rather than a producer of digital innovation.

Nothias (2025) traces the intellectual history of digital colonialism and shows how Global South scholars and activists have long recognised that digital technologies frequently reinforce structural hierarchies. The critique is not simply about unequal access. It concerns the ways in which infrastructures, platforms and governance models are designed elsewhere and imported into contexts where local institutions have limited capacity to interrogate or adapt them. This dynamic creates a form of epistemic dependency in which external actors define standards, shape data practices and influence governance frameworks.

Infrastructural and Data Dependency

Artificial intelligence intensifies these concerns because it relies on data, compute and algorithmic models that are rarely produced locally. Birhane (2021) argues that many AI systems deployed in African contexts fail to adapt to local realities and instead embed external assumptions into decision-making processes. These systems often rely on datasets that do not represent African populations, which can lead to misclassification, exclusion or biased outcomes. Africa's average internet penetration remains at 43 percent, compared to

89 percent in Europe, according to the International Telecommunication Union (ITU, 2024), which limits both the scale of local data generation and the ability to build representative datasets for AI systems. The problem is not only technical; it is epistemic. Imported systems carry embedded worldviews that may not align with local histories, social structures or development priorities.

Recent studies extend this critique to algorithmic governance. Feyijimi et al. (2026) show that recommendation systems used in African settings can reproduce power asymmetries and undermine local epistemologies, particularly when governance frameworks are weak or externally imposed. Their analysis demonstrates that algorithmic systems do not simply automate decisions; they shape what is visible, what is prioritised and whose knowledge is recognised. Kanu and Okpokwasili (2025) warn that data extraction is becoming a new frontier of resource exploitation, with value flowing outward while local capability remains limited. They argue that data flows mirror earlier extractive economies in which raw materials leave the continent while value is captured elsewhere.

These structural concerns are visible in recent public sector deployments. Nigeria's GovGuide Nigeria platform, launched in partnership with Meta, illustrates how foreign AI infrastructures can become embedded in core state functions (Eleanya, 2026). The platform expands access to government information in multiple languages, yet it also highlights the absence of local research and governance capacity that could support more sovereign approaches to AI development. More than 60 percent of African governments rely on foreign cloud providers for public-sector digital services, raising questions about long-term autonomy, data governance and the ability of states to shape their own digital futures (Xalam Analytics, 2024).

Capability Gaps and Governance Constraints

Capability gaps remain a central barrier to autonomous AI development, but the literature shows that these gaps manifest in ways that directly shape how AI systems function in African contexts. Okolo, Aruleba and Obaido (2023) demonstrate that limited research capacity results in shallow or externally dependent AI experimentation within universities and public institutions. Weak regulatory systems translate into fragmented oversight, where governments struggle to evaluate imported technologies or enforce accountability. Shortages of skilled professionals mean that many public-sector deployments rely on external consultants or proprietary platforms, which further entrenches dependency. Africa has fewer than 20,000 AI professionals, compared to more than one million in North America, illustrating the scale of the continent's talent gap (LinkedIn, 2023). These conditions do not simply restrict innovation; they create structural pathways through which external actors define standards, supply infrastructures and shape governance models. Epistemic dependency is also built into the data pipelines of flagship large language models (LLMs). The web crawl repositories that underpin modern generative AI models derive overwhelmingly from Global North digital footprints. In the web-scale Common Crawl archives, which represent a large share of primary pretraining tokens for major generative

models, major African languages such as Swahili, Hausa, Yoruba and Igbo each make up only microscopic fractions of a percent, compared to English, which accounts for over 40 percent (Common Crawl, 2026; Baack and Mozilla Insights, 2024). These linguistic distortions limit the extent to which AI systems can reflect African communicative practices and knowledge systems.

The institutional root of this capability gap is directly linked to historical underinvestment in national research ecosystems. While the African Union set a target for member states to allocate 1 percent of GDP to Gross Expenditure on Research and Development (GERD), Sub-Saharan Africa's average spending remains stagnant at approximately 0.38 percent of GDP, far below the global average of 1.92 percent and Western regions at 2.55 percent (UIS, 2026). This lack of domestic capacity is further reflected in global governance benchmarking: on the Oxford Insights Government AI Readiness Index, Sub-Saharan Africa scores a regional average of 30.16 out of 100, ranking eighth out of nine global regions in policy capacity and infrastructure readiness (Oxford Insights, 2024; Nzobonimpa and Savard, 2023).

Digital Colonialism as an Interpretive Lens

Taken together, the literature shows that AI dependency is not only a technological issue. It is a structural and epistemic challenge that affects development practice, governance and institutional autonomy. Digital colonialism provides a critical framework for interrogating how algorithmic architectures and platform ecosystems perpetuate historic asymmetries (Mare & Mhlambi, 2022). It highlights the ways in which data extraction, platform dominance and imported governance models can limit the ability of countries to build their own innovation capacity. It also underscores the need for institutions capable of producing knowledge, cultivating expertise and supporting governance.

The Missing Institutional Actor: Universities

Despite the breadth of this literature, universities remain largely absent from discussions about AI dependency and digital colonialism. Most analyses focus on state capacity, private sector innovation or civil society advocacy. Far less attention is given to universities, even though they hold mandates and resources that position them to build research infrastructure, strengthen public sector capability and support contextually grounded approaches to AI. This gap is significant. Universities are among the few institutions capable of addressing the structural and epistemic challenges identified above. They can interrogate imported systems, produce local knowledge, cultivate technical and governance expertise and support coordinated approaches to innovation.

The literature therefore reveals a paradox. AI dependency is widely recognised as a development challenge, yet one of the institutions best positioned to address it receives limited attention. This gap provides the rationale for the conceptual framework developed in this study, which positions universities as engines of AI sovereignty and examines how they can contribute to more autonomous and contextually grounded AI ecosystems.

Table 1. Structural Indicators of AI Dependency in Africa (Source: Author's construction)

Domain	Indicator	Statistic	Source
Digital Infrastructure	Routing of internet traffic	Over 70 percent of African internet traffic is routed through servers outside the continent	Internet Society (2022)
Cloud Dependency	Public-sector reliance on foreign cloud providers	More than 60 percent of African governments rely on foreign cloud providers for digital public services	Xalam Analytics (2024)
Data Centre Capacity	Share of global data centres located in Africa	Less than 1 percent of global commercial capacity (<2 percent of total physical data centre footprint)	Xalam Analytics (2024)
Connectivity & Access	Internet penetration	Africa's average internet penetration is 43 percent, compared to 89 percent in Europe	ITU (2024)
Device Access	Smartphone penetration	Sub-Saharan Africa's smartphone penetration is 51 percent	GSMA (2023)
Knowledge Production	Contribution to global AI research	Africa contributes less than 1.3% of global AI research output	UNESCO (2021)
AI Talent Base	Number of AI professionals	Fewer than 20,000 AI professionals across the continent	LinkedIn (2023)
R&D Investment	National investment in research and development	African countries invest an average of 0.38 percent of GDP in R&D, below the global average of 1.92 percent	UIS (2023)
Epistemic Representation	African languages in major NLP datasets	Fewer than twenty African languages appear in large-scale training corpora	Gitau et al., (2023)
Governance Capacity	Operational data protection authorities	Only fourteen African countries have fully operational data protection authorities	UNCTAD (2024)

This table highlights the structural conditions that shape AI dependency across the continent. The indicators show how infrastructural reliance, limited research capacity, weak governance systems and epistemic exclusion collectively constrain the ability of African states and institutions to develop autonomous AI ecosystems. These patterns reinforce the argument that universities must play a more deliberate role in addressing capability gaps and supporting contextually grounded approaches to AI sovereignty.

Theoretical Positioning

This study positions universities as central institutions in efforts to build AI sovereignty in the Global South. The argument draws on three bodies of scholarship that help explain how universities can contribute to more autonomous and contextually grounded AI ecosystems: the Knowledge-Based View, the Triple Helix model of innovation and Engaged University

theory. Together, they offer a way of understanding universities as knowledge institutions, coordination hubs and developmental actors. They also provide a conceptual route that links internal capability formation to systemic alignment and societal impact.

Rather than treating these frameworks as separate perspectives, the analysis positions them as sequential and mutually reinforcing stages in the evolution of a university's contribution to AI sovereignty. The integrated pathway reflects a progression from capability formation to systemic alignment and finally to developmental impact. It creates a coherent route through which universities move from internal knowledge cultivation to external coordination and ultimately to societal transformation.

Universities as Knowledge Institutions: The Knowledge-Based View

The Knowledge-Based View (KBV) conceptualises organisations as repositories and producers of knowledge. Differences in knowledge stocks and capacities for creating and applying knowledge help explain variations in organisational performance. Foss (2005) and Grant (1996) argue that knowledge is the most valuable organisational resource and that institutions must specialise, coordinate and continually renew their knowledge systems. Knowledge exists in multiple forms, including tacit expertise, embodied skills, organisational routines and codified materials. It is dynamic and shaped by learning, interpretation and action.

Applied to universities, KBV highlights their core functions of generating new knowledge, cultivating specialised expertise and sustaining environments where knowledge can be integrated and expanded. Fewer than 10% of African universities have active AI research groups or laboratories, which limits the institutional base required for sustained capability formation (AOSTI, 2023). These capabilities are foundational. Universities train technical and governance talent, produce research that challenges imported systems and provide the epistemic grounding needed for contextually relevant AI development. Without strong internal knowledge systems, countries remain dependent on foreign infrastructures, platforms and epistemologies. KBV therefore supports the first stage of the conceptual route by explaining how universities build the intellectual foundations required for AI sovereignty.

Universities as Governance and Coordination Hubs: The Triple Helix Model

The Triple Helix model conceptualises innovation as the outcome of interactions between universities, industry and government. Etzkowitz and Leydesdorff (2000) argue that knowledge production and circulation are central drivers of economic development in the post-industrial era, with universities, firms and states each contributing to innovation through research, entrepreneurship and regulatory functions. Innovation emerges from complex sociotechnical networks rather than linear progressions from science to technology.

In many African contexts, universities are among the most stable and legitimate institutions within these networks. Their research capacity enables them to support policy

development, provide independent expertise and mediate between public and private actors. They can help governments design innovation policies, support regulatory frameworks and anchor ethical and contextual approaches to AI. This governance and coordination role is fuelled by the knowledge capacity described by KBV. The Triple Helix model therefore explains how universities translate internal capability into systemic influence and how they contribute to national governance systems that shape AI development.

Universities as Developmental Actors: Engaged University Theory

Engaged University theory views universities as institutions embedded within their societies, with responsibilities that extend beyond teaching and research. Boyer (1996) argues that universities should contribute to solving social, civic and economic challenges through interconnected forms of scholarship. Holland (2005) emphasises that engagement involves reciprocal knowledge exchange between universities and communities, where academic expertise is mobilised to address societal needs.

This developmental role is particularly significant for AI sovereignty. Universities can support local innovation ecosystems, strengthen public sector capability, contribute to regulatory development and foster indigenous technological solutions. They can also help build digital capability among youth and communities, which is essential for reducing dependency on external technologies. Through these functions, universities act as developmental institutions capable of shaping national futures.

Theoretical Integration and Emergent Propositions

The Knowledge-Based View, Triple Helix model and Engaged University theory are not simply combined additively in this paper. They are integrated to address distinct explanatory gaps that arise when analysing universities' contribution to AI sovereignty in the Global South. Each theory explains part of the phenomenon, but each is insufficient on its own.

The Knowledge-Based View (KBV) explains how organisations build, coordinate and renew knowledge stocks as a source of advantage (Grant, 1996; Foss, 2005). Applied to universities, KBV clarifies how internal research capacity, specialised expertise and epistemic autonomy constitute the foundational capability required for any sovereign AI trajectory. However, KBV says little about how these internal capabilities connect to external actors, policy processes or societal outcomes. It cannot explain how universities influence national AI governance or how knowledge is translated into systemic change.

The Triple Helix model explains innovation as emerging from interactions among universities, industry and government (Etzkowitz and Leydesdorff, 2000). It clarifies how universities can act as coordination hubs, mediating between public and private actors and shaping regulatory and innovation systems. Yet the Triple Helix model assumes the existence of relevant knowledge capabilities within each helix. It does not theorise how those capabilities are built, especially in contexts of severe resource constraints and

epistemic dependency. On its own, it cannot explain why some universities lack the capacity to participate meaningfully in innovation networks.

Engaged University theory explains universities' normative and practical orientation toward societal problem-solving and reciprocal knowledge exchange with communities (Boyer, 1996; Holland, 2005). It clarifies how universities can translate expertise into developmental outcomes, such as ethical governance, youth capability and community-centred innovation. However, engagement theory does not specify the internal knowledge conditions or the systemic coordination mechanisms that make such engagement effective. Without capability and alignment, engagement risks becoming symbolic or fragmented.

The integration of these three theories is therefore non-redundant. KBV provides the capability condition, Triple Helix provides the alignment condition and Engaged University theory provides the impact condition for universities' contribution to AI sovereignty. The ordering from capability to alignment to impact is not arbitrary; it reflects a logical dependency. Without internal knowledge capability, universities have little to align or translate. Without alignment, capability remains siloed and fails to influence governance or innovation systems. Without an engagement orientation, aligned capability may serve narrow interests rather than broader societal goals.

A critical tension must be acknowledged within this theoretical synthesis: as documented by Ahmed (2026), universities themselves are deeply entangled in platform dependency, relying heavily on foreign cloud providers, enterprise software, and international funding streams. To act as credible engines of sovereignty rather than vectors of digital colonialism, universities cannot simply deploy imported tools uncritically. Institutional autonomy requires that higher education institutions establish internal data governance protocols, audit vendor lock-in, cultivate open-source and local-language alternatives, and protect academic agendas from external donor capture. Only when universities deliberately build this internal reflective capability can they move from passive technological consumers to active anchors of national digital sovereignty.

Furthermore, while state regulatory agencies or specialized public research institutes are often proposed as alternative leads for national AI strategy, they frequently suffer from acute administrative turnover, budget vulnerability, and political politicisation in many Global South contexts. Universities, by contrast, possess enduring institutional continuity, cross-disciplinary breadth, pedagogical reach, and international epistemic legitimacy. While regional research consortia and state bodies are vital partners, higher education institutions remain uniquely positioned to bridge foundational knowledge creation, public-policy advisory roles, and long-term societal capability building.

From this integration, the CAI Framework generates several testable propositions for future empirical testing:

Proposition 1 (Capability condition). Universities with higher levels of internal AI-related knowledge capability (research capacity, specialised expertise, epistemic autonomy) are

more likely to participate substantively in national AI governance and innovation networks than universities with lower levels of such capability.

Proposition 2 (Alignment condition). The effect of university knowledge capability on AI sovereignty outcomes is mediated by the extent of university alignment with government, industry and civil society actors. Capability without alignment will have limited systemic impact.

Proposition 3 (Impact condition). Universities that combine high capability and high alignment with a strong engagement orientation will produce more inclusive and contextually grounded AI outcomes (e.g., local language technologies, community-centred applications, ethical governance frameworks) than universities that lack an engagement orientation.

Proposition 4 (Iterative reinforcement). Engagement in societal impact activities feeds back into capability and alignment by reshaping research agendas, attracting new partners and resources, and strengthening institutional resilience.

These propositions move the CAI Framework beyond a descriptive model. They specify causal expectations that can be examined empirically through comparative case studies, network analyses and capability assessments across university systems.

Methodological Note on Framework Construction

To construct this framework, literature was identified through systematic keyword searches across Google Scholar, Scopus, and Web of Science covering the period 2017–2026. Core search strings combined terms for technology governance ("AI sovereignty", "digital colonialism", "data governance", "algorithmic bias") with higher education and political economy terms ("higher education in Africa", "Triple Helix Global South", "university innovation ecosystems", "epistemic autonomy"). Sources were selected based on their thematic focus on structural digital dependency, critical AI ethics, or higher education capability building in developing contexts, prioritizing recent peer-reviewed articles, international agency reports (UNESCO, ITU, UNCTAD), and regional policy documents.

Conceptual Framework: The Capability–Alignment–Impact (CAI) Framework

The conceptual framework developed in this study brings together the theoretical foundations outlined above and translates them into a practical model for understanding how universities can contribute to AI sovereignty in the Global South. The Capability–Alignment–Impact (CAI) Framework presents universities as institutions that generate knowledge, coordinate actors and support developmental outcomes. It offers a structured way of thinking about how internal capability formation connects to governance systems and ultimately to societal impact.

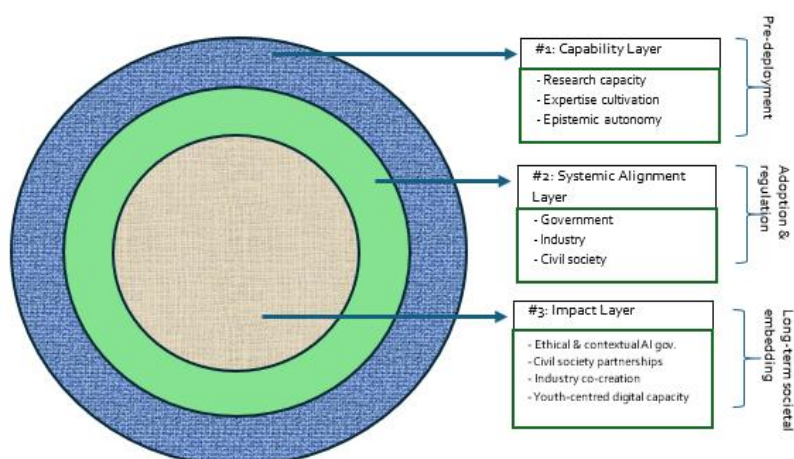


Figure 1: The Capability–Alignment–Impact (CAI) Framework for AI Sovereignty

Source: Author's construction

Figure 1 illustrates the CAI Framework as three concentric layers. Each layer represents a distinct institutional function, yet the layers are interdependent. The framework begins with capability formation, moves outward to systemic alignment and culminates in developmental impact. This structure reflects the argument that universities must first build internal knowledge systems before they can influence national governance or contribute to broader development goals.

Capability Layer

The Capability Layer forms the foundation of the framework. It captures the internal knowledge systems that universities must cultivate to support autonomous AI development. These systems include research capacity, specialised expertise and epistemic autonomy. Research capacity refers to the ability to generate new knowledge, interrogate imported systems and produce contextually relevant alternatives. Expertise cultivation involves training technical and governance talent through structured programmes, codified curricula and research outputs. Epistemic autonomy concerns the development of local datasets, linguistic resources and analytical frameworks that reduce reliance on external epistemologies.

This layer reflects the Knowledge-Based View, which emphasises that knowledge is the most valuable organisational resource and that institutions must coordinate and renew their knowledge systems to remain effective (Grant, 1996; Foss, 2005). Without this capability foundation, universities cannot meaningfully contribute to AI governance or development. Countries remain dependent on foreign infrastructures and platforms when local knowledge systems are weak or fragmented.

Alignment Layer

The Alignment Layer represents the university's role in coordinating actors across the innovation ecosystem. It draws on the Triple Helix model, which conceptualises innovation as the outcome of interactions between universities, industry and government (Etzkowitz and Leydesdorff, 2000). In this layer, universities act as intermediaries that connect internal expertise to national governance systems. They support policy development, provide independent analysis and collaborate with firms on research and innovation. They also engage with civil society organisations that work on digital rights, accountability and public interest advocacy.

This coordination role is particularly important in African contexts, where governments and private sector actors often face capability gaps. Universities can help shape regulatory frameworks, evaluate procurement decisions and support ethical and contextual approaches to AI. They can also strengthen civil society by providing technical expertise and research support. The Alignment Layer therefore explains how universities translate internal capability into systemic influence.

Impact Layer

The Impact Layer captures the outward-facing functions through which universities contribute to societal outcomes. It reflects Engaged University theory, which views universities as institutions embedded within their communities and responsible for addressing social, civic and economic challenges (Boyer, 1996; Holland, 2005). In the context of AI sovereignty, this layer includes ethical and contextual AI governance, civil society partnerships, industry co-creation and youth-centred digital capability.

Ethical and contextual governance involves supporting governments in designing frameworks that reflect local values and priorities. Civil society partnerships allow universities to share expertise with organisations working on digital rights and algorithmic accountability. Industry co-creation refers to collaborations that produce technologies suited to local needs rather than global market pressures. Youth-centred digital capability includes training programmes, incubators and community initiatives that build long-term digital resilience. Youth digital literacy rates across Sub-Saharan Africa average between 30 and 35 percent, which underscores the importance of university-led capability-building initiatives (UNICEF, 2023).

These functions represent the point at which internal capability and systemic alignment are converted into developmental action. They show how universities can help countries move beyond dependency by strengthening local innovation ecosystems and supporting more autonomous approaches to AI development.

Integrating the Layers: A Sovereignty-Building Model

The CAI Framework treats capability, alignment and impact as domains that both interact and unfold in a logical sequence. They are not linear steps, and they are not simply nested layers.

Capability functions as the foundational condition: without robust internal knowledge systems, there is nothing meaningful to align with external actors or translate into societal outcomes. Yet the domains also operate systemically. Alignment processes often expose new capability gaps. Societal engagement can reshape governance priorities and redirect research agendas. Strengthened capability, in turn, enables more effective alignment and deeper, more durable forms of impact.

This dual character, logical sequencing combined with ongoing interaction, explains why the framework can be depicted as concentric layers while still functioning as an iterative system. The outer layers depend on the inner ones, but they also feed back into them, creating a cycle through which universities continually refine and extend their contribution to AI sovereignty.

The next section discusses the implications of this framework for development practice and outlines how governments, universities, civil society and development agencies can apply it in efforts to strengthen AI sovereignty in the Global South.

Discussion & Implications

The CAI Framework demonstrates that addressing AI dependency requires moving beyond fragmented policy interventions toward institutional anchors capable of generating knowledge, aligning actors, and driving developmental impact. While the theoretical integration establishes why universities are uniquely suited for this role, operationalising the framework requires examining real-world applications, institutional barriers, and actionable implementation roadmaps.

Operationalising CAI: Real-World Illustrative Cases

Across the continent, emerging university initiatives demonstrate how the three layers of the CAI framework operate in practice:

- **Capability Building via Open Language Resources:** Makerere University's AI and Data Science Lab, working with the Masakhane NLP research collective, has developed and released open-access NLP resources (including parallel corpora and named-entity recognition datasets) for low-resource African languages such as Luganda, Swahili, and Yoruba (Adelani et al., 2021; Nakatumba-Nabende et al., 2024). These efforts create foundational, community-curated datasets that reduce reliance on Global-North web-crawl archives.
- **Systemic Alignment via Policy and Ethics:** The Policy Innovation Lab at Stellenbosch University demonstrates the Alignment Layer by serving as an institutional bridge between academic research, government, and public-sector practice. Working in partnership with The Presidency of South Africa, the Lab develops practical guidance for the responsible use of AI in policymaking most notably the CRAFT principles (Controllability, Rigour, Accountability, Fairness, and Transparency) and supports capacity-building so that government AI applications

remain under human control, verifiable, accountable, and aligned with democratic and developmental priorities (Willem, Gray and de Villiers-Botha, 2026).

- **Impact through Public-Private Ecosystems:** The collaboration between Data Science Nigeria (DSN) and local higher education institutions exemplifies the Impact Layer. By establishing campus communities across universities and polytechnics, embedding practical AI curriculum through free classes and workshops, hosting cross-institutional hackathons and annual AI Bootcamps, and training hundreds of thousands of students and young professionals (approaching one million talents), this ecosystem model translates academic and practical knowledge into local skills development, digital literacy, and community-centered application development (DSN, 2025).

Institutional Barriers and Implementation Risks

Efforts to establish universities as engines of AI sovereignty face significant structural obstacles that must be managed:

- **Brain Drain and Talent Retention:** Universities in the Global South face intense competition from foreign tech multinationals and Global North institutions offering significantly higher compensation. High faculty turnover degrades research continuity and institutional memory.
- **Infrastructure Deficits and High Compute Costs:** Compute infrastructure remains prohibitively expensive. High electricity costs, limited access to advanced GPU clusters, and unreliable cloud access restrict local model training, threatening to relegate universities to mere consumers of API-based services.
- **Political Interference and Bureaucracy:** Academic autonomy is often constrained by state overreach or rigid bureaucratic approval processes that inhibit rapid technological adaptation and agile industry partnerships.
- **Donor Dependency and Vendor Capture:** Much of the research funding for AI in the Global South originates from foreign philanthropic foundations or international technology corporations. Without clear national research priorities, university agendas risk becoming aligned with external donor objectives or proprietary corporate ecosystems rather than sovereign developmental needs.

Implementation Roadmap for Stakeholders

To operationalise the CAI Framework across distinct operational horizons, university leaders, policymakers, and industry partners should follow the structured matrix in Table 2.

Table 2. Actionable Roadmap for Operationalising the CAI Framework

CAI Layer	Time Horizon	Recommended Strategic Actions	Key Stakeholders	Key Success Metrics
Capability	Short Term (1–2 yrs)	Audit institutional cloud/vendor lock-in; establish open-source	University Leadership, Faculty, Research Deans	Number of curated local datasets; percentage of

CAI Layer	Time Horizon	Recommended Strategic Actions	Key Stakeholders	Key Success Metrics
		and local dataset repositories; introduce context-grounded AI ethics modules		open-source AI tools deployed in teaching
Alignment	Medium Term (3–5 yrs)	Establish interdisciplinary AI policy hubs; form national university-industry-government advisory panels; co-design ethical procurement guidelines	Ministries of Higher Education/ICT, Industry Partners, University Policy Hubs	Number of policy advisories adopted by government; active industry-sponsored research labs.
Impact	Long Term (5+ yrs)	Launch regional AI compute consortia; deploy localized public-service AI tools; scale community digital literacy programs	Regional Consortia (e.g., AU, ECOWAS), Civil Society, Public Sector Agencies	Percentage of public AI systems locally audited; youth employment in sovereign tech sectors

Source: Authors' own construction

Policy Implications

First, governments should recognise universities as strategic institutions in national AI policy, not merely as suppliers of graduates. Digital colonialism in Africa is linked to foreign control of digital infrastructure, unequal data flows and asymmetrical power relations (Salami, 2024). AI policy must therefore address not only access to technologies, but also the institutional capacity required to shape, evaluate and govern them. National AI strategies should explicitly name universities as partners in capability building, standards development and governance innovation, rather than treating them as peripheral training institutions.

Second, public investment in university-led AI research should be treated as a sovereignty-building priority. This includes investment in AI research centres, African language technologies, data governance, algorithmic accountability, ethical AI and interdisciplinary doctoral training. This implication is consistent with the Knowledge-Based View, which treats knowledge as a central organisational resource and emphasises the coordination of specialised expertise (Grant, 1996). In the context of AI, research capacity becomes a foundation for epistemic autonomy and reduced technological dependency. Funding mechanisms should prioritise collaborative, problem-oriented research that links technical work to public-sector use cases and local development challenges.

Third, universities should be formally embedded in AI governance, procurement and regulatory processes. AI systems are increasingly shaped by infrastructures, datasets, model architectures and academic platforms controlled by Global North corporations and

states, creating dependencies that affect both technology use and knowledge legitimacy (Ahmed, 2026). Universities can help governments assess imported AI systems, review procurement risks, develop standards and produce context-sensitive governance models. This aligns with the Triple Helix model, which views innovation as emerging from interaction among universities, industry and government (Etzkowitz and Leydesdorff, 2000). Policy instruments could include mandatory university representation on AI advisory councils, procurement review panels and data governance bodies.

Fourth, policy should avoid equating sovereignty with isolation. Technology sovereignty does not imply autarky; rather, it refers to the ability to develop, access or source critical technologies without one-sided structural dependency (Edler et al., 2020). For African AI policy, this means building sufficient local capability to negotiate, adapt and govern global technologies on more equal terms. Strategies might include open standards, regional data spaces, shared research infrastructure and negotiated access to global compute and models, coupled with domestic capacity to audit and regulate their use.

Finally, regional collaboration is essential. No single university or national system is likely to build AI sovereignty alone. Universities should therefore be integrated into regional initiatives on AI governance, data protection, open standards, digital infrastructure, research mobility and youth digital capability. This is important because responsible AI adoption in Africa remains constrained by gaps in digital literacy, infrastructure, local AI talent and institutional capacity (Okolo, Aruleba and Obaido, 2023). Regional research networks, joint degree programmes and shared AI testbeds could help overcome scale limitations and reduce duplication.

Institutional Implications

For universities, the key implication is the need to move from passive adoption to strategic agency. African universities should not simply import AI tools into teaching, research and administration; they should help shape the knowledge, ethics and governance systems through which AI is developed and used. This shift is central to the CAI framework's capability layer: without deliberate internal capacity building, universities cannot fulfil their alignment and impact roles.

Universities should develop interdisciplinary AI capacity. AI sovereignty should not be limited to computer science; it also concerns law, ethics, political economy, education, public policy, language, business and development. Cross-faculty AI clusters would allow universities to study algorithmic bias, digital colonialism, data governance, African language representation, AI ethics and public-sector AI use in a more integrated way. This is especially important because Western-developed AI systems may be poorly suited to African problems while reinforcing dependence on Western software and infrastructure (Birhane, 2021).

Curriculum reform is also necessary. AI literacy should be embedded across disciplines so that graduates in law, business, education, health, public administration and the social sciences can critically evaluate AI systems rather than merely use them. Responsible AI in

Africa requires local workforce training, infrastructure, representative datasets, government support, regulation and accountable institutions (Okolo, Aruleba and Obaido, 2023). Universities are therefore central to the human-capability dimension of AI sovereignty. Recent empirical evidence highlights the urgency of this intervention: studies on student AI adoption in Tanzania (Mollel, 2025) and Nigeria (Olatunji-Ishola & Okanlawon, 2025) reveal a growing reliance on uncritical generative AI tools, warning that unguided utilisation risks deepening cognitive and academic dependency across African universities.

Universities should also review their own digital dependency. Many higher education institutions rely on proprietary platforms for plagiarism detection, analytics, cloud services, research visibility and learning management. Ahmed (2026) argues that such platforms can embed assumptions about originality, quality, relevance and authority, thereby shaping which forms of knowledge become visible and legitimate. If universities are to support AI sovereignty, they must develop stronger data governance policies, ethical procurement frameworks and digital autonomy strategies. This may include negotiating data rights, adopting open-source alternatives where feasible and conducting regular audits of vendor lock-in and epistemic bias.

Finally, universities should institutionalise civic and developmental engagement. Boyer's scholarship of engagement argues that universities should contribute to pressing social, civic and economic problems (Boyer, 1996). In the AI context, this means supporting public agencies, civil society, local firms and communities with research, training, ethical guidance and context-sensitive innovation. Such engagement operationalises the impact layer of the CAI framework, converting internal capability and systemic alignment into tangible societal benefits.

Societal Implications

The core societal implication is that AI sovereignty must be inclusive. It should not become a narrow agenda controlled only by governments, corporations or elite research institutions. It should expand the capacity of young people, communities and civil society to understand, question and shape AI systems. This aligns with the CAI framework's emphasis on youth-centred digital capability and developmental action.

Universities can support this by extending AI literacy beyond degree programmes through youth innovation hubs, community workshops, school partnerships and civil society collaborations. Evidence from digital technology use in Africa shows that technologies can improve access to information, markets and services, but such benefits depend on broader institutional and infrastructural conditions (Aker and Mbiti, 2010). AI must therefore be embedded in local capability rather than treated as a technical fix. Programmes that combine technical skills with critical digital citizenship, rights awareness and local language content can help ensure that AI serves broader public interests.

The framework also has implications for indigenous knowledge and epistemic justice. Decolonising AI requires more than access to global platforms; it requires African

languages, values, histories and development priorities to shape AI design and governance. Decolonial AI scholarship argues that mainstream AI ethics may reproduce Western assumptions and fail to address harms tied to colonial legacies unless it adopts more relational and context-sensitive approaches (Mhlambi and Tiribelli, 2023). Universities can support this by prioritising research on African languages in NLP, co-designing AI applications with local communities and integrating indigenous knowledge systems into curricula and research agendas.

Overall, the CAI framework suggests that AI sovereignty is ultimately about agency: who defines AI problems, who controls data, who builds systems, who governs risk and who benefits from technological change. This makes universities central because they connect knowledge production, governance capacity and societal engagement in ways that neither the state nor the market can achieve alone.

Conclusion, Recommendation and Future Studies

This paper has examined how artificial intelligence risks reproducing structural dependency in the Global South, building on critical literature that warns against algorithmic extraction and normative mimicry (Birhane, 2021; Salami, 2024). Moving beyond purely technical or regulatory critiques, the paper introduced the Capability–Alignment–Impact (CAI) Framework to demonstrate how African universities can actively bridge persistent state and market gaps (Ahmed, 2026). By combining the Knowledge-Based View (Grant, 1996) to drive localized dataset and research creation, the Triple Helix model (Etzkowitz & Leydesdorff, 2000) to align public-private governance, and Boyer’s (1996) scholarship of engagement to anchor societal impact, the framework reframes higher education institutions as essential anchors for technological sovereignty.

While providing a structured operational pathway, this study acknowledges clear conceptual and contextual limitations. The CAI Framework has not yet been empirically tested across diverse African national governance systems or varying university structures. In practice, operationalizing these layers faces severe real-world hurdles, including chronic higher education underfunding, energy and compute infrastructure deficits, political interference, and fragmented regional innovation networks (Salami, 2024). Acknowledging these constraints highlights that university-led digital sovereignty is not a simple technical fix, but an ongoing institutional challenge deeply intertwined with national political economy dynamics and resource allocations.

Policy Recommendations

To realize this potential, key policy actions are required across multiple governance levels:

1. National Governments: Reallocate public R&D expenditure toward national university compute funds and require sovereign data governance audits for all public-sector AI procurements.

2. University Executives: Establish institutional data sovereignty policies, promote interdisciplinary AI research centres, and create retention pathways for high-tier academic talent.
3. International Donors and Development Partners: Shift funding models from tied technological imports toward building long-term, unencumbered local research capacity and open-access compute infrastructure.

Future Research Directions

While this paper provides a robust theoretical foundation and conceptual framework, several avenues for future empirical inquiry remain:

- Empirical Testing of Propositions: Future studies should empirically evaluate the four propositions generated by the CAI framework using comparative qualitative case studies across African, Latin American, and Southeast Asian higher education systems.
- Quantitative Indexing: Scholars should develop quantitative metrics to measure institutional "AI Sovereignty Readiness" within universities, evaluating variables such as compute ownership, local language model output, and policy participation.
- Longitudinal Impact Evaluation: Longitudinal research is needed to trace the multi-year social and economic impacts of university-led AI initiatives on national digital autonomy and economic development.

Declarations

Ethical Approval and Consent to Participate

This study did not involve human participants, primary data collection or procedures requiring ethical approval. No consent to participate was required.

Consent for Publication

All authors consent to the publication of this manuscript.

Funding

This research received no external funding.

References

- Adelani, D.I., Abbott, J.Z., Neubig, G., D'souza, D., Kreutzer, J., Lignos, C., Palen-Michel, C., Happy Buzaaba, Shruti Rijhwani, Ruder, S., Mayhew, S., Israel Abebe Azime, Shamsuddeen Hassan Muhammad, Chris Chinenye Emezue, Nakatumba-Nabende, J., Perez Ogayo, Aremu Anuoluwapo, Gitau, C., Mbaye, D., Alabi, J.O., Seid Muhie Yimam, Tajuddeen Gwadabe, Ignatius Ezeani, Rubungo Andre Niyongabo, Mukiibi, J., Verrah Otiende, Iroko Orife, David, D., Samba Ngom, Adewumi, T.P., Rayson, P., Adeyemi, M., Muriuki, G., Anebi, E., Chiamaka Chukwuneke, Nkiruka Odu, Eric Peter Wairagala, Oyerinde, S., Siro, C., Tobius Saul Bateesa, Oloyede, T., Wambui, Y., Akinode, V., Nabagereka, D., Katusiime, M., Ayodele Awokoya, Mouhamadane Mboup, Dibora Gebreyohannes, Henok Tilaye, Kelechi Nwaike, Wolde, D., Faye, A., Blessing Sibanda, Ahia, O., Bonaventure, Kelechi Ogueji, Thierno Ibrahima Diop, Diallo, A., Adewale Akinfaderin, Tendai Marengereke and Osei, S. (2021).

- MasakhaNER: Named entity recognition for African languages. *Transactions of the Association for Computational Linguistics*, 9, pp.1116–1131. <https://doi.org/10.1162/tacl.a.00416>.
- Africa Data Centres Association [ADCA]. (2026). Data centres in Africa: 2026 economic report. ADCA & Rising Advisory.
- AOSTI (2023). African Science, Technology and Innovation Outlook. African Observatory on Science, Technology and Innovation.
- African Business, (2023). Can Africa achieve 'digital sovereignty' in an era of Big Tech? Retrieved from <https://african.business/2023/07/technology-information/can-africa-achieve-digital-sovereignty-in-an-era-of-big-tech>.
- Ahmed, S.A. (2026) 'Algorithmic dependence and digital colonialism: a conceptual framework for artificial intelligence in education and knowledge systems of the Global South', *Frontiers in Education*, 11, 1720563. Available at: <https://doi.org/10.3389/educ.2026.1720563> (Accessed: 13 August 2026).
- Aker, J. C., and Mbiti, I. (2010). Mobile phones and economic development in Africa. *Journal of Economic Perspectives*, 24(3), 207–232.
- Baack, S. and Mozilla Insights (2024). Training data for the price of a sandwich: Common crawl's impact on generative AI. [online] Mozilla Foundation. Available at: <https://www.mozillafoundation.org/en/research/library/generative-ai-training-data/common-crawl/> [Accessed 13 Aug. 2026].
- Birhane, A. (2021). Algorithmic Injustice: A Relational Ethics Approach. *Patterns*, 2, 1-9. <https://doi.org/10.1016/j.patter.2021.100205>
- Boyer, E.L. (1996) 'The scholarship of engagement', *Journal of Public Service and Outreach*, 1(1), pp. 11–20. Available at: unco.edu (Accessed: 13 August 2026).
- Common Crawl (2026). *Statistics of Common Crawl Monthly Archives by commoncrawl*. [online] commoncrawl.github.io. Available at: <https://commoncrawl.github.io/cc-crawl-statistics/plots/languages> [Accessed 13 Aug. 2026].
- Data Science Nigeria (2025) Annual Report. Available at: <https://datasciencenigeria.org/annual-report/>
- Edler, J.; Blind, K.; Frietsch, R.; Kimpeler, S.; Kroll, H.; Lerch, C.; Reiss, T.; Roth, F.; Schubert, T.; Schuler, J. and Walz, R. (2020): Technology Sovereignty: from demand to concept. Perspectives-Policy Brief. Karlsruhe: Fraunhofer ISI.
- Effoduh, J. O. (2026). Decolonizing the governance of artificial intelligence in Africa: from normative mimicry to epistemic sovereignty, *Science and Public Policy*, Volume 53, Issue 2, April 2026, Pages 245–257, <https://doi.org/10.1093/scipol/scag005>
- Eleanya, F. (2026). Nigeria launches Meta-backed AI chatbot for government information access. [online] TechCabal. Available at: <https://techcabal.com/2026/05/22/nigeria-taps-meta-ai-to-help-citizens-access-government-services/> [Accessed 23 May 2026].
- Etzkowitz, H., and Leydesdorff, L. (2000). The dynamics of innovation: From National Systems and "Mode 2" to a Triple Helix of university–industry–government relations. *Research Policy*, 29(2), 109–123.
- Feyijimi, T.R., Dansu, V., Osunbunmi, I.S., Elesemoyo, I.O., Olayemi, M., Apata, O.E. and Oyeniran, D.O. (2026). Ubuntu-èkò framework: A four-pillared critical-cultural-contextual-communal model for cultivating, educating and enhancing an AI-ready African workforce. *Computers and Education Open*, [online] 10, p.100372. doi:10.1016/j.cao.2026.100372.
- Foss, N. J. (2005). Strategy, economic organization and the knowledge economy. The Coordination of firms and resources, Oxford University Press, Oxford.
- Gillwald, A. (2020). Mapping Africa's digital future: Policies and capacity gaps. Research ICT Africa Policy Paper Series, 2020.
- Gitau, C., Mukilbi, J., Martinus, L., Marivate, V. and Abbott, J. (2023) 'Masakhane Web: a machine translation platform for African languages', *Research Square*, 17 March [Preprint].

- Grant, R. M. (1996). 'Toward a knowledge-based theory of the firm', *Strategic Management Journal*, 17(S2), 109–122.
- GSMA (2023) *The Mobile Economy Sub-Saharan Africa 2023*. London: GSMA. Available at: <https://www.gsma.com/solutions-and-impact/connectivity-for-good/mobile-economy/sub-saharan-africa-2024/> (Accessed: 13 August 2026).
- Holland, B.A. (2005) 'Scholarship and Mission in the 21st Century University: The Role of Engagement', in *Proceedings of the Australian Universities Quality Forum 2005*. Melbourne: Australian Universities Quality Agency, pp. 11–17. Available at: auqa.edu.au (Accessed: 13 August 2026).
- Internet Society (2022) *Africa Internet traffic report*. Available at: internetsociety.org (Accessed: 13 August 2026).
- International Telecommunication Union (2024) *Measuring digital development: Facts and Figures 2024*. Geneva: International Telecommunication Union. Available at: <https://www.itu.int/itu-d/reports/statistics/facts-figures-2024/> (Accessed: 13 August 2026).
- Kanu, I.A. and Okpokwasili, O.A. (2025) 'Artificial intelligence and digital colonialism in Africa', *Igwebuike: An African Journal of Arts and Humanities*, 11(7), pp. 2–13. Available at: https://www.igwebuikeresearchinstitute.org/journal_article.php?paper=804 (Accessed: 13 August 2026).
- LinkedIn (2023). *LinkedIn Workforce Report: AI Talent Distribution*. LinkedIn Corporation.
- Mare, A., and Mhlambi, S. (2022). *Decolonial AI: A framework for ethical AI in Africa*. *African Journal of Information and Communication*, 29, 1–22.
- Mhlambi, S. and Tiribelli, S. (2023) 'Decolonizing AI ethics: relational autonomy as a means to counter AI harms', *Topoi*, 42(3), pp. 867–880. Available at: <https://doi.org/10.1007/s11245-022-09874-2> (Accessed: 13 August 2026).
- Mollel, G.S. (2025) 'Determinants of AI utilization among Tanzania higher learning students: examining trends, predictors, and academic applications', *East African Journal of Information Technology*, 8(1), pp. 57–69. Available at: <https://doi.org/10.37284/eajit.8.1.2838> (Accessed: 13 August 2026).
- Mohamed, S., Png, M.-T. and Isaac, W. (2020). *Decolonial AI: Decolonial theory as sociotechnical foresight in artificial intelligence*. *Philosophy & Technology*, 33(4), pp.659–684. doi:10.1007/s13347-020-00405-8.
- Nakatumba-Nabende, J., Babirye, C., Nabende, P., Tusubira, J.F., Mukiibi, J., Wairagala, E.P., Mutebi, C., Bateesa, T.S., Nahabwe, A., Tusiime, H. and Katumba, A. (2024). *Building Text and Speech Benchmark Datasets and Models for Low-Resourced East African Languages: Experiences and Lessons*. *Applied AI letters*, 5(2). <https://doi.org/10.1002/ail2.92>.
- Nothias, T. (2025) 'An intellectual history of digital colonialism', *Journal of Communication*, 75(5), pp. 385–395. Available at: doi.org (Accessed: 13 August 2026).
- Nzobonimpa, S. and Savard, J. (2023) 'Ready but irresponsible? Analysis of the Government Artificial Intelligence Readiness Index', *Policy & Internet*, 15(4), pp. 532–551. Available at: doi.org (Accessed: 13 August 2026).
- Okolo, C.T., Aruleba, K. and Obaido, G. (2023) 'Responsible AI in Africa—Challenges and Opportunities', in Eke, D.O., Wakunuma, K. and Akintoye, S. (eds.) *Responsible AI in Africa: Challenges and Opportunities*. Cham: Springer, pp. 35–64. Available at: https://doi.org/10.1007/978-3-031-08215-3_3 (Accessed: 13 August 2026).
- Oladipo, E.K., Adeyemo, S.F., Oluwasanya, G.J., Oyinloye, O.R., Oyeyiola, O.H., Akinrinmade, I.D., Oyewole, O.M. and Nnaji, N.D. (2024) 'Impact and challenges of artificial intelligence integration in the African health sector: a review', *Trends in Medical Research*, 19(1), pp. 220–235. Available at: <https://doi.org/10.3923/tmr.2024.220.235> (Accessed: 13 August 2026).

- Olatunji-Ishola, C.O. and Okanlawon, K. (2025) 'The risks and rewards of AI dependence in Nigerian education: a critical evaluation', *Tech-Sphere Journal of Pure and Applied Sciences*, 2(1), pp. 1–15. Available at: techspherejournals.com (Accessed: 13 August 2026).
- Oxford Insights (2024) Government AI Readiness Index 2024. Available at: oxfordinsights.com (Accessed: 13 August 2026).
- Rodrigues, C., Cossa, J., Souza, J. and Elgezeri, M. (2023) Right to Education in the Global South: REGS Integrated Report. Buenos Aires: CLACSO. Available at: https://www.clacso.org/wp-content/uploads/2024/05/Integrated_Report_RIGHTS_TO_EDUCATION_IN_THE_GLOBAL_SOUTH-1.pdf (Accessed: 13 August 2026).
- Salami, A.O. (2024) 'Artificial intelligence, digital colonialism, and the implications for Africa's future development', *Data & Policy*, 6, e67. Available at: <https://doi.org/10.1017/dap.2024.75> (Accessed: 13 August 2026).
- Solon, O. (2017) 'It's digital colonialism: how Facebook's free internet service has failed its users', *The Guardian*, 27 July. Available at: <https://www.theguardian.com/technology/2017/jul/27/facebook-free-basics-developing-markets> (Accessed: 13 August 2026).
- TechCabal Insights (2026). Africa's AI sovereignty problem is really an energy problem. [online] TechCabal. Available at: <https://techcabal.com/2026/05/13/africas-ai-sovereignty-problem-is-really-an-energy-problem/> [Accessed 23 May 2026].
- United Nations Conference on Trade and Development (2024) Data protection and privacy legislation tracker. Available at: unctad.org (Accessed: 13 August 2026).
- UNESCO (2021). UNESCO Science Report: The Race Against Time for Smarter Development. Paris: UNESCO Publishing.
- UNESCO Institute for Statistics (2023). Education statistics. [online] Available at: <http://data.uis.unesco.org/>. [Accessed on June 05, 2023].
- UNESCO Institute for Statistics (2026). 2026 R&D data release: Global investment and researcher workforce trends (SDG Indicator 9.5).
- UNICEF (2023). Digital Literacy Index Report. UNICEF.
- Willem, F., Gray, M. and de Villiers-Botha, T. (2026). *The CRAFT principles for the responsible use of large language models in policymaking*. arXiv. Available at: <https://arxiv.org/abs/2607.15704v1> [Accessed 26 Sept. 2026].
- Xalam Analytics (2024) State of Africa Data Center 2024. United States: Xalam Analytics. Available at: <https://xalamanalytics.com/africa-reports/africa-data-center-market-report/> (Accessed: 13 August 2026).