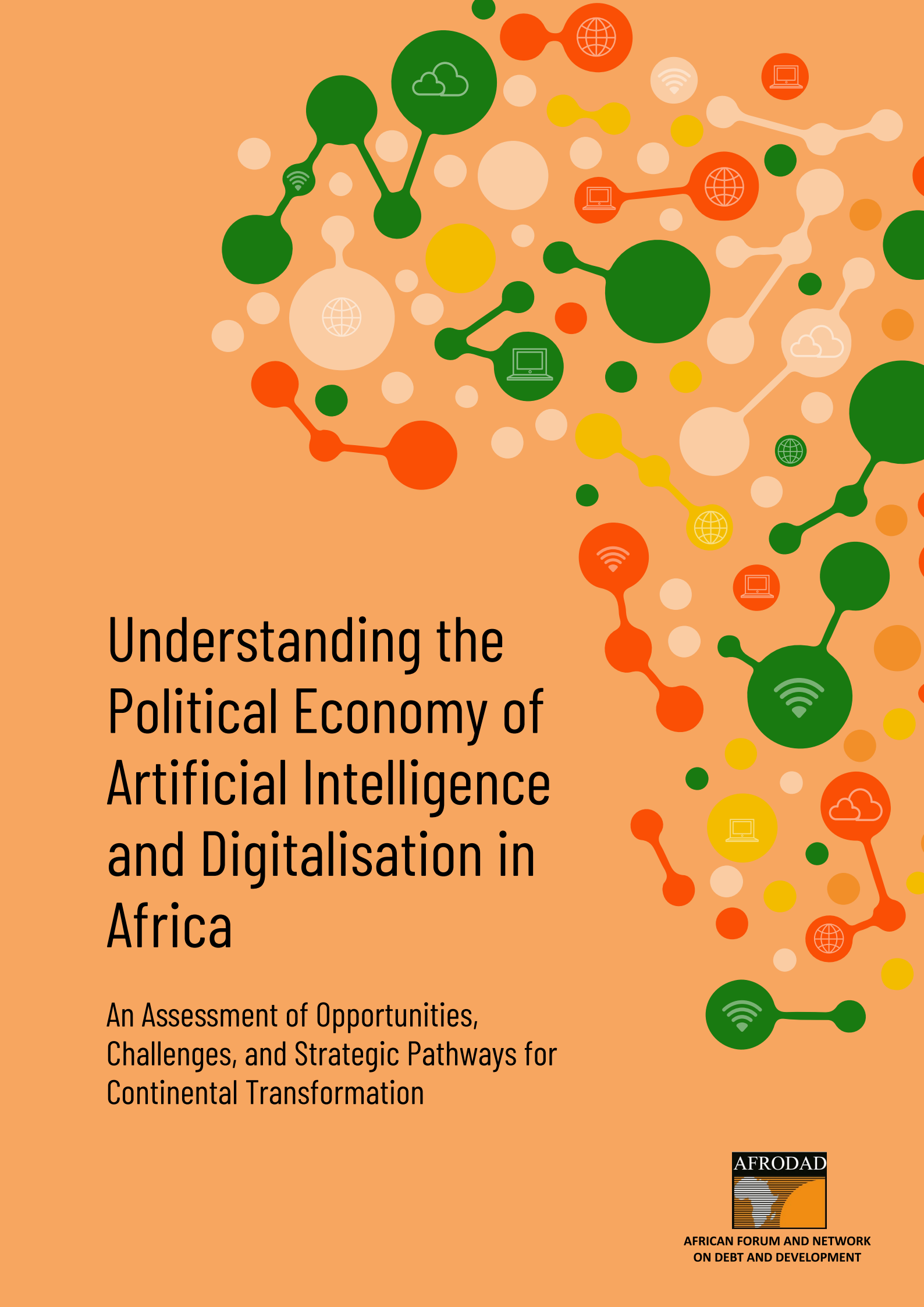


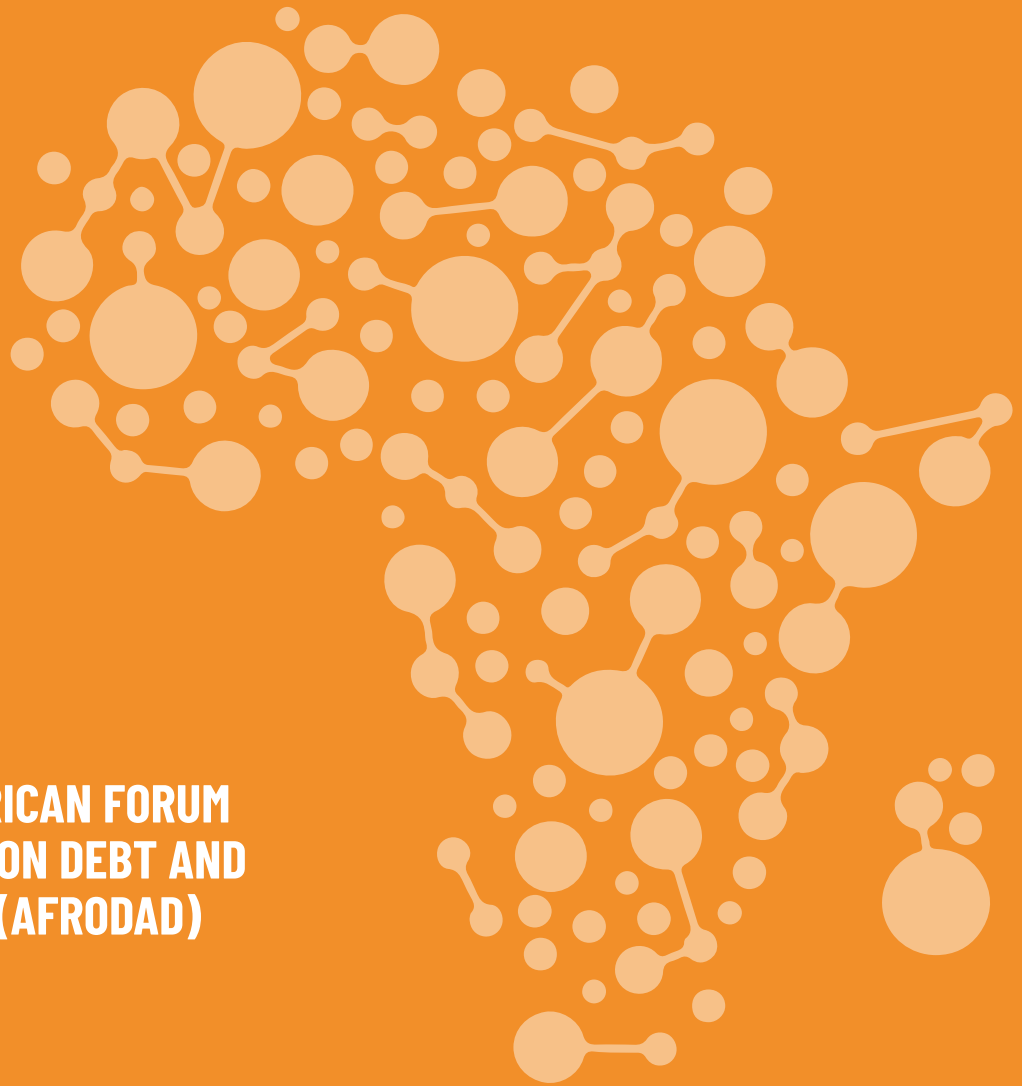


Understanding the Political Economy of Artificial Intelligence and Digitalisation in Africa

An Assessment of Opportunities,
Challenges, and Strategic Pathways for
Continental Transformation



AFRICAN FORUM AND NETWORK
ON DEBT AND DEVELOPMENT



ABOUT THE AFRICAN FORUM AND NETWORK ON DEBT AND DEVELOPMENT (AFRODAD)

The African Forum and Network on Debt and Development (AFRODAD) is a pan-African civil society organisation established in 1996 to advocate for debt cancellation and address debt-related issues in Africa. Over the past 25 years, AFRODAD has built expertise in public debt management and its intersection with domestic resource mobilisation, as well as international public and private finance in Sub-Saharan Africa. It continues to be a concern that African economies may become highly indebted and fall into debt distress, as experienced in the 1980s.

AFRODAD works with government officials across Africa, members of parliament, media professionals and journalists, civil society organisations, and representatives from the global financial architecture at both continental and global levels. We advocate for accountable and transparent public debt and financial management, the strengthening of legal and

policy frameworks to curtail leakages through illicit financial flows and profit shifting, and the prioritisation of revenue-generating opportunities through all forms of finance in Africa.

Our work focuses on influencing African governments and institutions to adopt accountable and transparent public debt management policies and practices for sustainable development and the eradication of poverty. Since our establishment, we have contributed to finding sustainable solutions to Africa's challenges in debt and resource mobilisation, including financial development. Our focus areas are: Sovereign Debt Management, Democratisation of the Debt Discourse, Collective Action on Debt and Development, and Institutional Development & Sustainability.

Website: <https://afrodad.org>



EXECUTIVE SUMMARY

This comprehensive study examines Africa's position within the global artificial intelligence (AI) political economy, analysing both the opportunities and challenges facing the continent in the Fourth Industrial Revolution (4IR). The research emerges from a critical juncture: African leaders have articulated an ambition to mobilise large-scale financing for AI development, yet Africa currently captures only 0.3 per cent of global AI investment and hosts merely 1 per cent of the world's AI compute capacity.

The study's analysis is organised around seven pillars of the AI political economy: compute, models, data, governance, energy, applications, and skills. These pillars identify where value is created, who controls critical inputs, and how Africa can shift from being primarily a consumer of externally produced technologies to becoming an active co-creator. This replaces the earlier invention–adoption distinction and aligns with the revised analytical framework of the paper.

Through detailed sectoral analysis, the research reveals uneven patterns of AI integration and potential across different domains of African economic activity. Financial services emerge as the most advanced sector, building successfully on Africa's mobile money revolution with AI enhancing credit scoring mechanisms, fraud detection systems, and financial inclusion initiatives. The agricultural sector, while facing significant infrastructure challenges, presents critical opportunities for AI applications in precision farming, weather prediction systems, and market information platforms that could address food security concerns affecting millions across the continent. Healthcare demonstrates transformative potential through telemedicine platforms, diagnostic systems, and supply chain optimisation, though successful implementation requires careful validation processes and robust regulatory frameworks to ensure patient safety and system reliability.

The study identifies several key challenges and risks that must be addressed for Africa to successfully harness the potential of AI systems. The infrastructure gap remains the most significant barrier, with limited digital infrastructure, unreliable electricity supply, and insufficient compute capacity constraining both AI development and adoption across the continent. A critical skills shortage compounds this challenge, as fewer than 15 per cent of Africa's estimated 828,000 software developers possess AI-related competencies, limiting local capacity for both innovation and implementation. Governance deficits present another major concern, with inadequate regulatory frameworks for responsible AI deployment potentially exposing African populations to algorithmic bias, privacy violations, and



other harms associated with poorly governed AI systems. These challenges reflect deeper political-economy dynamics, including structural dependency on foreign technologies, limited participation in global standards-setting, and financial constraints that restrict long-term investment in enabling infrastructure.

This research offers a set of strategic recommendations designed to enhance Africa's participation in the global AI economy while maintaining digital sovereignty and promoting inclusive development. These recommendations focus on investing in AI-enabling infrastructure and skills development, leveraging critical mineral resources for strategic value capture in global AI supply chains, developing adaptive governance frameworks that balance innovation with protection, promoting data governance initiatives that ensure African digital sovereignty, driving AI adoption in priority sectors through carefully structured public-private partnerships, fostering regional and South-South collaboration to pool resources and share knowledge, and ensuring inclusive participation and meaningful stakeholder engagement throughout AI development processes.

The implementation framework recognises that translating these recommendations into action requires sophisticated coordination mechanisms across multiple levels of governance, from local communities to continental institutions. Success depends on establishing clear leadership structures and coordination bodies, mobilising diverse financing mechanisms, including domestic resources and international partnerships, alongside domestic resources and international partnerships, implementing robust monitoring and evaluation systems to track progress and course-correct as needed, and maintaining unwavering emphasis on democratic participation and transparency throughout all AI development initiatives.

The study's vision for Africa's AI future is both ambitious and grounded in a realistic assessment of current capabilities and constraints. It envisions a continent that transitions from passive AI consumer to active co-creator and innovator, leveraging its collective demographic, resource, and market strengths while maintaining digital sovereignty and democratic governance. This transformation must be anchored in principles of economic justice, environmental sustainability, and Pan-African solidarity, ensuring that AI development serves authentic African development priorities rather than perpetuating historical patterns of technological dependency and economic extraction.

The significance of this research extends beyond academic analysis to provide essential policy guidance for what the study identifies as a critical decade ahead. The decisions made during this period will largely determine whether Africa benefits equitably from the AI revolution or finds itself further marginalised in an increasingly AI-driven global economy. By providing a comprehensive analysis of Africa's position in the global AI political economy, this study offers both sobering warnings about the risks of continued marginalisation and realistic hope that strategic collective action can fundamentally transform the continent's technological trajectory and, with it, Africa's broader development prospects in the twenty-first century.

AFRICAN FORUM AND NETWORK ON DEBT AND DEVELOPMENT

UNDERSTANDING THE POLITICAL ECONOMY OF ARTIFICIAL INTELLIGENCE AND DIGITALISATION IN AFRICA

KEY FINDINGS

- » The continent occupies a peripheral position in the global AI ecosystem, characterised by minimal participation in the creation and control of key AI capabilities, limited AI adoption capabilities capacity to deploy AI at scale due to infrastructure deficits, heavy dependence on foreign AI systems and platforms, and risk of “digital colonialism” where African data is extracted to train models developed elsewhere.
- » Despite current marginalization, Africa possesses unique advantages such as the continent’s demographic dividend (1.4 billion people with a median age of 19 years, representing a massive future workforce and market); critical minerals including cobalt, lithium, and rare-earth elements, which are essential for AI hardware (DRC alone has 60 per cent of global cobalt); a strong mobile innovation legacy with a proven track record in mobile-first solutions, particularly in fintech; and significant opportunities for context-specific applications with unique development contexts creating opportunities for frugal innovation.

1.4 billion

people with a median age of 19 years, representing a massive future workforce and market

ANALYTICAL FRAMEWORK

The study adopts a seven-pillar analytical framework that reflects the structural foundations of the global AI political economy:

- » Compute (data centres, cloud infrastructure, chips)
- » Models (foundational, domain-specific, and locally fine-tuned systems)
- » Data (availability, governance, representativeness, and value capture)
- » Governance (laws, regulations, standards, and institutional capacity)
- » Energy (reliable and affordable power for compute and digital systems)
- » Applications (sector-specific use cases in finance, agriculture, health, and public administration)
- » Skills (human capital required to build, adapt, and deploy AI safely)



SECTORAL ANALYSIS



Financial services remain the most advanced sector, building on mobile money systems with AI improving credit scoring, fraud detection, and financial inclusion.



Agriculture shows growing potential in precision farming, climate analytics, and market information systems, though adoption is constrained by infrastructure gaps.



Healthcare has high-impact opportunities in telemedicine, diagnostics, and supply chain optimisation, but requires rigorous validation and strong regulatory oversight.

KEY CHALLENGES AND RISKS

- » Infrastructure gap (limited digital infrastructure, electricity reliability, and computing capacity).
- » Skills shortage (fewer than 15 per cent of Africa's approximately 828,000 software developers have AI-related skills)
- » Governance deficits (inadequate regulatory frameworks for responsible AI deployment)
- » Digital dependency (over 80 per cent of cloud, data-hosting, and compute infrastructure is foreign-owned)
- » Bias and exclusion (risk of AI systems trained on Western data misclassifying African contexts)
- » Financial constraints (high debt servicing and limited access to affordable capital restricting investment in digital infrastructure).

STRATEGIC RECOMMENDATIONS

The study offers strategic recommendations:

- Invest in AI-enabling infrastructure and skills at scale
- Leverage critical minerals for strategic value capture in global AI supply chains.
- Develop adaptive AI governance frameworks
- Promote data governance and digital sovereignty initiatives
- Drive AI adoption in priority sectors through Public-Private Partnerships
- Foster regional and South-South collaboration
- Ensure inclusivity and stakeholder engagement in AI development

IMPLEMENTATION FRAMEWORK

Success requires:

- Clear leadership and coordination bodies at the continental, national, and local levels
- Diverse financing mechanisms, including domestic resources and international partnerships.
- Robust monitoring and evaluation systems
- Emphasis on democratic participation and transparency

VISION FOR THE FUTURE

The study envisions an Africa that transitions from passive AI consumer to active co-creator and innovator, leveraging its collective strengths while maintaining digital sovereignty. This transformation must be grounded in principles of economic justice, sustainability, and Pan-African solidarity, ensuring AI development serves African development priorities rather than perpetuating dependency.

SIGNIFICANCE

This research provides offers a comprehensive analysis of Africa's position in the global AI political economy, offering both analytical insights and actionable policy guidance for the critical decade ahead. The decisions made now will largely determine whether Africa benefits from the AI revolution or is further marginalised by it.

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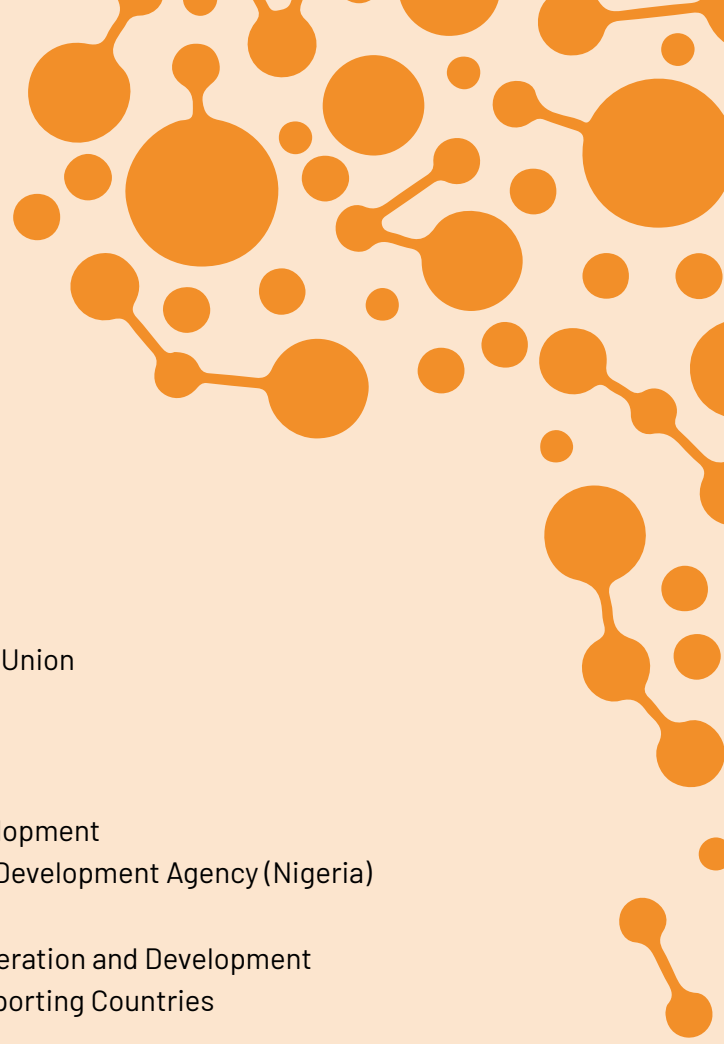
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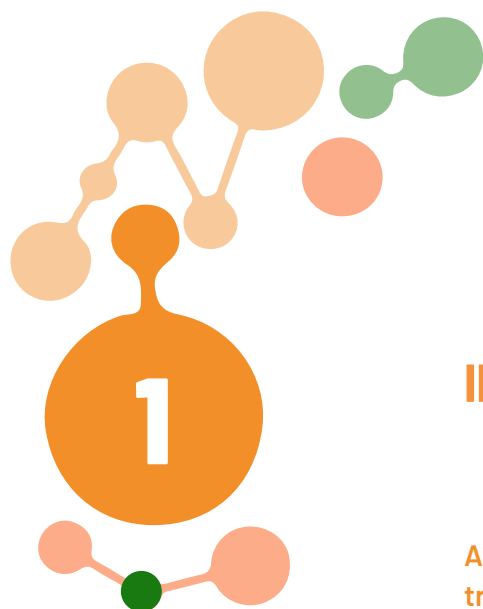
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LIST OF ABBREVIATIONS

4IR	Fourth Industrial Revolution
AfCFTA	African Continental Free Trade Area
AFRODAD	African Forum and Network on Debt and Development
AI	Artificial Intelligence
AMD	Advanced Micro Devices
ASIC	Application-Specific Integrated Circuit
ATA	Agricultural Transformation Agency (Ethiopia)
AU	African Union
CAD4TB	Computer-Aided Detection for Tuberculosis
CGIAR	Consultative Group on International Agricultural Research
CHIPS	Creating Helpful Incentives to Produce Semiconductors
CIFAR	Canadian Institute for Advanced Research
CSR	Corporate Social Responsibility
DE4A	Digital Economy for Africa
DPI	Digital Public Infrastructure
DRC	Democratic Republic of Congo
EAC	East African Community
ECOWAS	Economic Community of West African States
EthioSIS	Ethiopian Soil Information System
EU	European Union
EV	Electric Vehicle
FDA	Food and Drug Administration
FPGA	Field-Programmable Gate Array
GDP	Gross Domestic Product
GDPR	General Data Protection Regulation
GPAI	Global Partnership on AI
GPU	Graphics Processing Unit
ICT	Information and Communication Technology
ICPAC	IGAD Climate Prediction & Applications Centre
IEEE	Institute of Electrical and Electronics Engineers
IFAD	International Fund for Agricultural Development
IGAD	Intergovernmental Authority on Development
IMF	International Monetary Fund
ISO	International Organization for Standardization



IT	Information Technology
ITU	International Telecommunication Union
MFI	Microfinance Institution
MoU	Memorandum of Understanding
MTN	Mobile Telephone Networks
NEPAD	New Partnership for Africa's Development
NITDA	National Information Technology Development Agency (Nigeria)
NVIDIA	NVIDIA Corporation
OECD	Organisation for Economic Co-operation and Development
OPEC	Organisation of the Petroleum Exporting Countries
PPP	Public-Private Partnership
R&D	Research and Development
REC	Regional Economic Community
ROI	Return on Investment
SADC	Southern African Development Community
SDG	Sustainable Development Goals
SME	Small and Medium Enterprises
SMS	Short Message Service
STEM	Science, Technology, Engineering, and Mathematics
TB	Tuberculosis
TPU	Tensor Processing Unit
TSMC	Taiwan Semiconductor Manufacturing Company
UAE	United Arab Emirates
UBI	Universal Basic Income
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UPI	Unified Payments Interface (India)
USAID	United States Agency for International Development
USD	United States Dollar
VC	Venture Capital
WHO	World Health Organisation
WEF	World Economic Forum
WRI	World Resources Institute
WTO	World Trade Organisation



INTRODUCTION

Africa stands at a decisive moment in the global technological transition. Artificial intelligence (AI) and digitalization are rapidly transforming production, governance, and social relations worldwide, reshaping not only economies but also the underlying architectures of power and knowledge.¹ The continent's participation in this transformation will determine whether the emerging digital order reproduces structural dependency or enables new forms of autonomy and inclusion. The purpose of this paper is to analyze the political economy of AI and digitalization in Africa: how global technological systems intersect with Africa's sociopolitical realities, and what institutional, infrastructural, and governance capacities are required to ensure that AI development aligns with continental priorities for equity and sustainable growth. The analysis focuses on political-economic structures rather than technical innovation per se, situating Africa's AI trajectory within broader historical and geopolitical processes that have long defined the continent's position in global value chains.

The urgency of this inquiry lies in the speed and concentration of current technological change. Since 2020, a handful of firms and states have consolidated control over the compute, data, and energy resources that drive the AI economy.² AI has become a strategic asset in the competition between major powers such as the United States and China, whose export controls on advanced semiconductors and data flows are fragmenting the global technology landscape.³ These developments directly affect Africa's prospects for digital industrialization. The continent supplies roughly one-third of global reserves of rare earth minerals essential to AI and renewable technologies,⁴ yet remains largely excluded from the governance regimes

Debt servicing
absorbs more than
20%
of government
revenues across
sub-Saharan Africa

- 1 Maas, M. M. (2025). Architectures of global AI governance: From technological change to human choice. Oxford University Press.
- 2 OECD. (2023). A blueprint for building national compute capacity for artificial intelligence. Paris: OECD Publishing. https://www.oecd.org/en/publications/a-blueprint-for-building-national-compute-capacity-for-artificial-intelligence_876367e3-en.html; UNESCO. (2024, Sept. 26, last updated). *Recommendation on the Ethics of Artificial Intelligence (adopted 2021)*.
- 3 (Lee, Kai-Fu, AI Superpowers: China, Silicon Valley, and the New World Order, Houghton Mifflin Harcourt, 2018.; Ding, 2018). See also: Zwetsloot R, Toner H, Ding J (2018) Beyond the AI arms race: America, China and the dangers of zero-sum thinking, Foreign Affairs, November 16. Available at: <https://www.foreignaffairs.com/reviews/review-essay/2018-11-16/beyond-ai-arms-race>.
- 4 African Development Bank. (2025). African Economic Outlook 2025: Africa's Short-term Outlook Resilient Despite Global Economic and Political Headwinds. Abidjan: AfDB.



determining their use. At the same time, African governments are advancing national AI strategies and digital-public-infrastructure initiatives under the African Union's Continental AI Strategy (2024),⁵ reflecting growing recognition that technological sovereignty will shape economic sovereignty in the coming decade.

This study therefore examines how Africa can navigate the structural challenges of the global AI economy to secure inclusive and sovereign digital development. The inquiry stems from persistent asymmetries in global technology production and use. Historically, Africa's role has been defined by resource provision rather than innovation, with technologies often imported as turnkey systems that entrench dependency rather than build capacity.⁶ The political economy of AI raises enduring questions about power, ownership, and value distribution within knowledge-intensive industries. Technology is not neutral; it reflects the interests of its producers and the governance models under which it is deployed.⁷ Understanding these dynamics is essential to designing interventions that can shift Africa's position from passive consumer to active co-creator of AI technologies.

This paper contributes three main interventions to existing scholarship. First, it integrates the AI invention and AI adoption ecosystems within a single analytical framework to explain how value is created, controlled, and distributed along global AI value chains.⁸ Second, it grounds the analysis in recent empirical developments, including the AU Continental AI Strategy and national policy roadmaps in Nigeria, Kenya, and South Africa, bridging policy and political-economy perspectives. Third, it advances a normative argument for digital sovereignty, which is the capacity of African states and institutions to govern AI in ways that serve public rather than purely commercial or foreign interests.⁹

Methodologically, the paper employs a qualitative, comparative approach. It synthesizes policy documents, grey literature, and secondary data from 2020–2025 to trace how global AI dynamics shape national and regional trajectories. While continental in scope, the analysis recognizes national diversity and variation in institutional readiness. The timeframe extends to 2030 to align with the implementation horizon of the AU AI Strategy and related digital policy frameworks.

The remainder of the paper is organized into five chapters. Chapter 2 sets out the conceptual foundations by examining the political economy of technology and the Fourth Industrial Revolution, and by analyzing global AI power structures in relation to Africa's digital transformation trajectory. Chapter 3 maps the global AI ecosystem, focusing on invention and adoption dynamics and locating Africa within contemporary value chains. Chapter 4 outlines the strategic imperatives for Africa's AI future, supported by sectoral case studies. Chapter 5 synthesizes the findings and presents policy recommendations for national and continental actors. The conclusion considers the implications of the analysis for Africa's role in the emerging global digital order.

5 African Union Commission. (2024, July). Continental Artificial Intelligence Strategy. Accra: AU Executive Council.

6 Mhlambi, S., & Tiribelli, S. (2023). Decolonizing AI ethics: Relational autonomy as a means to counter AI harms. *Topoi*, 42(3), 867–880.

7 Winner, L. (1980). Do artifacts have politics? *Daedalus*, 109(1), 121–136. See also Pinch, T. J., & Bijker, W. E. (1984). The social construction of facts and artifacts: Or how the sociology of science and the sociology of technology might benefit each other. *Social Studies of Science*, 14(3), 399–441; Bijker, W. E., Hughes, T. P., & Pinch, T. J. (Eds.). (1987). *The social construction of technological systems: New directions in the sociology and history of technology*. MIT Press; Feenberg, A. (1999). *Questioning technology*. Routledge.

8 Muldoon, J., Nolan, J., & Molloy, S. (2025). *The politics of artificial intelligence supply chains*. *AI & Society*. <https://doi.org/10.1007/s00146-025-02625-y>

9 Ishkhanyan, A. (2025). *The sovereignty-internationalism paradox in AI governance: Digital federalism and global algorithmic control*. *Discover Artificial Intelligence*. <https://doi.org/10.1007/s44163-025-00374-x>

1.1. Problem Analysis: Africa's Structural Position in the Digital Age

Africa enters the digital era from a position of profound asymmetry. Despite representing nearly one-fifth of the world's population, the continent accounts for less than one percent of global AI research output and under 0.3 percent of private AI investment.¹⁰ Broadband penetration, computing capacity, and digital-skills readiness remain far below global averages, reflecting historical underinvestment in science and technology infrastructure. These disparities are not incidental; they stem from long-standing political and economic structures grounded in colonial extraction and post-colonial dependency, which positioned most African economies at the margins of global knowledge production.¹¹ The resulting digital divide mirrors earlier inequalities in trade, finance, and industrial development.

A central insight from the political economy of technology is that technological systems are not neutral. Scholars have long debated whether technology shapes society or whether society shapes technology. In practice, both dynamics operate simultaneously. The design, functionality, and purpose of AI systems reflect the social, economic, and political interests of those who create them. Technologies emerge from particular institutional environments, encode the values and priorities of dominant actors, and then reorganize social and economic relations once deployed. This dual process is essential for understanding Africa's structural position in AI development. It underscores why technological outcomes cannot be divorced from the power structures in which they are embedded.

In the context of AI, the development of systems is rooted in the values, priorities, and datasets of their creators, who are predominantly located in Silicon Valley, Beijing, and other centres of technological power.¹² This shapes everything from design choices and optimization targets to safety benchmarks and commercial licensing. Africa, therefore, appears rich in data but poor in agency. The continent generates enormous datasets through mobile commerce, fintech usage, agricultural activity, climate sensors, and population-scale digital services.¹³ Yet over 80 percent of the infrastructure required to store, process, and commercialize these datasets is foreign-owned. African data contributes to the training of models developed elsewhere, while African consumers receive AI products calibrated to foreign commercial priorities.¹⁴ This pattern is increasingly described as a form of digital colonialism, a continuation of extractive relationships in which African resources fuel value creation abroad while domestic capability remains underdeveloped.¹⁵

African data occupies a structurally marginal position within the global AI ecosystem. Available evidence shows that many widely used large language models are trained on datasets that substantially underrepresent African languages, social contexts, and institutional realities. As a result, these models exhibit markedly lower performance and systematic errors on African languages than on high-resource languages, leading to misclassification and context-blind outputs that reinforce exclusion.¹⁶ This underrepresentation reflects broader political-economy dynamics in which African data is either absent from global corpora or incorporated without meaningful control, governance, or compensation.

¹⁰ OECD. (2023). A blueprint for building national compute capacity for artificial intelligence. Paris: OECD Publishing. https://www.oecd.org/en/publications/a-blueprint-for-building-national-compute-capacity-for-artificial-intelligence_876367e3-en.html

¹¹ Kwet M (2019) Digital colonialism: US empire and the new imperialism in the global south. *Race & Class* 60(4): 3–26; See also: Couldry, N., & Mejias, U. A. (2021). The decolonial turn in data and technology research: what is at stake and where is it heading? *Information, Communication & Society*, 26(4), 786–802. <https://doi.org/10.1080/1369118X.2021.1986102>

¹² See Crawford, K. (2021). *Atlas of AI: Power, politics, and the planetary costs of artificial intelligence*. Yale University Press. See also Noble, S. U. (2018). *Algorithms of oppression: How search engines reinforce racism*. NYU Press; Zuboff, S. (2019). *The age of surveillance capitalism: The fight for a human future at the new frontier of power*. PublicAffairs; Benjamin, R. (2019). *Race after technology: Abolitionist tools for the new Jim code*. Polity Press.

¹³ Gebru, T., Morgenstern, J., Vecchione, B., Vaughan, J. W., Wallach, H., Daumé III, H., & Crawford, K. (2021). Datasheets for datasets. *Communications of the ACM*, 64(12), 86–92.

¹⁴ Birhane, A. (2021). Algorithmic injustice: A relational ethics approach. *Patterns*, 2(2), 100205.

¹⁵ Bernardus Jansen, Natalia Kadenko, Dennis Broeders, Michel van Eeten, Kevin Borgolte, Tobias Fiebig, Pushing boundaries: An empirical view on the digital sovereignty of six governments in the midst of geopolitical tensions, *Government Information Quarterly*, Volume 40, Issue 4, 2023, 101862. See also Kwet M (2019) Digital colonialism: US empire and the new imperialism in the global south. *Race & Class* 60(4): 3–26; See also: Couldry, N., & Mejias, U. A. (2021). The decolonial turn in data and technology research: what is at stake and where is it heading? *Information, Communication & Society*, 26(4), 786–802. <https://doi.org/10.1080/1369118X.2021.1986102>

¹⁶ Adebara, I., Toyin, H. O., Ghebremichael, N. T., Elmadany, A. A., & Abdul-Mageed, M. (2025). Where Are We? Evaluating LLM Performance on African Languages. *Proceedings of the 63rd Annual Meeting of the Association for Computational Linguistics (ACL)*, 32704–32731.

Yet the gap also presents a strategic opportunity: administrative datasets, indigenous-language corpora, cultural materials, and sector-specific information are assets that can be governed and valued in ways that support Africa-led model development and responsible cross-border data use. The challenge is therefore not only the risk of exclusion but also the need to convert Africa's underutilised data landscape into a foundation for innovation, sovereignty, and equitable value capture.

These dynamics extend into broader questions of technological transfer and intellectual property. Proprietary models, restrictive licensing regimes, and closed-source software architectures limit Africa's ability to adapt AI systems to local needs. Intellectual-property rules, along with the commercial incentives of dominant technology firms, privilege those already in control of the innovation frontier.¹⁷ As a result, Africa remains structurally positioned as a consumer of imported AI systems rather than a producer capable of shaping design, standards, or global governance processes. This reinforces the continent's dependence on foreign technology even when the raw materials and data that fuel AI originate within African borders.

The politics of technology further intensify these inequities. AI and digitalization are governed through standards, trade rules, and investment flows that reflect the strategic interests of technologically advanced states and corporations.¹⁸ Export controls on semiconductors, restrictions on cross-border data flows, and intellectual-property regimes collectively limit the ability of African countries to access inputs essential for domestic innovation.¹⁹ These governance structures determine whose knowledge counts and whose interests are embedded in emerging AI systems. Within Africa, uneven regulatory capacity deepens vulnerability. Frameworks for data protection, cybersecurity, and AI ethics remain fragmented, and coordination between economic, digital, and competition authorities is limited. Without strong, coherent governance institutions capable of setting expectations for safety, equity, and accountability, Africa risks reproducing dependence under the veneer of digital modernization.

Africa's peripheral position is paradoxical given its material contribution to global technological development. The continent supplies critical minerals such as cobalt, lithium, and rare-earth elements that underpin semiconductor manufacturing and renewable-energy systems.²⁰ Yet value capture from these resources is minimal. Extraction is dominated by foreign firms, and exports occur without downstream processing or local technology transfer. This reproduces an extractive pattern dating back to earlier industrial revolutions in which Africa provides inputs but remains excluded from the stages of production where knowledge, intellectual property, and capital accumulate. The challenge is not only to leverage natural-resource endowments but also to transform them into technological capability and to negotiate a more equitable position in global AI value chains.

These technological and governance asymmetries are compounded by financial constraints embedded within the global economic architecture. Debt servicing absorbs more than 20 percent of government revenues across sub-Saharan Africa,²¹ constraining fiscal space for investment in broadband, energy systems, AI research, and digital public infrastructure. AFRODAD's work demonstrates how unsustainable

17 Chang, H. J. (2001). Intellectual property rights and economic development: Historical lessons and emerging issues. *Journal of Human Development*, 2(2), 287–309. See also Drahos, P., & Braithwaite, J. (2002). *Information feudalism: Who owns the knowledge economy?* Earthscan.

18 Chang, H. J. (2002). *Kicking away the ladder: Development strategy in historical perspective*. Anthem Press.

19 Bown, C. P. (2022). How the United States marched the semiconductor industry into its trade war with China. *Peterson Institute for International Economics Working Paper* 22-12. See also Liu, H. W., & Lin, C. F. (2025). Techno-geopolitics and semiconductor chokepoints: Beyond the US-China WTO dispute. *Journal of World Investment & Trade*, 26, 749–791.

20 International Monetary Fund. (2024, April 29). Harnessing Sub-Saharan Africa's critical mineral wealth. <https://www.imf.org/en/news/articles/2024/04/29/cf-harnessing-sub-saharan-africas-critical-mineral-wealth>

21 Aminah Mustapha, "Silicon Savannah or Digital Debt Trap? Unpacking Foreign Tech in Sub-Saharan Africa" (February 2025) Georgetown Security Studies Review <<https://georgetownsecuritystudiesreview.org/2025/02/27/silicon-savannah-or-digital-debt-trap-unpacking-foreign-tech-in-sub-saharan-africa/>> 09 August 2025

debt burdens, conditional lending, and limited access to affordable finance perpetuate dependency and restrict the ability of African governments to undertake long-term, transformative investment in technology. The same dynamics shape AI adoption. Building compute capacity, data centres, or national digital-public-infrastructure systems requires capital-intensive, long-horizon investment, yet African countries face some of the highest borrowing costs in the world.²² Without systemic reform of the international financial architecture, including concessional financing for digital development, debt restructuring, and development finance tied to technological capability-building, the continent will struggle to secure the resources required for an inclusive digital transition.

The cumulative effect is a multilayered dependency that is technological, economic, and financial. Africa's digital lag is not a simple function of infrastructure shortages or skills gaps but a manifestation of deeper imbalances in the global political economy. The continent's participation in AI is constrained simultaneously by external power structures and internal governance limitations. These conditions set the foundation for this study's overarching inquiry into how Africa can confront the technological, political, and financial challenges of the global AI economy to secure an inclusive, sovereign, and sustainable digital future.

1.2. Research question and objectives

This study asks a single, guiding question: how can Africa confront the structural challenges of the global AI economy to advance inclusive, sovereign, and sustainable digital development. The question is anchored in the continent's position within global value chains, where invention capacity, data assets, and compute infrastructure are concentrated offshore, while adoption occurs mainly through imported systems. It follows from the asymmetries documented in the background and problem sections and from the manuscript's prior distinction between AI invention and AI adoption ecosystems, which together shape who creates value and who benefits from it.

The study pursues three objectives. First, it diagnoses Africa's position across the core inputs and institutions of the AI economy, situating continental trajectories in current geopolitical and geoeconomic shifts that affect access to chips, cloud, data, and standards.²³ Second, it identifies where policy and financing interventions can shift bargaining power and enable capability formation, with attention to continental initiatives such as the African Union's AI strategy and linked digital public infrastructure agendas.²⁴ Third, it translates these findings into targeted, sequenced recommendations for national governments, regional bodies, and private actors, consistent with AFRODAD's mandate on sustainable financing and debt justice for structural transformation.

1.3. Analytical framework: pillars of Africa's AI political economy

The analysis is organized around a set of interlocking pillars that structure the global political economy of AI and determine the conditions under which African countries can move from peripheral consumers of digital technologies to active co-creators. These pillars together describe how value is created, controlled, and distributed across global AI value chains, extending the distinction between AI invention and AI adoption by clarifying the technological, institutional, and financial levers that matter at each stage.

22 Aminah Mustapha, "Silicon Savannah or Digital Debt Trap? Unpacking Foreign Tech in Sub-Saharan Africa" (February 2025) Georgetown Security Studies Review <<https://georgetownsecuritystudiesreview.org/2025/02/21/silicon-savannah-or-digital-debt-trap-unpacking-foreign-tech-in-sub-saharan-africa/>> 09 August 2025

23 OECD. (2023). A blueprint for building national compute capacity for artificial intelligence. Paris: OECD Publishing. https://www.oecd.org/en/publications/a-blueprint-for-building-national-compute-capacity-for-artificial-intelligence_876367e3-en.html; UNESCO. (2024, Sept. 26, last updated). Recommendation on the Ethics of Artificial Intelligence (adopted 2021).

24 African Union Commission. (2024, July). Continental Artificial Intelligence Strategy. Accra: AU Executive Council.

A first pillar concerns compute, which includes data centres, cloud platforms, networking, and the semiconductor supply chain that underpins both model training and inference. Control over advanced chips and hyperscale infrastructure remains concentrated in a small number of firms and jurisdictions, and access is increasingly shaped by export controls, industrial policy, and geopolitical alignments. For African countries, insufficient compute capacity is an enabling constraint that shapes every other aspect of AI development: without affordable and reliable access to high-performance compute and stable energy, model training and secure inference remain dependent on offshore providers, with direct implications for cost, sovereignty, and regulatory compliance.²⁵ Assessing Africa's current compute landscape requires attention to data-centre availability, latency and hosting constraints, investment models, and the prospects for regional or cross-border facilities aligned with energy infrastructure.

A second pillar concerns AI models, including foundational, domain-specific, and task-specific systems used across public and private sectors. Africa's interaction with the model layer is still predominantly through proprietary frontier models or smaller open-source variants hosted abroad. The central questions here involve ownership, access terms, and the scope for local adaptation. These issues shape whether African institutions can develop or fine-tune models using local datasets and whether pooled procurement or public-sector "model-as-a-service" arrangements can reduce dependency on foreign providers while preserving control over sensitive data. The feasibility of African-led model development depends on the intersection of compute budgets, data availability, talent pools, and institutional capacity.

A third pillar relates to data, which encompasses availability, representativeness, lawful access, and governance. Data constitutes one of the most consequential asymmetries in the global AI political economy. African languages, cultural contexts, institutional arrangements, and social realities remain severely underrepresented in major training datasets, producing models whose performance degrades when applied to African settings. This exclusion reflects long-standing patterns of extractive data flows, where African-generated digital content and behavioural traces are collected by foreign platforms and incorporated into model training without governance, valuation, or public benefit. The political economy of data therefore involves not only scarcity but also dispossession. At the same time, Africa's diverse linguistic landscape, rapidly digitizing public sectors, and expanding cultural and informational resources create opportunities to build public-interest datasets that support local model development. Effective analysis distinguishes between public-sector administrative data, cultural and research corpora, and commercially held datasets, and considers instruments such as data trusts, public-interest data-access frameworks, and community-based governance models aligned with privacy and equity commitments.²⁶ These arrangements are central to determining how value from African datasets can be retained on the continent.

Governance forms a fourth pillar and includes statutory frameworks, regulatory agencies, standards participation, procurement systems, and accountability mechanisms. Fragmentation or duplication across these domains can impose high compliance costs without improving safety or rights protections, while regulatory gaps expose users to harm. Mapping the governance landscape requires examining the state of AI strategies and laws across the continent, coordination between data-protection, competition, consumer-protection, and sector regulators, and Africa's limited participation in the

²⁵ OECD. (2023). A blueprint for building national compute capacity for artificial intelligence. Paris: OECD Publishing. https://www.oecd.org/en/publications/a-blueprint-for-building-national-compute-capacity-for-artificial-intelligence_876367e3-en.html; UNESCO. (2024, Sept. 26, last updated). Recommendation on the Ethics of Artificial Intelligence (adopted 2021).

²⁶ UNESCO. (2024, Sept. 26, last updated). Recommendation on the Ethics of Artificial Intelligence (adopted 2021).

international standards bodies where AI norms and technical specifications are set. Procurement is especially important: public-sector adoption of AI technologies can operationalize responsible-AI principles through requirements for documentation, testing, audit rights, and accessibility.²⁷

Energy forms a fifth pillar because AI workloads are energy-intensive and highly sensitive to power reliability, cost, and decarbonization trajectories. Many African energy systems face generation deficits and grid instability, which affect both the feasibility and viability of hosting compute-intensive infrastructure. Understanding this pillar requires linking compute-infrastructure planning to energy-policy choices, including the development of renewable energy, independent power producers, regional power pools, and strategies to manage the carbon and water footprint of data-centre operations. These considerations also influence long-term infrastructure financing models.

A sixth pillar concerns applications, which capture how AI tools are adopted, localized, and integrated into public administration and productive sectors. While the manuscript already develops examples in finance, agriculture, and health, the analytical framework repositions these cases within a broader assessment of enabling conditions, such as compute, data, governance, energy, and skills. This pillar evaluates the maturity of use cases, identifies exemplar programmes, and highlights the interoperability and procurement barriers that impede diffusion and scale.

A seventh and final pillar is talent and skills, which encompass research scientists, machine-learning engineers, data professionals, and domain experts required for the safe and effective deployment of AI systems. Skills shortages across these categories restrict both invention and adoption. A structured assessment considers higher-education capacity, vocational and industry-based training, diaspora networks, research hubs, and inclusion pathways, while linking workforce development to procurement so that public-sector projects contribute to durable local capability rather than isolated vendor-dependent deployments.²⁸

Taken together, these pillars provide an integrated framework for analyzing Africa's political-economy position in the AI landscape. For each pillar, the study examines baseline capacity, identifies gaps, maps key actors at global, regional, and national levels, and assesses policy and financing instruments that could shift Africa's bargaining position. Cross-cutting attention is given to debt sustainability and access to affordable capital, consistent with AFRODAD's focus on expanding fiscal space for transformative investment. The framework therefore links the study's political-economy diagnosis to concrete implementation choices that can be monitored over time through measurable institutional and developmental indicators.

27 OECD. (2023). A blueprint for building national compute capacity for artificial intelligence. Paris: OECD Publishing. https://www.oecd.org/en/publications/a-blueprint-for-building-national-compute-capacity-for-artificial-intelligence_876367e3-en.html; African Union Commission. (2024, July). Continental Artificial Intelligence Strategy. Accra: AU Executive Council.

28 OECD. (2023). A blueprint for building national compute capacity for artificial intelligence. Paris: OECD Publishing. https://www.oecd.org/en/publications/a-blueprint-for-building-national-compute-capacity-for-artificial-intelligence_876367e3-en.html



CONCEPTUAL FOUNDATIONS: THE POLITICAL ECONOMY OF TECHNOLOGY AND AFRICA'S DIGITAL TRANSFORMATION TRAJECTORY

2.1. Fourth Industrial Revolution in Africa's Economic Development

The political economy approach to technology studies examines how technological development is embedded within broader structures of power, economic relations, and institutional arrangements.²⁹ In the context of AI, this framework reveals how technological capabilities are distributed unequally across global hierarchies, reinforcing existing patterns of dependency and extraction.³⁰ Recent scholarship on the political economy of AI emphasises the concentration of computational power, data resources, and technical expertise in a small number of multinational corporations and advanced economies.³¹ This concentration creates technological sovereignty challenges³² for developing nations, where dependence on foreign AI systems may compromise national autonomy and development pathways. This framing aligns with the introduction's recognition that AI development reflects the values and datasets of its creators, and it provides a theoretical basis for understanding how technological outcomes reproduce global hierarchies.

Building on this foundation, the political economy of AI highlights how the global distribution of power shapes access to technological capability. This political economy approach to AI asks: Who owns and controls the means of AI innovation? Who sets the rules and standards? And how do these factors influence global and local socioeconomic outcomes? Importantly, AI is not only a technical artefact but also a socio-technical assemblage shaped by decisions about funding, regulation, labour, and infrastructure. These decisions often reflect global capitalist imperatives rather than local development needs, raising concerns about the misalignment between Africa's developmental priorities and the economic logics underpinning global AI deployment. For African countries, this concentration produces technological sovereignty challenges, as



there is a growing call among African scholars and policymakers for "digital decolonisation"

29 Fuchs, Christian, "The power and political economy of social media" In *Social Media: A Critical Introduction*. London: SAGE Publications Ltd; 2014: 97-125. doi:10.4135/9781446270066.n5

30 Shiva, V., & Mies, M. (2014) *Ecofeminism*, Bloomsbury Publishing.

31 Srnicek, N. *Platform Capitalism* (2017 Cambridge) Polity Press.; See also: Zuboff, S., *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*. (2019 First Trade Paperback Edition). New York: Public Affairs.

32 Lynch, C. R. (2019). *Contesting Digital Futures: Urban Politics, Alternative Economies, and the Movement for Technological Sovereignty in Barcelona*. Antipode. <https://doi.org/10.1111/anti.12522>

reliance on foreign AI systems limits the ability to control data governance, shape innovation pathways, or build endogenous technological capacity. The result is a pattern of dependency in which Africa remains a consumer of externally produced technologies, unable to influence the political or economic logic embedded within them. This dynamic explains why Africa finds itself structurally marginal in the global AI economy and underscores the need for a political economy lens to analyse both the constraints and the possibilities for more autonomous digital development.

Klaus Schwab's conceptualisation of the 4IR emphasises the unprecedented pace and scope of technological change, arguing that "fusion of new technologies" which is "evolving at an exponential rate" and is "disrupting every industry in every country".³³ However, critical development scholars argue that this framing often obscures questions of power and inequality.³⁴ For Africa specifically, the 4IR literature presents two contrasting narratives. Optimistic accounts emphasise leapfrogging opportunities and the potential for technological solutions to address development challenges.³⁵ Pessimistic perspectives highlight infrastructure deficits, skills gaps, and the risk of technological dependency.³⁶ Pragmatically, the 4IR in Africa demands a contextualised approach, one that neither romanticises technology as a silver bullet nor dismisses its transformative potential. The continent's historical entanglements with extractive global systems mean that, without deliberate policy choices, digital infrastructures may replicate colonial patterns of dependency and exclusion. A pragmatic lens foregrounds the need for sovereign digital governance, investment in human capital, and inclusive innovation ecosystems that prioritise local knowledge and socio-economic justice. In this view, and in tandem with AFRODAD's vision, the success of Africa's engagement with the 4IR hinges not merely on adoption but on critical adaptation and ownership.³⁷

Equally, there is a growing call among African scholars and policymakers for "digital decolonisation", a process that centres African epistemologies, developmental visions, and institutional agency in shaping the continent's digital future.³⁸ This includes fostering endogenous innovation capabilities and ensuring that digital systems align with long-term social equity and environmental sustainability.

2.2. AI Development and Global Power Structures versus Africa's Digital Transformation Trajectory

The contemporary AI landscape is characterised by intense geopolitical competition, primarily between the United States and China, with Europe emerging as a third pole focused on AI governance and ethics.³⁹ This competition extends beyond commercial markets to encompass standard-setting, data governance, and technological architectures.⁴⁰ For Africa, this geopolitical context presents both opportunities and risks. While competition among major powers may increase investment and technology transfer opportunities, it also risks instrumentalising African countries as markets for AI products rather than partners in AI development.

Scholars increasingly utilise the concept of "digital colonialism" to describe how contemporary technological relationships reproduce colonial patterns of extraction and dependency.⁴¹ In the AI context, this manifests

33 Klaus Schwab, *The Fourth Industrial Revolution* (Geneva: World Economic Forum, 2016).

34 Mariana Mazzucato *The Value of Everything: Making and Taking in the Global Economy* (2018 Penguin London) UK: Random House UK

35 Naudé, Wim, 2017. "Entrepreneurship, Education and the Fourth Industrial Revolution in Africa," IZA Discussion Papers 10855, Institute of Labor Economics (IZA)

36 Andreoni, A. and F. Tregenna (2020). 'Escaping the middle-income technology trap: a comparative analysis of industrial policies in China, Brazil and South Africa.' *Structural Change and Economic Dynamics* 54: 324.

37 Effoduh, Jake Okechukwu. "The Fourth Industrial Revolution by Klaus Schwab." *The Transnational Human Rights Review* 3. (2017): DOI: <https://doi.org/10.60082/2563-4631.1023> <<https://digitalcommons.osgoode.yorku.ca/thr/vol3/iss1/4>>

38 Schoon, A., Mabweazara, H. M., Bosch, T., & Dugmore, H. (2020). "Decolonising Digital Media Research Methods: Positioning African Digital Experiences as Epistemic Sites of Knowledge Production" *African Journalism Studies*, 41(4), 1-15. <https://doi.org/10.1080/23743670.2020.1865645>

39 (Lee, Kai-Fu, *AI Superpowers: China, Silicon Valley, and the New World Order*, Houghton Mifflin Harcourt, 2018.; Ding, 2018). See also: Zwetsloot R, Toner H, Ding J (2018) Beyond the AI arms race: America, China and the dangers of zero-sum thinking, *Foreign Affairs*, November 16. Available at: <https://www.foreignaffairs.com/reviews/review-essay/2018-11-16/beyond-ai-arms-race>.

40 Roberts H, Cows J, Morley J (2021) The Chinese approach to artificial intelligence: an analysis of policy, ethics, and regulation. *AI and Society* 36: 59-77. <https://doi-org.ezp.lib.cam.ac.uk/10.1007/s00146-020-00992-2>

41 Kwet M (2019) Digital colonialism: US empire and the new imperialism in the global south. *Race & Class* 60(4): 3-26; See also: Couldry, N., & Mejias, U. A. (2021). The decolonial turn in data and technology research: what is at stake and where is it heading? *Information, Communication & Society*, 26(4), 786-802. <https://doi.org/10.1080/1369118X.2021.1986102>



through data extraction without equitable value sharing; dependence on foreign AI platforms and infrastructure; limited participation in AI standard-setting and governance; and reproduction of biases and exclusions in AI systems. This dynamic reinforces asymmetrical power relations where African states and institutions become mere data providers, while economic and political value is captured elsewhere, primarily by Global North tech conglomerates. The dominance of foreign AI platforms not only limits digital sovereignty⁴² but also curtails the continent's capacity to shape the ethical, legal, and technical norms that govern AI. Moreover, when AI systems are trained on datasets that underrepresent African contexts (or worse, misrepresent them), they risk entrenching epistemic injustice, marginalising local languages, norms, and knowledge systems.⁴³ In this sense, digital colonialism is not just economic; it is cultural, political, and even cognitive, raising urgent questions about who gets to define intelligence, fairness, and progress in the age of AI, and what the continent's future gets to become.

This also brings into view the role of multilateral institutions and global regulatory forums where African voices are often underrepresented. As AI norms and standards are being set in institutions such as the OECD, ISO, and the EU's regulatory ecosystems, the risk is that African interests become subordinated to frameworks that do not reflect the continent's specific socio-economic realities or developmental aspirations.

Africa's distinctive mobile-first digital transformation has been extensively documented, with particular attention to mobile money innovations in Kenya, Nigeria, and other markets.⁴⁴ This trajectory demonstrates Africa's capacity for technological innovation adapted to local conditions and constraints. However, scholars caution against overgeneralising from mobile money success, noting that replication in other technological domains requires different institutional arrangements and capabilities.⁴⁵ Recognising this, regional policy frameworks have begun to address the structural foundations necessary for broader digital transformation. The African Union's Agenda 2063 and Digital Transformation Strategy provide frameworks for continental integration through digital technologies.⁴⁶ Recent policy initiatives, including the African Continental Free Trade Area (AfCFTA) and the Single Digital Market initiative, create institutional foundations for scaled digital transformation.⁴⁷ However, implementation challenges remain significant, including coordination across diverse national contexts, capacity constraints, and competing priorities.⁴⁸

Moreover, African digital ecosystems remain fragmented, with wide disparities in digital infrastructure, regulatory maturity, and innovation ecosystems across countries.⁴⁹ This fragmentation inhibits the scaling of AI systems and undermines collaborative regional approaches that could foster cross-border data governance, infrastructure sharing, and policy harmonisation. The role of regional organisations (such as Smart Africa, NEPAD, and ECOWAS) in shaping continental digital strategy is increasingly pivotal. These bodies provide platforms for articulating collective bargaining positions in global AI governance debates, while also helping to align national AI strategies with regional development priorities.

42 Digital sovereignty simply refers to a nation or region's ability to control and responsibly manage its own digital assets (data, infrastructure, skills) in line with its interests.

43 daka, A., Lassou, P. J., Seny Kan, K. A., & Fosso-Wamba, S. (2024). Toward response-able AI: A decolonial perspective to AI-enabled accounting systems in Africa. *Critical Perspectives on Accounting*, 99, 102736

44 Suri, Tavneet, and William Jack. 2016. "The Long-Run Poverty and Gender Impacts of Mobile Money." *Science* 354 (6377): 1288–92.; See also: Beck, Thorsten, Lemma Senbet, and Witness Simbanegavi, 2015, "Financial inclusion and innovation in Africa: An overview," *Journal of African Economies* 24, i3–i11

45 (Donovan, 2012; Demirci-Kunt et al., 2018).

46 (African Union, 2020).

47 Simo, R. Y. 2020. "Trade in Services in the African Continental Free Trade Area: Prospects, Challenges and WTO Compatibility." *Journal of International Economic Law* 23 (1): 65–95. <https://doi.org/10.1093/jiel/jgz031>.

48 Pasara, M. T. 2020. "An Overview of the Obstacles to the African Economic Integration Process in View of the African Continental Free Trade Area." *Africa Review* 12 (1): 1–17. <https://doi.org/10.1080/09744053.2019.1685336>.

49 Stanford University Human-Centred Artificial Intelligence, "Artificial Intelligence Index Report 2025" <https://hai.stanford.edu/assets/files/hai_ai_index_report_2025.pdf> accessed 15 July 2025.



THE GLOBAL AI POLITICAL ECONOMY AND AFRICA'S POSITION

3.1. The Structure of the Global AI Ecosystem: Invention and Adoption Dynamics

The governance and distribution of power in the AI ecosystem are shaped by a dense constellation of global and regional actors whose decisions influence Africa's prospects for digital transformation. AI invention (the research, development, and production of AI technologies) and AI adoption (the integration and use of those technologies across economies).⁵⁰ Understanding the global political economy of AI requires examining both sides and the value chains that connect them. On the invention side, a handful of countries and firms dominate the key components of AI production. These components include advanced computational infrastructure (i.e. semiconductors and chips); data infrastructure and cloud computing; and AI software development and talent. On the adoption side of the AI ecosystem, which deals with how AI tools diffuse into economies and societies, the patterns are tied closely to general digital readiness and economic structure, which include enterprise and sectoral adoption as well as public sector and government AI applications. It is pertinent to address each of these key components to appreciate Africa's position in the global AI ecosystem.

3.1.1. Key Aspects of the AI Invention Dynamics

One key component is advanced computational infrastructure, such as semiconductors and chips. Modern AI (especially deep learning) depends on high-performance chips (GPUs, TPUs, ASICs) and large-scale computing clusters. This industry is highly concentrated. Taiwan's TSMC manufactures about 60 per cent of the world's chips for others, while a few firms like NVIDIA, AMD, and

As of

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the number of AI-focused companies in Africa remains modest (roughly 2,400 startups and firms across the continent)

⁵⁰ Broadly and for ease of analysis, the invention side of the AI business ecosystem includes, but is not limited to, AI software development, data centres, cloud computing/storage, platform services, AI-specific hardware and language modelling/development. The combined activities within this invention ecosystem produce AI products and services that become accessible to both corporate and individual end-users through computers and other electronic devices. These outputs form the foundation of the AI adoption ecosystem. On the other hand, participants in the AI adoption ecosystem include individual and corporate end-users such as banks, telecommunications companies, government agencies, and hospitals that procure AI-powered services like chatbots, virtual assistants, data management and analysis tools, project management platforms, workflow automation tools, and compliance monitoring systems. Adoption also occurs at the individual level, when users on digital platforms access AI products and services such as online shopping assistants, language and writing tools, AI-driven stock and crypto trading assistants, social media management tools, predictive or autocorrect text, AI imaging, facial recognition, and many others.

Intel dominate chip design.⁵¹ Geopolitical tensions (e.g. US-China trade disputes) have highlighted how strategic these supply chains are, leading to government interventions like the U.S. CHIPS and Science Act (2022) and the EU Chips Act (2023), which pour billions into domestic semiconductor capacity.⁵² Countries see control over AI hardware as a matter of national security and economic sovereignty.⁵³ Africa, by contrast, has almost no presence in chip fabrication or design today. However, Africa holds abundant reserves of critical minerals used in semiconductors and electronics (such as cobalt, coltan/tantalum, platinum group metals).⁵⁴ For example, the Democratic Republic of Congo (DRC) alone possesses over 60 per cent of the world's cobalt reserves.⁵⁵ This gives Africa potential leverage in the AI value chain, if it can negotiate resource-for-technology partnerships or invest in local processing of these minerals. Recent partnerships, like the 2023 NVIDIA-Cassava Technologies initiative to develop AI-ready data centres in Africa, hint at possibilities where mineral wealth could be parlayed into AI infrastructure investment.⁵⁶

Another major key component on the invention side is data infrastructure and cloud computing. It is trite that developing and deploying AI models (especially large models) requires massive data storage and processing capabilities, typically provided via cloud data centres. This market is similarly dominated by a few players, notably Amazon Web Services, Microsoft Azure, and Google Cloud, along with Chinese firms like Alibaba and Tencent Cloud. The physical footprint of AI-capable data centres is revealing of global divides. It's estimated that training a single advanced AI model can consume gigawatt-hours of electricity and require specialised cooling and connectivity.⁵⁷ There are fewer than 40 countries that host such AI-ready data centres, with the United States and China operating most of them.⁵⁸ Entire continents like Africa and South America are nearly absent from this map. In fact, Africa is said to have just two known data centre facilities (both in South Africa) capable of handling AI model training, and these are foreign-owned.⁵⁹

The resulting dependency means African AI developers must often rent cloud compute from overseas, incurring high costs and raising concerns over data jurisdiction. This is a critical strategic gap because, without local or affordable access to AI compute power, African researchers and startups are at a significant disadvantage. A striking comparison: a single institute at Harvard University reportedly has more AI computing capacity than all African-owned AI facilities combined.⁶⁰ Such disparities underline the urgency for Africa to develop its own digital infrastructure. Encouraging trends include investments in undersea cables, internet exchange points, and plans for green data centres in countries like Kenya and Morocco.⁶¹ Still, bridging the "compute divide" will require not just money but policies incentivising cloud providers to locate infrastructure in Africa, possibly through public-private partnerships or regional pooling of demand to achieve scale.

51 Thomas Alsop, "AI chips - statistics & facts" (Statista 2025) <<https://www.statista.com/topics/6153/artificial-intelligence-ai-chips/#topicOverview>> 15 July 2025

52 Peters, M. A. (2022). Semiconductors, geopolitics and technological rivalry: The US CHIPS & Science Act, 2022. *Educational Philosophy and Theory*, 55(14), 1642-1646.

53 Bernardus Jansen, Natalia Kadenko, Dennis Broeders, Michel van Eeten, Kevin Borgolte, Tobias Fiebig, Pushing boundaries: An empirical view on the digital sovereignty of six governments in the midst of geopolitical tensions, *Government Information Quarterly*, Volume 40, Issue 4, 2023, 101862. See also: Saif M. Khan, "AI Chips: What They Are and Why They Matter" (The Centre for Security and Emerging Technology, Georgetown University, 2020) <<https://cset.georgetown.edu/publication/ai-chips-what-they-are-and-why-they-matter/>> 15 July 2025.

54 Dorina A. Bekoe et al. "Rare Earth Elements in Africa: Implications for U.S. National and Economic Security" (Institute for Defence Analysis, 2022) <<https://apps.dtic.mil/sti/trecms/pdf/AD1204908.pdf>> 17 July 2025.

55 Raphael Deberdt, "The Democratic Republic of the Congo (DRC)'s response to artisanal cobalt mining: The Entreprise Générale du Cobalt (EGC)", *The Extractive Industries and Society*, Volume 8, Issue 4, 2021, 101013

56 Bloomberg, "Nvidia, Cassava's AI Factory in Africa Tie-Up to Cost \$720 Million" (<https://www.bloomberg.com/news/articles/2025-04-07/nvidia-cassava-s-ai-factory-in-africa-tie-up-to-cost-720-million>)

57 IEA (2025), Energy and AI, IEA, Paris <<https://www.iea.org/reports/energy-and-ai>> 15 July 2025. See also: Alex de Vries, "The growing energy footprint of artificial intelligence" (*Joule*, Volume 7, Issue 10, 2023, Pages 2191-2194; See also: Mahmut Kandemir, "Why AI uses so much energy—and what we can do about it" (Penn State University, 2025) <<https://iee.psu.edu/news/blog/why-ai-uses-so-much-energy-and-what-we-can-do-about-it>> 15 July 2025.

58 McKinsey and company, "AI power: Expanding data center capacity to meet growing demand" (McKinsey 2024) <<https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/ai-power-expanding-data-center-capacity-to-meet-growing-demand>> 15 July 2025.

59 Hawkins, Zoe and Lehdonvirta, Vili and Wu, Boxi, "AI Compute Sovereignty: Infrastructure Control Across Territories, Cloud Providers, and Accelerators" (June 20, 2025). <<http://dx.doi.org/10.2139/ssrn.5312977>> 15 July 2025.

60 The Global AI Divide, Where AI Data Centres are Located (June 2025 New York Times) <https://www.nytimes.com/interactive/2025/06/23/technology/ai-computing-global-divide.html> Accessed 08 August 2025.

61 Ahmed Eljehtimi, "Morocco to build data centre powered by renewable energy" (June 2025, Reuters) <https://www.reuters.com/sustainability/boards-policy-regulation/morocco-build-data-centre-powered-by-renewable-energy-2025-07-09/> Accessed 08 August 2025.

AI software development and talent are key components because the creation of AI algorithms and applications relies on skilled human capital. Globally, AI expertise is concentrated in tech hubs (Silicon Valley, Beijing, London, etc.) and a small number of elite universities and corporate R&D labs. Estimates suggest the US alone has twice as much A.I. application developers than the entire African continent.⁶² Assuming generally that 15% of software developers are AI software specialists,⁶³ the US alone would still have more AI software developers than all African countries combined. Europe and China also have large pools, whereas Africa's AI talent pool is only in the tens of thousands. A 2021 survey showed Africa had around 716,000 professional software developers of all kinds; by 2025, about 828,000, but fewer than 15 per cent have AI-related skills.⁶⁴ The scarcity of advanced AI researchers in Africa is both a cause and an effect of the limited AI industry presence. Tech giants have started some initiatives (e.g. Google's AI lab in Ghana,⁶⁵ Deep Learning Indaba programs⁶⁶) to train and retain African talent, yet brain drain remains a concern. The global labour market for AI is lucrative, pulling skilled Africans abroad or to foreign firms. Additionally, the number of AI-focused companies in Africa remains modest (roughly 2,400 startups and firms across the continent as of 2024)⁶⁷ compared to tens of thousands in the U.S. alone. This gap in innovation capacity is reflected in outputs like research publications and patents: African institutions contribute less than two per cent of global AI research papers a few patents and no notable AI model development.⁶⁸ Without building this human and institutional capacity, Africa risks perpetually lagging in AI creation and having to import or license foreign technologies at high cost.

3.1.2. Key Aspects of the AI Adoption Dynamics

As mentioned earlier, the adoption side of the AI ecosystem deals with how AI tools diffuse into economies and societies. Here, patterns are tied closely to general digital readiness and economic structure.

One key component of the adoption side of the AI ecosystem is enterprise and sectoral adoption. Globally, AI adoption is uneven across sectors. Tech-forward industries like finance, healthcare, manufacturing, and telecom are leading adopters because AI can directly improve their efficiency and services. In Africa, we see a similar trend where the financial services sector (especially fintech) is among the most advanced in AI uptake, leveraging Africa's strong fintech base. For example, companies like Nigeria's Flutterwave and Paystack use machine learning for payment fraud detection and credit risk analysis.⁶⁹ Telecommunications firms analyse customer data with AI to personalise services.⁷⁰ E-commerce and ride-hailing platforms employ AI for recommendations and route optimisation.⁷¹ Agriculture and manufacturing remain relatively under-automated in Africa, but agri-tech startups are emerging (applying AI to crop monitoring or supply chain management) as connectivity slowly improves in rural areas.⁷² The healthcare sector is also nascent in AI adoption, yet promising pilots exist. For instance, in medical diagnostics, South Africa's Genio and Nigeria's LifeBank have applied AI to analyse medical

62 Bureau of Labor Statistics, "Occupational Outlook Handbook: Software Developers, Quality Assurance Analysts, and Testers," (Bureau of Labor Statistics, 2024) <<https://www.bls.gov/ooh/computer-and-information-technology/software-developers.htm>> accessed 15 July 2025.

63 Xuan Ji, "How many AI engineers are there in USA" <<https://www.byteplus.com/en/topic/537725?title=how-many-ai-engineers-are-there-in-usa>> accessed 15 July 2025.

64 Google and Accenture, "Africa Developer Ecosystem 2021" <<https://kstatic.googleusercontent.com/files/f921919199e8543ce5ba3925e4ddbc6d104fe2e995c7f3338a6d88554890372ca442a6a23c9a17f94e06b143eba71d4652cbea529d4e2b6b5646da8f46736615>> accessed 15 July 2025.

65 Aanu Adeoye, "Google has opened its first Africa Artificial Intelligence lab in Ghana" (CNN 2019) <Google has opened its first Africa Artificial Intelligence lab in Ghana> Accessed 08 August 2025.

66 The Deep Learning Indaba, <<https://deeplearningindaba.com/2025/>> Accessed 08 August 2025.

67 Mthulisi Sibanda, "Artificial intelligence (AI) is expected to add US\$1.5 trillion to the African economy by 2030, if the continent captures 10% of the AI global market." (SAP 2025) <<https://news.sap.com/africa/2025/06/ai-projected-to-add-15-trillion-in-africa-by-2030/#:~:text=According%20to%20SAP%20research%2C%20there,a%20shortage%20of%20AI%20expertise>> accessed 15 July 2025.

68 Stanford University Human-Centred Artificial Intelligence, "Artificial Intelligence Index Report 2025" <https://hai.stanford.edu/assets/files/hai_ai_index_report_2025.pdf> page 46 accessed 15 July 2025.

69 Rotimi Okunbaye, "Payment Security Best Practices in Nigeria" (Flutterwave, 2024) <<https://flutterwave.com/cm/blog/payment-security-best-practices-in-nigeria>> Accessed 09 August 2025.

70 Pay Shabangu, "Artificial Intelligence's (AI's) implications for strategic communication" (2024 Journal for Communication Studies in Africa) Volume 43 (1) July 2024 Pages 36-47.

71 Yang Liu, Ruo Jia, Jieping Ye, Xiaobo Qu, How machine learning informs ride-hailing services: A survey, Communications in Transportation Research, Volume 2, 2022, 100075, ISSN 2772-4247, <https://doi.org/10.1016/j.commtr.2022.100075>.

72 Chatrabhui, Kundan Meshram, Umank Mishra, Upaka Rathnayake, Application of artificial intelligence in agri-tech, environmental and biodiversity conservation, Array, Volume 26, 2025, 100412, ISSN 2590-0056, <https://doi.org/10.1016/j.array.2025.100412>.

images (radiology) and optimise blood supply chains, respectively.⁷³ These localised innovations show the potential for AI to address African challenges, but scaling them up will require supportive ecosystems (funding, partnerships with public health systems, regulatory approval for AI medical devices, etc.).

When it comes to public sector and government AI applications, governments worldwide are exploring AI for public services (from automating administrative tasks to improving welfare targeting). In Africa, some early use cases have shown impact: Togo used an AI system to identify households most in need of COVID-19 cash assistance via mobile money, making relief distribution more data-driven.⁷⁴ Zambia piloted AI to monitor and counter election misinformation on social media.⁷⁵ Rwanda employs AI-driven chatbots for agricultural extension, providing farmers with instant advice.⁷⁶ At the same time, such uses raise significant governance questions. Many African states have limited capacity for auditing AI algorithms or managing issues like bias, privacy, and security. If a government outsources an AI system (say, for facial recognition in policing or automated public service delivery) to a foreign vendor, it can inadvertently cede a degree of digital sovereignty, not fully controlling the technology that influences its citizens' lives. Public trust and accountability are also at stake: decisions made by AI (e.g. identifying which regions receive aid or which tax returns to flag for auditing) must be explainable and fair, or they risk public backlash. These factors make it clear that adoption without local capacity can be problematic.

Nonetheless, the drive to use AI in governance is strong, given the potential efficiency gains. African leaders increasingly view tech adoption as key to leapfrogging infrastructural gaps (for example, using drones with AI to deliver medical supplies in remote areas, as done in Ghana and Rwanda, instead of waiting to build extensive road networks).⁷⁷

Generally, the global adoption of AI is projected to add trillions of dollars to economic output. A seminal analysis by McKinsey estimated that AI could contribute around 13 trillion USD to the global economy by 2030 (roughly a 1.2 per cent annual increase in GDP), making it one of the largest economic opportunities of our time.⁷⁸ Within that, AI systems are proliferating. Agentic AI (systems that act autonomously to achieve goals, often across multiple steps, and sometimes over time) has also changed the game for the economic output of AI adoption. Even the wave of generative AI (capable of creating content, like ChatGPT) alone might account for 2.6 to 4.4 trillion USD in annual value in the coming years.⁷⁹

These numbers underscore why countries are racing to harness AI. However, the distribution of this potential gain will depend on readiness: countries with mature digital infrastructure and skills are far better positioned to capture the productivity of AI boosts than those without. Unfortunately, by most indices of readiness, African countries lag. For instance, the Oxford Insights Government AI Readiness Index (2023) finds that even Africa's top performers (Mauritius, South Africa) score just above 50 out of 100, whereas leading nations score above 80.⁸⁰ Most African nations cluster toward the bottom in terms of digital infrastructure, human capital, and governance readiness for AI.⁸¹ Another assessment, the

73 Empower Africa, "LifeBank: This health-tech startup is transforming medical supply chains in Nigeria and beyond" (2023) <<https://empowerafrica.com/bridging-the-gap-how-lifebank-is-transforming-medical-supply-chains-in-nigeria-and-beyond/>> Assessed 09 August 2025.

74 Cina Lawson et al, "NOVISSI TOGO: Harnessing Artificial Intelligence to Deliver Shock-Responsive Social Protection", (September 2023) Social Protection and Jobs Discussion Paper No 2306 <<https://documents1.worldbank.org/curated/en/099751009222330502/pdf/IDU0e83f857301ff1047bf082710a8d21ddf42c3.pdf>> Assessed 09 August 2025.

75 UNDP, "AI-powered fact-checking tool iVerify, piloted during Zambia election, shows global promise" (November 2021) <<https://www.undp.org/digital/stories/ai-powered-fact-checking-tool-iverify-piloted-during-zambia-election-shows-global-promise>> Assessed 09 August 2025.

76 McCampbell, M., Adewopo, J., Klerkx, L., & Leeuwis, C. (2021). Are farmers ready to use phone-based digital tools for agronomic advice? Ex-ante user readiness assessment using the case of Rwandan banana farmers. The Journal of Agricultural Education and Extension, 29(1), 29–51. <https://doi.org/10.1080/1389224X.2021.1984955>

77 Albert Apotele Nyaaba, Matthew Ayamga, "Intricacies of medical drones in healthcare delivery: Implications for Africa, Technology in Society", Volume 66, 2021, 101624, ISSN 0160-791X, <<https://doi.org/10.1016/j.techsoc.2021.101624>> Assessed 09 August 2025.

78 Jacques Bughin et al, "Notes from the AI frontier: Modeling the impact of AI on the world economy," McKinsey Global Institute, September 4, 2018. <<https://www.mckinsey.com/featured-insights/artificial-intelligence/notes-from-the-ai-frontier-modeling-the-impact-of-ai-on-the-world-economy>> accessed 15 July 2025.

79 McKinsey & Company, The economic potential of generative AI: The next productivity frontier (June 2023) <<https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-economic-potential-of-generative-ai-the-next-productivity-frontier>> 09 August 2025.

80 Oxford Insights, "Government AI Readiness Index 2024" <<https://oxfordinsights.com/ai-readiness/ai-readiness-index/>> accessed 15 July 2025.

81 International Monetary Fund, "AI Preparedness Index (AIIPI)" (IMF 2023) <<https://www.imf.org/external/datamapper/AIPI>Note.pdf>> accessed 15 July 2025.

IMF's AI Preparedness Index, shows sub-Saharan Africa's average score (around 0.34) trailing far behind the global average (0.50).⁸²

3.2. Africa Amidst the Global Value Chains and Power Asymmetries

The above-described structure of the AI ecosystem reveals clear power asymmetries. A few global corporations and nations wield outsized control over AI resources (whether compute power, algorithms, or data), and this shapes the distribution of benefits. In value chain terms, the highest-value segments (chip design, proprietary AI models, cloud platforms) are concentrated in the Global North and parts of Asia. Lower-value activities or end-uses are dispersed, with African countries often importing AI solutions or using mostly the consumer end of AI (for example, using social media algorithms developed elsewhere). These dynamic risks reinforce a familiar pattern: Africa exports raw inputs (now data and minerals) and imports finished high-tech products, echoing the old commodities trade paradigm.

One way to gauge Africa's marginalisation is via investment flows. Between 2022 and 2023, African AI startups raised approximately 641 million USD across 103 deals (a record for the continent), yet this was only 0.3 per cent of global AI investment projected for 2025.⁸³ In effect, out of every 100 USD of AI investment worldwide, Africa gets just 30 cents.

This stark disparity in investment contributes to what could be termed a "digital dependency": African tech firms and governments depend heavily on external capital and technology.⁸⁴ Without intervention, this can translate into a form of dependency where strategic decisions (like where to deploy data centres, or which languages to prioritise in natural language processing) are made by foreign actors according to their priorities, not Africa's. As noted in the literature, we are witnessing a potential bifurcation of the world into AI "haves" and "have-nots", which Microsoft's President Brad Smith warned could leave Africa further behind if not addressed.⁸⁵

From a political economy viewpoint, such asymmetries raise questions about bargaining power and value capture. Africa's bargaining power in the current scenario is limited. For instance, African governments or universities trying to procure cutting-edge NVIDIA AI chips will face the same global shortage as everyone else, but without the geopolitical clout or capital reserves that big powers have. Moreover, many African markets on their own are relatively small in GDP terms, which can make them less of a priority for global tech firms to invest in localised solutions (one reason why many AI products don't support African languages or local context initially, the expected ROI is lower compared to, say, Chinese or European markets).

However, there are counter-movements. Some African nations collectively have assets that can improve their leverage. Critical minerals are one: as mentioned, countries like the DRC, Zambia, and Rwanda have resources vital for tech manufacturing. African leaders are increasingly aware of this, and some are coordinating strategies. For example, the DRC and Zambia announced plans for a joint venture to channel their cobalt and copper into local battery value chains instead of simply exporting ore.⁸⁶ If the AU can organise a bloc of mineral producers, it could negotiate deals where access to minerals is

⁸² Such statistics reflect underlying structural issues: limited broadband access (only less than 25 percent of Africans use the internet regularly), high costs of data, patchy electricity supply (which is critical for running digital devices and data centers), and education systems that have not yet incorporated advanced digital skills training. However, these broad averages hide some positive outliers and rapid changes in certain areas. Mobile penetration is now over 80 per cent in many African countries, and mobile broadband coverage continues to improve. Importantly, Africa leads the world in mobile money usage and digital financial innovation. In 2023, sub-Saharan Africa had over 330 million active mobile money accounts and nearly 50 percent of the world's mobile money transactions, moving 2.5 billion USD per day. This digital finance ecosystem provides a platform for AI-driven services in finance and commerce and indicates an aptitude for tech adoption when solutions meet local needs. The challenge is to replicate such success in other sectors and more advanced technologies.

⁸³ Aimée Dushime "What role will private equity play in Africa's AI future?" (World Economic Forum, 2025) <<https://www.weforum.org/stories/2025/04/rethinking-private-equity-for-africa-s-ai-driven-future/#:~:text=Between%202022%20and%202023%20alone,the%20future%20is%20not%20guaranteed>> accessed 15 July 2025.

⁸⁴ Aminah Mustapha, "Silicon Savannah or Digital Debt Trap? Unpacking Foreign Tech in Sub-Saharan Africa" (February 2025) Georgetown Security Studies Review <<https://georgetownsecuritystudiesreview.org/2025/02/21/silicon-savannah-or-digital-debt-trap-unpacking-foreign-tech-in-sub-saharan-africa/>> 09 August 2025.

⁸⁵ New York Times, "Quote of the Day: The Global A.I. Divide" (July 2025) <<https://www.nytimes.com/2025/07/15/pageoneplus/quote-of-the-day-the-global-ai-divide.html>> 09 August 2025.

⁸⁶ United Nations Economic Commission for Africa, "Zambia and DRC to implement an Innovative transboundary battery and Electric vehicle Special Economic Zone" (April 2024) <<https://www.uneca.org/stories/zambia-and-drc-to-implement-an-innovative-transboundary-battery-and-electric-vehicle-special>> 09 August 2025.

tied to investments in local AI capabilities (e.g. requiring a company to set up an AI research centre or semiconductor test facility in Africa in exchange for mineral offtake agreements).

Another asset is market size. By population, Africa is huge and young. By 2050, Africa will account for about 25 per cent of the world's people and an even larger share of the youth population.⁸⁷ This represents a massive future market for AI products and an enormous talent pool for AI innovation that, if properly skilled⁸⁸, could drive Afrocentric AI development. Already, Africa's large datasets in areas like mobile phone usage, genomic diversity, or even wildlife ecology are of interest to global researchers. Ensuring that African stakeholders benefit when these data are used (through data governance frameworks that mandate sharing of value or localisation of data processing) is an ongoing policy issue. This again triggers concern about digital sovereignty. As AI becomes integral to economic and social systems, digital sovereignty becomes intertwined with national security and economic independence.

In global forums, there is recognition that including African states is not just fairness but perhaps necessary for AI's long-term sustainability. AI that is developed with a narrow demographic and cultural scope can be brittle or biased; including African contexts can improve AI robustness and open new innovation pathways (for instance, thinking about AI for low-resource environments, or novel use cases emerging from African entrepreneurs).⁸⁹ Initiatives like UNESCO's Recommendation on AI Ethics explicitly involved African experts,⁹⁰ and the Global Partnership on AI (GPAI) now has a few African member states.⁹¹ The African Union, through its AI Continental Strategy, has also created a platform for African countries to formulate common positions.⁹² This AU strategy emphasises "responsible AI for Africa's development", highlighting principles of inclusion, data governance, and local capacity-building.

Africa's position in the global AI political economy right now is peripheral, characterised by low levels of value creation, high dependence on external technology and investment, and minimal influence in rule-setting. But this position is not immutable. It is the product of both historical legacies (colonialism, late industrialisation) and current policy choices. Understanding these interdependencies is central to assessing Africa's position within the global AI economy. It also highlights why coordinated continental action, strategic alliances, and strengthened institutional capacity are key to shifting bargaining power. If the continent can leverage its collective strengths (minerals, market, youthful human capital) and pursue strategic policies (discussed in the next section), it can shift to a more empowered role. The remainder of this work delves into exactly those strategic opportunities and the governance imperatives that must accompany them.

In Chapter 4, a discussion of what Africa can do is provided, i.e., what opportunities exist to boost its participation in AI innovation and adoption, and what risks need to be managed through governance (ethical frameworks, regulatory measures, etc.). Then these points are illustrated in concrete sectors and country examples, showing how the political economy dynamics manifest in fintech, health, agriculture and beyond.

87 Saifaddin Galal, "African countries with the lowest median age as of 2023" (Statista 2023) <<https://www.statista.com/statistics/1121264/median-age-in-africa-by-country/#?text=Africa%20has%20the%20youngest%20population.the%20most%20populous%20African%20countries>> Accessed 17 July 2025.

88 United Nations, "Young People's Potential, the Key to Africa's Sustainable Development" <<https://www.un.org/ohrls/news/young-people%E2%80%99s-potential-key-africa%E2%80%99s-sustainable-development>> 17 July 2025.

89 Effoduh Jake Okechukwu, A Global South Perspective on Explainable AI, <https://carnegieendowment.org/research/2024/04/a-global-south-perspective-on-explainable-ai?lang=en>. Although, such proposition might still be plagued by the concern for commercial viability.

90 UNESCO, Recommendation on the Ethics of Artificial Intelligence (Adopted on 23 November 2021) <https://unesdoc.unesco.org/in/documentViewer.xhtml?v=2.1.196&id=p:usmarcdef_0000381137&file=/in/rest/annotationSVC/DownloadWatermarkedAttachment/attach_import_75c9fb6b-92a6-4982-b772-79f540c9fc39%3F_%3D381137eng.pdf&locale=en&multi=true&ark=ark:/48223/pf0000381137/PDF/381137eng.pdf#1517_21_EN_SHS_int.indd%3A.8904%3A1> Accessed 17 July 2025.

91 Africa is represented by Senegal with the membership of Dr. Seydina Moussa Ndiaye. <<https://www.unesco.org/ethics-ai/en/ai-ethics-experts-without-borders/seydina-moussa-ndiaye>> Assessed 10 August 2025.

92 AU, Continental Artificial Intelligence Strategy (July 2024) <https://au.int/sites/default/files/documents/44004-doc-EN-Continental_AI_Strategy_July_2024.pdf> Accessed 10 August 2025.



IMPERATIVES FOR AFRICA'S AI FUTURE

4.1 Africa's Strategic Opportunities in this AI Revolution

Despite being a latecomer in the AI revolution, Africa possesses several comparative advantages and unique opportunities that it can leverage to participate more actively in the AI economy.

One opportunity is the continent's demographic dividend and human capital. Africa's population of about 1.4 billion is not only large but young, with a median age of around 19 years.⁹³ This youthful demographic, 70 per cent of whom are under the age of 30, represents a huge potential workforce and market for AI. Already, literacy rates among African youth stand around 78 per cent, and basic digital familiarity is growing as mobile phone access becomes ubiquitous.⁹⁴ With the right investments in education and skills, this demographic dividend can become AI tech-savvy labour force. Training programs in coding, data science, and AI model training are expanding through universities and private initiatives (e.g. African Leadership University's data science program, online courses by Coursera/[DeepLearning.AI](https://www.coursera.org/deeplearningai) targeted at Africa, and community-driven efforts like Deep Learning Indaba). If governments and industries can (re)skill large numbers of young people in AI-relevant fields, it will not only create local innovators and practitioners but also signal to global investors that Africa has the talent needed for an AI innovation. Moreover, a large English-speaking and French-speaking population means many Africans can engage with existing AI tools and global research (though support for indigenous languages in AI is still limited – an area for targeted development).

Crucially, Africa's youthful populace is quick to learn and adopt new digital tools when accessible. The rapid rise of tech hubs, start-up accelerators, hackathons, and AI communities across Africa (from Nairobi's "Silicon Savannah" to Lagos' burgeoning tech scene) attests to latent innovative energy.

1.4 billion

people with a median age of 19 years, representing a massive future workforce and market

⁹³ Saifaddin Galal, "Demographics of Africa - statistics & facts" (Statista 2025) <<https://www.statista.com/topics/7928/demographics-of-africa/>> Accessed 10 August 2025.

⁹⁴ Saifaddin Galal, "Adult literacy rate in Africa as of 2023, by region" (Statista 2023) <<https://www.statista.com/statistics/1233204/adult-literacy-rate-in-africa-by-region/#:~:text=In%202023%2C%2067.97%20percent%20of,simple%20statement%20and%20understand%20it.>> 17 July 2025.

This can be harnessed by providing opportunities: expanding STEM education, supporting women and underrepresented groups in tech (to widen the talent pool), and curbing brain drain by enabling robust local AI innovation ecosystem. If Africa can turn its youth bulge into a skilled digital workforce, it has the most essential ingredient for long-term success in the AI economy. No other region will add as many new workers in the coming decades, which is an opportunity to cultivate an AI workforce that could even serve global needs. However, failing to train this workforce could conversely turn into a lost opportunity or even a destabilising force which may see Africa's demographical advantage turn into economic disadvantage. Without a deliberate step to train and retain its AI skilled work force, Africa risks not only losing its already thin AI invention workforce, it risks putting the life of its increasing youth demography in jeopardy. Thus, investments in human capital (from improving primary and secondary education quality to technical and vocational training in AI-related fields) are paramount.

Another strategic opportunity for Africa's AI revolution is the continent's market-driven innovation and untapped⁹⁵. Africa's economic structure and needs differ in many ways from those of high-income countries, which creates niche opportunities for AI solutions tailored to developing contexts. For example, Africa has the world's highest proportion of unbanked adults; hence, fintech innovations (like mobile-based micro-lending, pay-as-you-go solar energy finance, etc.) took off to meet that need. These same areas are ripe for AI-driven enhancement, such as using AI to⁹⁶ alternative data (mobile phone records, utility payments) for credit scoring, thus extending credit to those without formal banking histories. Another domain is agriculture, where the majority of Africans are employed. Smallholder farmers face challenges with weather variability, pests, and market access. AI can help by providing hyper-local weather forecasts, early warning of crop diseases via image recognition apps, or optimised planting advice through machine learning on soil and yield data. Companies and research projects in Kenya, Nigeria, and Uganda, for instance, are piloting such tools⁹⁷. While subsistence farmers might not use AI directly, extension services and NGOs can act as intermediaries, bringing AI insights to them.

Similarly, healthcare in Africa suffers from shortages of doctors, especially specialists. AI-assisted diagnosis (e.g. reading radiology images or analysing symptoms through chatbot triage) can alleviate some gaps. Startups are developing AI telemedicine platforms to connect patients in rural areas with advice or refer critical cases to hospitals.⁹⁸ Education is another sector with enormous demand (millions of children need quality schooling). AI-powered educational platforms or personalised learning apps, if made accessible (in local languages with offline-capability), could support teachers and students in under-resourced schools.

In many of these areas, Africa's context demands frugal innovation: solutions that are low-cost, robust (able to work with patchy internet or on basic phones), and address basic needs. These constraints can spur creative approaches that might not emerge in wealthier climes. For instance, an AI algorithm optimised to run on low-power devices, or a voice-based AI assistant for users who are illiterate, etc., have global relevance (serving billions of low-income users worldwide) but are most likely to be developed by innovators familiar with such socio-economic contexts. Africa can be a cradle for these inclusive AI innovations that leave no one behind. The key is to foster an environment where entrepreneurs

95 Lars Hornuf, Kulondwa Safari, Johannes Voshaar, "Mobile fintech adoption in Sub-Saharan Africa: A systematic literature review and meta-analysis", *Research in International Business and Finance*, Volume 73, Part A, 2025 <<https://doi.org/10.1016/j.ribaf.2024.102529>> 17 July 2025.

96 KPMG, Sector Report Agriculture in Africa, (KPMG 2014) <<https://assets.kpmg.com/content/dam/kpmg/za/pdf/Agriculture-in-Africa.pdf>> Accessed 10 August 2025.

97 Rukayat Abisola Olawale, Matthew A. Olawumi, Bankole I. Oladapo, "Sustainable farming with machine learning solutions for minimizing food waste", *Journal of Stored Products Research*, Volume 112, 2025, 102611, ISSN 0022-474X, <<https://doi.org/10.1016/j.jspr.2025.102611>> Accessed 10 August 2025.

98 Owoyemi, A., Owoyemi, J., Osiyemi, A., & Boyd, A. (2020). Artificial Intelligence for Healthcare in Africa. *Frontiers in digital health*, 2, 6. <<https://doi.org/10.3389/fdgh.2020.00006>> Accessed 10 August 2025.

working on these problems can access support, be it incubators, datasets (open data initiatives for development), or favourable regulatory sandboxes to test new models.

Another strategic opportunity for Africa's AI revolution is in diplomacy and strategic partnerships. As discussed earlier, Africa's wealth of critical minerals (cobalt, lithium, rare earths, manganese, etc.) gives it a strategic bargaining chip in the AI era, because these minerals are vital for manufacturing batteries, semiconductors, and electronics, which underpin AI hardware. African governments can adopt what one might call a "minerals-for-technology" diplomacy. This could take several forms: negotiating with tech giants or nations to establish local manufacturing or R&D facilities in exchange for secure mineral supply; forming an African alliance of mineral producers to collectively negotiate better terms in global value chains (akin to OPEC but for critical minerals); or using mineral revenues to directly invest in AI infrastructure. Some moves in this direction are visible – e.g., Rwanda and Zimbabwe are looking into local refining of lithium (for batteries) instead of pure export.⁹⁹ The Africa Mining Vision policy framework also emphasises value addition.¹⁰⁰ If Africa can capture more of the processing stage (even if not full chip fabrication, perhaps assembling components or packaging), it could incrementally build know-how relevant to the electronics supply chain. Over time, this could support ambitions like those of an African semiconductor design startup (there are early-stage examples like Morocco's efforts in chip design training).¹⁰¹

Beyond minerals, international partnerships can help build Africa's AI capacity in other ways. Collaborations with universities and firms in more advanced countries can transfer knowledge. Already, we see partnerships: France's INRIA partnering with African universities on AI research to support subsistent farmers,¹⁰² and China's tech companies signing MoUs to develop tech hubs (though these often raise issues of influence). The crucial principle for partnerships is that they should be mutually beneficial and build local capacity rather than foster dependency. For instance, if a foreign company is contracted to deploy an AI system in African public services, a good partnership model would involve training local engineers to maintain and adapt the system, rather than a black-box service contract. The proposed 60 billion USD Africa AI Fund (announced in 2025 at the Kigali summit) is an example of blended finance aiming to co-invest with private and philanthropic partners in African AI projects.¹⁰³ If realised, such a fund could de-risk investments in areas like setting up data centres or funding AI startups addressing development challenges, by absorbing some initial losses that pure private capital might avoid.

Finally, Africa's position as a late adopter means it can learn from others' mistakes and perhaps avoid certain pitfalls. For example, seeing the unintended consequences of unregulated AI (privacy violations, bias scandals) elsewhere, African policymakers might proactively craft regulations that protect citizens from day one (we discuss governance in section 4.2 below). Also, having less legacy infrastructure can be an advantage – African telecom networks leapfrogged to wireless; similarly, some African enterprises might leap straight to cloud-based AI solutions without clunky legacy IT systems to retrofit. In sum, Africa's opportunities lie in playing to its strengths (its people, its natural assets, its ability to innovate under constraints) and in strategically aligning with global partners while asserting its interests.

99 James Bofofo, Jacob Obodai, Eric Stemm, Philip Nti Nkrumah, "The race for critical minerals in Africa: A blessing or another resource curse?", *Resources Policy*, Volume 93, 2024, 105046.

100 AU, Africa Mining Vision (February 2009), <https://au.int/sites/default/files/documents/30995-doc-africa_mining_vision_english_1.pdf> Accessed 10 August 2025.

101 Sean Whitehead, Morocco to Launch AI and Digital Engineering School Under Digital 2030 Strategy, (July 2025) <<https://iafrica.com/morocco-to-launch-ai-and-digital-engineering-school-under-digital-2030-strategy/>> Accessed 10 August 2025.

102 Inria, "Machine Learning: AI technology to help small farmers in Africa" (April 2020) <https://inria.fr/en/machine-learning-ai-technology-help-small-farmers-africa> Accessed 10 August 2025.

103 AU, The Africa Declaration on Artificial Intelligence (AU AI Declaration) <<https://c4ir.rw/docs/Africa-Declaration-on-Artificial-Intelligence.pdf>> 17 July 2025.

4.2. Risks, Challenges and Governance Imperatives

For Africa to harness AI opportunities, significant risks and challenges must be addressed concurrently. These range from ethical and social risks posed by AI to economic and security concerns. Governance (encompassing policies, regulations, and institutions) is the mechanism by which these risks can be mitigated. Key imperatives are outlined below:

One immediate challenge is the infrastructure gap (i.e. digital Infrastructure). Without closing this gap, opportunities cannot be realised. National governments in Africa need to prioritise investments and policies that improve connectivity (e.g. spectrum allocation for rural broadband, public-private partnership for fibre backbones), electricity reliability (as AI and digital services need power), and compute infrastructure. The concept of digital public infrastructure (DPI) is gaining traction: basic digital services provided or regulated by the state to support digital activities such as digital ID systems, payment platforms, and data exchanges.¹⁰⁴ DPI can provide a foundation upon which AI solutions are built. For instance, India's experience with its "India Stack" (Aadhaar ID, UPI payments) shows how government-facilitated digital infrastructure enabled a boom in fintech innovation.¹⁰⁵ Similarly, African nations implementing digital ID and interoperable payment systems (like Nigeria and Ghana) will create an environment more conducive to AI applications in finance, health (patient records), etc.

Closely linked is data governance. Data is the fuel for AI, but it must be handled carefully to protect privacy, security, and equity. Many African countries now have data protection laws (around 35 countries have legislation broadly aligned with the EU's GDPR principles).¹⁰⁶ However, enforcement is still weak in places, and large troves of African data often reside overseas (for example, Africans using Facebook or Google generate data stored outside the continent). It is imperative to establish rules around data localisation and cross-border flows that ensure African data benefits African development, whilst preventing exploitative extraction. The African Union's Malabo Convention on data security and privacy is a start, but only a handful of countries have ratified it.¹⁰⁷ The AU Continental Data Policy Framework aims to strike this balance. One idea is to require that certain sensitive datasets (like national health records or biometrics) be stored and processed within Africa, or that copies remain in-country if hosted on foreign-controlled cloud facility. Another is to mandate data sharing for the public good: private firms controlling valuable datasets (telecom, satellite, fintech) could be obliged to share anonymised data with researchers or startups to spur innovation, under clear guidelines. This approach could be modelled after data sharing mechanism applicable to national open-banking frameworks. This prevents a scenario where only big foreign companies sit on huge data troves that no one else can use. South Africa's open data initiative¹⁰⁸ and Kenya's Data Protection Act (with provisions on data sharing contracts)¹⁰⁹ are steps in this direction.

Another challenge is responsible AI Use. AI technologies carry risks of bias, discrimination, and harm if not governed properly. Studies have shown that AI systems trained on Western data can misclassify

104 Sandrine Kergroach and Julien Héritier, "Early divides in the transition to artificial intelligence" (OECD 2025) OECD Regional Development Papers No. 147 <<https://www.oecd.org/content/dam/oecd/en/publications/reports/2025/06/emerging-divides-in-the-transition-to-artificial-intelligence-eeb5e120/7376c776-en.pdf>> (page 16) 15 July 2025.

105 Sreevas Sahasranamam & Jaideep Prabhu, "Digital Public Infrastructure for the Developing World" (March 2024) Stanford Social Innovation Review <<https://ssir.org/articles/entry/digital-public-infrastructure-developing-world>> Accessed 10 August 2025.

106 Daigle, Brian. "Data Protection Laws in Africa: A Pan-African Survey and Noted Trends." Journal of International Commerce and Economics, February 2021. <<https://www.usitc.gov/journals>> Accessed 10 August 2025.

107 Mozilla Africa Mradi, The Malabo Roadmap: Approaches to promote data protection and data governance in Africa" <https://dataprotection.africa/wp-content/uploads/malabo_roadmap_Sept_2022.pdf> Accessed 10 August 2025.

108 Ricker, B., Dierwechter, Y., Cinnamon, J. (2020) "When Open Data and Data Activism Meet: An Analysis of Civic Participation in Cape Town, South Africa" The Canadian Geographer. Special Issue titled "Smart citizens creating smart cities" 64(3): 359-373. <<https://onlinelibrary.wiley.com/doi/10.1111/cag.12608>> Accessed 10 August 2025.

109 Ciara Staunton, Alik Edgcombe, Lukman Abdulrauf, Amy Gooden, Paul Ogendi, Donrich Thaldar, Cross-border data sharing for research in Africa: an analysis of the data protection and research ethics requirements in 12 jurisdictions, Journal of Law and the Biosciences, Volume 12, Issue 1, January-June 2025, Isaf002, <<https://doi.org/10.1093/jlb/Isaf002>> Accessed 10 August 2025.

African faces or dialects, leading to higher error rates for African users (a form of algorithmic bias).¹¹⁰ There is also concern about AI-driven decision systems (credit scoring, job applicant filtering, predictive policing) inheriting societal biases and further marginalising disadvantaged groups. For Africa, with its ethnic, linguistic, and cultural diversity, it is crucial to ensure AI tools are inclusive and culturally adapted. Governments should consider regulations that require algorithmic auditing, and any high-impact AI system deployed (especially in sectors like finance, healthcare, or policing) should be tested for bias and fairness. Some global models exist (the EU's proposed AI Act categorises high-risk AI and mandates documentation and bias testing).¹¹¹ African regulators can borrow these ideas and tailor them.

Another ethical aspect is transparency and accountability. If an AI system denies someone a loan or a job interview, on what basis? Citizens should have the right to explanations for significant automated decisions. Additionally, there could be option for human re-assessment to obviate all concerns of bias algorithmic stereotypes. Ensuring this might involve mandating that AI systems used by businesses or government include an “explainability” feature or at least a recourse mechanism for appeal. Consumer protection agencies and civil rights groups in Africa have begun discussions on AI (for instance, in South Africa, the consumer commission has looked at whether AI-based price discrimination might occur in e-commerce).¹¹²

Moreover, Africa has the chance to embed African values into AI ethics discourse. Concepts like Ubuntu (emphasising community and shared humanity) have been resounding in the literature on how it could inform principles of AI design that stress social cohesion and collective well-being.¹¹³ As an example, an Ubuntu-informed AI might prioritise inclusion (making sure even marginalised communities benefit) and responsibility (ensuring AI usage doesn't harm social harmony). Some African AI researchers have indeed called for contextual ethics, not just importing Western frameworks but considering local norms (for instance, community consent for data use in tight-knit societies, not just individual consent). The AU's AI strategy explicitly mentions the need for AI to be developed in line with African ethical values and human rights.¹¹⁴

Another key imperative to concurrently address significant risks and challenges is to consider the labour market and social protection. A major concern globally is the impact of AI systems on jobs. In Africa, where formal employment is limited and the population is growing, this is even more pressing. AI and automation could displace certain jobs (for example, clerical tasks in offices, basic customer service jobs through chatbots, or even some manual jobs through robotics in manufacturing). At the same time, AI could create jobs: new roles in data annotation, AI system maintenance, and entirely new industries. The net effect on employment in Africa will depend on policies. Given Africa's high unemployment and informality, the continent cannot afford a large wave of displacement without a plan. Thus, governance must focus on managing labour transitions.

This includes investing in upskilling and re-skilling programs to help workers move into new roles that AI creates or complements AI (for instance, training healthcare workers to use AI diagnostic tools

¹¹⁰ Soojong Kim et al, “Rethinking Artificial Intelligence: Algorithmic Bias and Ethical Issues| Questioning Artificial Intelligence: How Racial Identity Shapes the Perceptions of Algorithmic Bias” International Journal of Communication Vol 18 (2024)

¹¹¹ Marvin van Bekkum, Using sensitive data to de-bias AI systems: Article 10(5) of the EU AI act, Computer Law & Security Review, Volume 56, 2025, 106115, ISSN 2212-473X, <https://doi.org/10.1016/j.clsr.2025.106115>, <https://www.sciencedirect.com/science/article/pii/S026736492500010X> Accessed 10 August 2025.

¹¹² OECD, Algorithmic competition – Note by South Africa (June 2023) < [https://one.oecd.org/document/DAF/COMP/WD\(2023\)19/en/pdf](https://one.oecd.org/document/DAF/COMP/WD(2023)19/en/pdf) > Accessed 10 August 2025.

¹¹³ Arthur Gwagwa, Emre Kazim, Airlie Hilliard, The role of the African value of Ubuntu in global AI inclusion discourse: A normative ethics perspective, Patterns, Volume 3, Issue 4, 2022, 100462, ISSN 2666-3899, <https://doi.org/10.1016/j.patter.2022.100462>, Accessed 10 August 2025.

¹¹⁴ UNESCO, “From readiness to ethical AI adoption and localization: UNESCO elevates Africa's voice in Bangkok” (July 2025) < <https://www.unesco.org/en/articles/readiness-ethical-ai-adoption-and-localization-unesco-elevates-africas-voice-bangkok> > Accessed 10 August 2025.

rather than be replaced by them). It also involves updating curricula to prepare the next generation for jobs of the future, emphasising creativity, critical thinking, and tech literacy from a young age. Labour regulations will need to adapt too. Issues of algorithmic management (workers being managed or hired/fired by AI decisions) are already emerging: gig economy workers often have algorithms deciding their work allocation and pay. Ensuring fairness and recourse in these situations is vital (perhaps by extending collective bargaining or requiring transparency of platform algorithms to regulators).

Social protection systems must also evolve. If AI-driven automation leads to job losses in certain sectors (say, automated call centres reducing the need for human agents), unemployment insurance or safety nets should be there to cushion the impact. More ambitiously, some have suggested exploring concepts like universal basic income (UBI) in the long term,¹¹⁵ if AI productivity gains are very high and traditional jobs scarce, though for most African economies, UBI is fiscally challenging at present. Nonetheless, pilot programs (like in Kenya and Namibia)¹¹⁶ provide some insights.

Finally, there is the ethical issue of preventing exploitation in the new AI workforce. Already, reports have highlighted how some African workers are being used as cheap labour for data labelling or content moderation for global AI companies, often under poor conditions and pay (e.g. Kenyan workers moderating traumatic content for ChatGPT were paid very low wages).¹¹⁷ African governments should enforce labour standards in these new digital jobs as much as in traditional sectors, to avoid a “race to the bottom” for AI data work. This could mean requiring that if international companies contract local firms for data tasks, those local workers are ensured minimum wages and counselling support if work is psychologically taxing, etc.

Furthermore, AI can pose new security risks (including risks to privacy and even sovereignty). Malicious use of AI (deepfakes, automated cyberattacks, AI-driven surveillance) can threaten stability or human rights.¹¹⁸ African states will need to guard against AI being used for destabilising misinformation, something that’s already been seen, such as deepfake audio or videos stoking ethnic tensions in elections.¹¹⁹ Strengthening cybersecurity frameworks and collaborating internationally to anticipate AI-related threats is crucial. There’s also a geopolitical angle: if only a few powerful countries control critical AI assets (like advanced AI models or chip supply), others become security-vulnerable. This reinforces the earlier point about building some self-reliance (e.g., diversifying suppliers, encouraging open-source AI alternatives that Africans can inspect and modify, etc.). On privacy, while data protection laws exist, their enforcement in the age of AI (where re-identification of anonymised data can happen, or where ubiquitous sensors collect personal data) will need to be aggressive. Data regulators in Africa might consider requiring algorithmic privacy-preserving techniques for companies (like differential privacy or federated learning) when dealing with sensitive personal data.

In terms of digital sovereignty (a theme repeatedly emphasised), governance must strive to give African countries more control over their digital destiny. This could involve things like promoting the use of open-source AI software in government (reducing dependency on proprietary systems), localising cloud storage of government data, and participating actively in setting global norms (so that, for example,

115 Cornelia C. Walther, Universal Basic Income: A Business Case for the AI Era (June 2025) < <https://www.forbes.com/sites/corneliawalther/2025/06/04/universal-basic-income-a-business-case-for-the-ai-era/> > Accessed 10 August 2025.

116 Abhijit Banerjee & Paul Niehaus & Tavneet Suri, 2019. “Universal Basic Income in the Developing World,” Annual Review of Economics, vol 11(1).

117 Niamh Rowe, “It’s destroyed me completely: Kenyan moderators decry toll of training of AI models” (2023, The Guardian) <<https://www.theguardian.com/technology/2023/aug/02/ai-chatbot-training-human-toll-content-moderator-meta-openai>> 17 July 2025.

118 Giuseppe Vecchietti, Gajendra Liyanaarachchi, Giampaolo Viglia, Managing deepfakes with artificial intelligence: Introducing the business privacy calculus, Journal of Business Research, Volume 186, 2025, 115010, ISSN 0148-2963, <https://doi.org/10.1016/j.jbusres.2024.115010> Accessed 10 August 2025.

119 Catherine Régis et al, “AI in the Ballot Box” https://www.uottawa.ca/research-innovation/sites/g/files/bhskd326/files/2025-02/gpb-ai_ai_and_elections.pdf Accessed 10 August 2025.

rules around AI and intellectual property or trade do not unfairly disadvantage African innovators). Internationally, Africa can champion causes such as data rights for developing countries, ethical AI standards that incorporate equity, and technology transfer mechanisms. If Africa speaks with a more unified voice (through the AU or coalitions), it can have more influence on these topics in forums like the UN or WTO discussions on e-commerce and data flows.

Basically, governance imperatives for Africa in the AI age revolve around enabling and protecting the innovation and uptake of beneficial AI, while protecting society from the downsides. Policymakers must navigate a delicate balance (too heavy-handed regulation could stifle nascent AI industries, whereas too lax an environment could invite abuse and external exploitation). The good news is that Africa does not have to start from scratch; it can adapt global best practices and innovate governance approaches suitable for its contexts (for instance, community-based data governance models that resonate with local practices of communal resource management).

The next section in this chapter will explore sectoral pathways and country cases, many of which will present strategic opportunities and governance challenges in concrete scenarios, further illustrating the importance of a holistic policy approach.

4.3. Sectoral Pathways and National Case Studies

The impact of AI systems is not uniform across all areas: it plays out differently in finance, agriculture, and healthcare. In this section, three pivotal sectors for Africa's development are examined: financial services (fintech), agriculture, and healthcare to see how AI is being applied, what benefits are emerging, and what challenges remain. Within each, national or regional case studies are highlighted to exemplify the trends.

These sectors are chosen because they directly relate to key development objectives (financial inclusion, food security, public health) and have seen some of the earliest AI innovations in Africa. Additionally, glimpses of other sectors (like public services and education) are also considered where relevant. By analysing these domains, some practical lessons can be identified for scaling AI in ways that drive inclusive growth and digital sovereignty in Africa.

4.3.1. Financial Services and Fintech: Building on Digital Finance Strengths

Financial services in Africa have been radically transformed over the past two decades by digital technologies. The rise of mobile money (led by Kenya's M-Pesa and followed by others like MTN Mobile Money, Orange Money, etc.) has provided tens of millions of previously unbanked Africans with basic financial tools. This created an ecosystem of fintech startups innovating in payments, lending, savings, and insurance. Africa now has a vibrant fintech scene, particularly in Kenya, Nigeria, South Africa, and Egypt. AI is naturally extending this digital finance revolution by improving efficiencies, enabling new products, and managing risks.

One primary use of AI in finance is in credit scoring and lending. Traditional banks often require formal credit histories or collateral, which many Africans lack. Fintech lenders are using machine learning to analyse alternative data (such as mobile phone usage patterns, utility bill payments, or even social media activity) to assess the creditworthiness of consumers and small businesses. For example, startups like Kenya's Tala or South Africa's Jumo have AI-driven models that decide loan approvals in

minutes for applicants with no prior bank credit record.¹²⁰ This has expanded access to microloans and financing for small enterprises. Another area is fraud detection and cybersecurity. As digital transactions grow, so do fraud attempts; AI systems help by detecting anomalies in transaction patterns in real-time (for instance, flagging a possibly fraudulent mobile money transfer based on unusual behaviour). Nigeria's payment processors (e.g. Flutterwave) employ machine learning to identify and block fraud, thereby increasing trust in digital payments.¹²¹

Personalised financial services are also on the rise: AI chatbots handle customer service queries for banks and mobile money operators, providing 24/7 assistance at scale. A case in point: Ethiopia's Commercial Bank introduced an AI chatbot named "Arif" to help customers check balances or get information in the local language, reducing the load on call centres.¹²² In the insurance sector, AI helps with risk assessment and claims processing (like automatically assessing damage from submitted photos for auto insurance claims). For customers, this means quicker payouts and more tailored products.

Perhaps the most game-changing potential is in fostering financial inclusion and economic empowerment. By integrating AI, fintech companies can offer services like farm insurance indexed to weather data (AI can analyse satellite weather patterns to trigger payouts in droughts), or microsavings investment platforms that use robo-advisors to help individuals save small amounts in optimal ways. These services, once accessible only to wealthier or urban populations, can reach rural and low-income communities through mobile devices.

CASE STUDY

KENYA'S EVOLVING FINTECH LANDSCAPE

Kenya, often dubbed the "cradle of mobile money," continues to lead in fintech innovation. Building on M-Pesa's success, Kenyan companies are now layering AI on top of the mobile money infrastructure. One example is M-Shwari, a mobile savings and loan service launched by Safaricom and Commercial Bank of Africa. M-Shwari uses an algorithm to determine loan eligibility and amounts for M-Pesa users based on their transaction histories and behaviours. Millions of Kenyans have accessed small loans through this platform, many for the first time. As the system has matured, they have integrated machine learning models to refine credit scoring, reducing default rates while expanding loan access. Another Kenyan innovation is Kopo Kopo, which provides an AI-powered analytics platform for small merchants using mobile payments. It offers insights into sales trends and cash flow and even extends credit advances based on the merchant's digital sales record (something like an AI-driven line of credit for SMEs).

On the regulatory side, Kenya's Central Bank has had to adapt to these innovations. They established a Fintech Regulatory Sandbox in 2019, allowing companies to live-test new AI-enabled financial products under supervision, enabling innovation while monitoring risks. Kenya's experience also highlights some challenges: digital loans became very popular, but concerns arose about over-indebtedness and debt collection practices. The government responded by drafting digital credit regulations, including mandating credit providers to use fair and transparent algorithms and to share data with credit bureaus to avoid excessive borrowing. This is a good example of how governance must catch up to sectoral AI growth, ensuring that innovation remains responsible and consumer-protective.

KENYA



¹²⁰ Harvard Business School, How \$40 Loans Lifted Lives in Kenya, (2025 Working Knowledge) <<https://www.library.hbs.edu/working-knowledge/how-40-dollar-loans-lifted-lives-in-kenya>> Accessed 10 August 2025.

¹²¹ Rotimi Okunbaye, Understanding Fraud In The Payment Space, Flutterwave 2021) <<https://flutterwave.com/ke/blog/understanding-fraud-in-the-payment-space>> Accessed 10 August 2025.

¹²² UNCDF, Report On Inclusive Innovation Strategies In Migrant Remittances And Financial Services: Ethiopia Country Assessment (October 2022) <<https://migrantmoney.uncdf.org/wp-content/uploads/2023/02/Ethiopia-Country-Assessment.pdf>> Accessed 10 August 2025.

While AI is enhancing fintech, there are issues to address. Data privacy is paramount.¹²³ Many African countries lack clear guidelines on AI use in finance, something regulators need to formulate. Also, bias in credit algorithms can be a problem; if the training data reflects historical biases (perhaps urban customers get higher scores than rural by default), AI might unintentionally reinforce inequality. Regular audits and inclusion of diverse data can mitigate this. Another challenge is interoperability. Africa has a patchwork of mobile money and banking systems. AI could help by serving as an intermediary layer (e.g. intelligent payment switches), but more fundamentally, policy push for interoperability (like the East African Payments System)¹²⁴ will widen the dataset and market AI systems can work with.

Skill gaps in financial institutions themselves need to be addressed. Banks and MFIs (microfinance institutions) must train staff in understanding and managing AI tools. Partnerships with fintech startups can bring these capabilities, but long-term capacity building is needed so local banks can develop or at least critically evaluate AI models rather than blindly using vendor solutions.

Financial services in Africa demonstrate a relatively positive story; the sector is leveraging AI to build on an existing success (digital finance), directly contributing to economic inclusion and growth. With careful governance and continual innovation, Africa might leapfrog further here, creating fintech models that can be exported to other emerging markets (indeed, Kenyan and Nigerian fintech startups are expanding to Asia and Latin America).

4.3.2. Agriculture: AI for Addressing Food Security and Rural Development

Agriculture remains the backbone of many African economies, employing around 50 to 60 per cent of the labour force and contributing significantly to GDP in several countries. It's predominantly smallholder-driven and often rain-fed, making it vulnerable to climate variability and inefficiencies. Improving agricultural productivity and resilience is essential for food security and poverty reduction. AI and digital tech can play a transformative role by providing farmers with timely information, optimising resource use, and integrating value chains. However, agriculture also presents some of the toughest challenges for tech adoption: rural areas may lack connectivity; farmers may have limited education or tech familiarity; and the economic returns for high-tech interventions can be uncertain in low-margin farming. Nonetheless, progress is being made through targeted initiatives.

One of the most direct applications is in precision agriculture. AI can analyse data from sensors or drones to detect crop stress, disease outbreaks, or soil nutrient deficiencies in fields. For instance, computer vision algorithms processing aerial imagery might identify early signs of a locust infestation or drought stress on plants, allowing interventions before it's too late. In East Africa, a project by PlantVillage (USAID-funded) uses a mobile app with AI that farmers can use to take a picture of a diseased plant leaf; the app diagnoses the disease (for crops like cassava or maize) and suggests treatment, in local languages.¹²⁵ This empowers even literate farmers with agronomic advice that was previously out of reach.

Weather prediction and climate adaptation are other crucial areas. African farmers often rely on guesswork for planting times. AI models that assimilate weather station data and satellite imagery can generate localised weather forecasts and climate risk maps. Organisations like ICPAC (IGAD Climate Prediction & Applications Center) have begun issuing downscaled seasonal forecasts for the Horn

¹²³ Financial data is sensitive, and using AI on personal data should comply with protection laws.

¹²⁴ National Bank of Rwanda, The East African Community Crossborder Payment System Masterplan <https://join-meeting.bnr.rw/documents/EAC-PAYMENT-SYSTEMS-MASTERPLAN_Published_May_25.pdf> Accessed 10 August 2025

¹²⁵ Kritika Minhas et al, "Artificial Intelligence and Plant Disease Management: An Agro-Innovative Approach" (2025), Journal of Phytopathology Volume 173, Issue 3 e70084 <<https://onlinelibrary.wiley.com/doi/10.1111/jph.70084>> 10 August 2025.

of Africa, using machine learning to interpret global models into local contexts.¹²⁶ AI could further improve the accuracy and relevance of such forecasts, which inform millions of farmers when to sow or irrigate.

Market information systems have also been enhanced by AI. In the past, farmers suffered from a lack of price information, often selling to middlemen at poor prices. Now, SMS-based or smartphone apps deliver daily market prices. AI can build on these by, for example, predicting price trends or matching farmers to optimal markets (a sort of “digital marketplace” where an AI algorithm finds the best buyer for a farmer’s crop, given quality, location, etc.). An example is the e-Granary platform in East Africa, which aggregates farmers into a collective digital marketplace and uses algorithms to negotiate better prices with buyers, even providing AI-based farming advice to the members.¹²⁷

Resource optimisation is another area. AI can assist with the efficient use of inputs like water and fertiliser. In parts of South Africa and Morocco, commercial farms are using AI-driven irrigation systems that measure soil moisture and crop status in real time, applying just enough water.¹²⁸ For smallholders, lower-cost versions exist: for example, Hello Tractor (a Nigerian startup often called “Uber for tractors”) uses AI to connect tractor owners with nearby farmers needing tractor services, optimising equipment use and making mechanisation more accessible.¹²⁹ Their platform also predicts maintenance needs to reduce breakdowns. While not AI in the sense of deep learning, these algorithmic matchmaking services significantly improve productivity for small farmers who otherwise couldn’t plough or harvest in a timely fashion.

CASE STUDY:

ETHIOPIA’S AGRICULTURAL AI INITIATIVES

Ethiopia, with a large agrarian population, has started leveraging AI to modernise extension services and climate resilience. A notable effort is the Agricultural Transformation Agency (ATA)’s program, which uses satellite data and AI analytics to map soil fertility across different regions. By combining remote sensing data with ground sample analysis, they produced the Ethiopian Soil Information System (EthioSIS), which guides fertiliser blending specific to local needs. The AI element comes in optimising fertiliser recommendations to each area’s soil profile and crop, which has reportedly improved yields when adopted. Additionally, Ethiopia’s Ministry of Agriculture piloted sending weather and planting advice via SMS to thousands of farmers, using a machine learning model that analysed historical yield data and forecast information to tailor the advice. Farmers receiving the tailored advice saw better outcomes in trials compared to generic advice.

On the climate front, Ethiopia’s AI-based drought prediction project (in collaboration with IBM’s The Weather Company) is trying to improve early warning for drought by analysing decades of climate data. If successful, it will inform the government’s disaster preparedness and enable earlier support to farmers (like destocking livestock or switching crops).

One more innovative angle: livestock management. Ethiopia has huge livestock herds. Researchers are testing AI-powered ear tags that monitor cattle health and movement, helping pastoralists manage herd health and grazing patterns more effectively. In Kenya, similar tech helped predict and contain a Rift Valley fever outbreak by alerting vets when cattle exhibited certain symptoms.



¹²⁶ Scheuerer, M., Bahaga, T.K., Segele, Z.T. et al. Probabilistic rainy season onset prediction over the greater horn of Africa based on long-range multi-model ensemble forecasts. *Clim Dyn* 62, 3587–3604 (2024). <https://doi.org/10.1007/s00382-023-07085-y> >10 August 2025.

¹²⁷ E-Granary, Transforming farmers’ livelihoods <<https://e-granary.com/>> 10 August 2025.

¹²⁸ IA Maroc, Smart Irrigation Solutions: AI for Water Conservation in Morocco (2024) <<https://www.intelligenceartificiellemaroc.com/en/blog/smart-irrigation-solutions-ai-for-water-conservation-in-morocco/>> 10 August 2025.

¹²⁹ Thomas Daum, Roberto Villalba, Oluwakayode Anidi, Sharon Masakhwe Mayienga, Saurabh Gupta, Regina Birner, Uber for tractors? Opportunities and challenges of digital tools for tractor hire in India and Nigeria, *World Development*, Volume 144, 2021, 105480, ISSN 0305-750X, <https://doi.org/10.1016/j.worlddev.2021.105480> 10 August 2025.

Scaling AI in agriculture is challenging due to infrastructural and human factors. Many smallholders still lack internet access or even electricity to use digital tools. So, solutions often need to be hybrid – e.g., AI processing might happen in the cloud, but the last-mile delivery of advice is via radio or community meetings facilitated by extension workers. In other words, blending high-tech with low-tech interfaces (SMS, voice, radio) is crucial so that AI benefits reach farmers on the ground. This calls for public investment in rural connectivity (e.g., extending mobile network coverage to farming communities, and electrification to charge phones/devices). Another issue is data scarcity: High-quality local data for training AI (such as labelled images of African crop diseases or granular soil data) is limited. Partnerships between governments, research institutes, and private AgTech firms can help generate and share these datasets.¹³⁰ International agricultural research centres (like CGIAR institutes in Africa) are now emphasising open data platforms,¹³¹ which African startups can use for AI development.

Farmers' trust and adoption of AI-driven advisories is not automatic; it often requires demonstrating efficacy. Thus, extension services need to be involved. One model is training the traditional extension agents to use AI tools themselves and then relay insights to farmers, bridging the gap between advanced tech and traditional practice. This human-centric approach can increase adoption, as farmers trust advice from known local agents more than an SMS from a stranger.

Policy-wise, governments should integrate digital tools into their agricultural strategy. Some countries (like Ghana and Rwanda) have launched “e-agriculture” initiatives and innovation hubs focusing on AgTech.¹³² Ensuring these initiatives get funding and support is key. Also, issues like data privacy (farmers' data) and equitable access need guidelines (e.g., if an AI platform starts charging fees, will poorer farmers be left out? Perhaps subsidies or tiered pricing could be considered to avoid widening inequality).

AI in agriculture holds promise to deliver “more crop per drop” (higher yields with efficient input use) and reduce climate risks, which is vital as Africa's food demand grows. However, it requires coupling technology with investments in rural infrastructure and human support systems. The successes in pilot projects now need to be scaled to benefit millions, which is the real test.

4.3.3. Healthcare: AI for Extending Care and Improving Health Outcomes

African healthcare systems face challenges of limited resources, workforce shortages (especially specialists like radiologists or surgeons), and remote populations with poor access to facilities.¹³³ AI in healthcare can potentially help bridge some of these gaps by augmenting the capabilities of health workers, automating certain diagnostic tasks, and optimising healthcare logistics. However, healthcare is a sensitive sector where errors can be life-and-death, so AI adoption must be carefully validated and regulated. In Africa, a number of health tech innovations are already incorporating AI, though many are at the pilot stage or operating in urban centres.

¹³⁰ For example, crowdsourcing approaches, where farmers themselves send data (like pictures of crops), can build local datasets, though quality control is needed

¹³¹ CGIAR, Open Data and Open Access <<https://www.cgiar.org/open-data-and-open-access/>> Accessed 10 August 2025.

¹³² Analysing Digital Platformization, Data Extractivism and Surveillance Practices in Smallholder Farming in Ghana.” Information Technology for Development, January, 1-27. <doi:10.1080/02681102.2024.2447596> Accessed 10 August 2025.

¹³³ B. Ohene-Botwe, W.K. Antwi, C. Amedu, T.N. Akudjedu, L.-S. Mudadi, B. Chinene, S.N. Adjeley Quaye, M.Y. Dambale, S.S. Mkoloma, C. Barare, M.J. Kumsa, J. Sichone, R. Saizi, S. Mdletshe, J.Z. Dlama, C. Malamateniou, R. Ahmad, Challenges and strategies for retaining Africa's radiography workforce in the continent amidst a competitive global market: Insights from 17 countries, Radiography, Volume 31, Issue 4, 2025, 103001, ISSN 1078-8174, <<https://doi.org/10.1016/j.radi.2025.103001>> Accessed 10 August 2025.

A prominent application is in medical diagnostics. For example, AI image analysis can assist in radiology and reading X-rays or ultrasounds. In countries like Uganda and Ghana, where radiologists are scarce (one per hundreds of thousands of people),¹³⁴ an AI system on a tablet that can flag TB on a chest X-ray or detect complications in a pregnancy ultrasound can be invaluable. There is an AI tool named CAD4TB that was trialled in Zambia and South Africa, which analyses chest X-rays for tuberculosis and provides a risk score;¹³⁵ this helped non-specialist health workers identify high-risk patients for further testing. Another imaging example is in pathology: an algorithm that analyses photos of a malaria blood smear to count parasite load, aiding lab technicians in rural clinics.¹³⁶

Telemedicine and decision support are other areas. AI chatbots (like Babylon's "Ada" deployed in Rwanda) can triage patients by asking a series of questions about their symptoms and medical history, then advising whether they should seek care and at what level (clinic vs hospital).¹³⁷ Rwanda's government integrated such a chatbot into its national telehealth program, allowing many routine queries to be handled virtually.¹³⁸ During the COVID-19 pandemic, several African countries (e.g. Ghana and South Africa) used AI-powered chatbots on WhatsApp to disseminate information and do preliminary symptom checking, which offloaded pressure from call centres.¹³⁹

AI is also used in predictive analytics for public health. For example, analysing trends from search queries or social media to detect disease outbreaks earlier (so-called "digital epidemiology").¹⁴⁰ In West Africa, researchers used machine learning on climate and population data to predict meningitis outbreak risks, helping target vaccination campaigns.¹⁴¹ Supply chain and logistics in health have seen AI pilots as well. Managing the supply of medicines (preventing stockouts of essential drugs or vaccines) is a big issue in Africa.¹⁴² AI can forecast demand more accurately at each clinic by learning from historical consumption and epidemiological trends.

134 Ohene-Botwe, B., Anim-Sampong, S., Adjeley Quaye, S. N., Akudjedu, T. N., & Antwi, W. K. (2024). The drivers of migration of Ghanaian radiographers to high-income countries. *Heliyon*, 10(15), e34778. <https://doi.org/10.1016/j.heliyon.2024.e34778> Accessed 10 August 2025.

135 Nzimande, N., Murphy, K., Reither, K., Bosman, S., Ayakaka, I., Glass, T. R., Vanobberghen, F., Jacobs, B. K. M., Signorelli, A., & Ncayiyana, J. (2025). Performance of CAD4TB artificial intelligence technology in TB screening programmes among the adult population in South Africa and Lesotho. *Journal of clinical tuberculosis and other mycobacterial diseases*, 40, 100540. <https://doi.org/10.1016/j.jctube.2025.100540> Accessed 10 August 2025.

136 Poostchi, M., Silamut, K., Maude, R. J., Jaeger, S., & Thoma, G. (2018). Image analysis and machine learning for detecting malaria. *Translational research: the journal of laboratory and clinical medicine*, 194, 36–55. <https://doi.org/10.1016/j.trsl.2017.12.004> Accessed 10 August 2025

137 Griffiths, F., Watkins, J. A., Huxley, C., Harris, B., Cave, J., Pemba, S., Chipwaza, B., Lilford, R., Ajisola, M., Arvanitis, T. N., Bakibinga, P., Billah, M., Choudhury, N., Davies, D., Fayehun, O., Kabaria, C., Iqbal, R., Omigbodun, A., Owoaje, E., Rahman, O., Sturt, J. (2020). Mobile consulting (mConsulting) and its potential for providing access to quality healthcare for populations living in low-resource settings of low- and middle-income countries. *Digital health*, 6, 2055207620919594. <https://doi.org/10.1177/2055207620919594> Accessed 10 August 2025.

138 World Economic Forum, Chatbots RESET Framework: Rwanda Artificial Intelligence (AI) Triage Pilot Insight Report (WEF March 2022) < https://www3.weforum.org/docs/WEF_Chatbots_Reset_Framework_2022.pdf > Accessed 10 August 2025.

139 Phiri, M., & Munoriyarwa, A. (2023). Health Chatbots in Africa: Scoping Review. *Journal of medical Internet research*, 25, e35573. <https://doi.org/10.2196/35573> > Accessed 10 August 2025.

140 Aiello, A. E., Renson, A., & Zivich, P. N. (2020). Social Media- and Internet-Based Disease Surveillance for Public Health. *Annual review of public health*, 41, 101–118. < <https://doi.org/10.1146/annurev-publhealth-040119-094402> > Accessed 10 August 2025.

141 Ghaddarpouri, K., Ghaddarpouri, M., Mousavi, A. S., Mousavi Baigi, S. F., Rezaei Sarsari, M., Dahmardeh Kemmak, F., & Mazaheri Habibi, M. R. (2024). The effect of machine learning algorithms in the prediction, and diagnosis of meningitis: A systematic review. *Health science reports*, 7(2), e1893. < <https://doi.org/10.1002/hsr2.1893> > Accessed 10 August 2025.

142 Yusuf Adebayo Adebisi et al. "Revisiting the issue of access to medicines in Africa: Challenges and recommendations" (2022) *Public Health Challenges* Volume 1, Issue 2 e9 < <https://onlinelibrary.wiley.com/doi/10.1002/puh2.9> > Accessed 10 August 2025.

CASE STUDY

NIGERIA'S HEALTHTECH STARTUPS

Nigeria's burgeoning tech scene includes companies tackling healthcare access. LifeBank, mentioned earlier, is a Nigerian startup using AI and data to improve blood supply chains. It matches blood bank inventories with patient needs and optimises delivery routes (even using drones for last-mile in some cases). By predicting demand and pre-positioning blood where it's likely to be needed (based on hospital surgeries scheduled, etc.), LifeBank has saved many lives by reducing blood shortages. Another Nigerian example is Ubenwa, a startup that developed an AI to interpret a newborn's cry to detect signs of birth asphyxia or other distress – essentially an early diagnosis tool for neonatal care that can be used by midwives or in rural areas without a paediatrician. It's like Shazam for baby cries, trained on audio samples to recognise pathological patterns.

Nigeria also implemented "ChatGPT-like" assistants for medical information: during COVID-19, the government partnered with tech firms to use AI chatbots for myth-busting and guiding people on testing.

From the policy angle, Nigeria has an agency, NITDA (National Information Technology Development Agency), that published an AI ethics framework in 2021, which, among other sectors, covers healthcare AI, emphasising patient safety, data confidentiality, and informed consent when AI is involved in care. They are encouraging domestic innovation but with guidelines to ensure solutions are safe and appropriate.



NIGERIA

The promise of AI in healthcare is huge, but adoption faces hurdles. Healthcare data in Africa is often not digitised; many hospitals still use paper records, so getting the data to train and run AI systems is itself a challenge. Initiatives to digitise health records and gather datasets (like radiology images or pathology slides) need support. Public-private partnerships could help here: governments could anonymise and share certain health datasets with innovators to catalyse solution development (with proper privacy safeguards).

Validation and regulation are critical. Before an AI diagnostic tool is widely used, it should undergo clinical trials similar to a drug or a new device. African regulatory bodies (often under-resourced) need the capacity to evaluate AI medical software. This might involve setting up specialised units or collaborating with international bodies (like leveraging WHO or FDA approvals). The African Union could potentially coordinate a continental approach so that countries don't each have to develop separate standards from scratch – a common evaluation framework for AI in health could be very beneficial.

There's also the human aspect: doctors and nurses need to trust and accept AI tools. This means training them in how to use these tools and interpret their outputs. It also means clarifying legal liability (if an AI advice leads to a wrong treatment, who is responsible: the software provider, the doctor, the hospital?) Legal frameworks will need updating to clarify this; otherwise, practitioners may be wary of using AI in critical decisions. This also requires the judiciary in African countries to give technically well-reasoned decisions that will shape liability, proprietary, privacy and other grey legal issues in connection to AI development and application.

Equity is another concern. We must ensure AI solutions are not just available in big urban hospitals but also benefit rural clinics and underserved communities. This might require government investment or subsidies to deploy proven AI systems in public primary health care centres. If left purely to market forces, private hospitals and wealthy patients might benefit first, possibly widening health disparities.

Local context is king: AI models often need local customisation (what works on medical images of Caucasian patients may not directly transfer to African patients due to genetic or environmental differences). So, continuous local data collection and model retraining are important. African research institutions should be funded to participate in this process, rather than just importing pre-made models.

The health sector in Africa can gain immensely from AI, perhaps even more so than wealthier regions, because the marginal benefit of any additional doctor-like capability is high. However, it must be pursued with a patient-centric mindset, regulatory foresight, and investment in complementary improvements (like basic healthcare funding, training, and infrastructure). With those pieces in place, AI could significantly strengthen healthcare delivery, from predicting disease outbreaks to ensuring a mother in a remote village gets timely advice and care during pregnancy.

4.3.4. Other Sectors and Governance Examples (Brief)

While the focus of this section was on finance, agriculture, and health, it's worth noting that virtually every sector in Africa now has some AI activity:



Education:

AI tutoring systems (e.g., personalised learning apps) are being tried in South Africa and Kenya. The Government of Mauritius is experimenting with an AI-driven platform for enhancing STEM learning in secondary schools. Ensuring such tools complement rather than replace teachers, and are accessible (maybe through offline modes for schools without internet) is key. Rwanda's use of robots in teaching basic programming in some schools is a quirky example of sparking student interest.



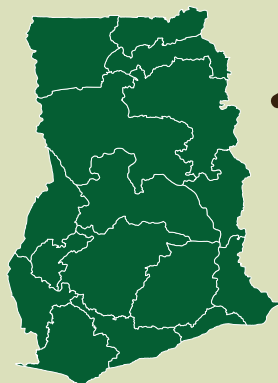
Public Services:

Many African governments are keen on "smart cities" and e-governance. For instance, traffic management AI is being implemented in Nairobi and Lagos to optimise signal timing and reduce jams. Some revenue authorities use AI for fraud detection in taxation (Nigeria and Kenya have systems that flag anomalies in tax filings). However, the use of AI in surveillance (e.g. facial recognition CCTV in certain cities) has raised civil liberty concerns. Addis Ababa faced pushback when introducing Chinese-made facial recognition tech without clear privacy laws.



Climate and Environment:

AI is used to monitor deforestation via satellite images (Cameroon, DRC with help from WRI's Global Forest Watch), and to optimise renewable energy management (South Africa's Eskom exploring AI for grid optimisation as more solar/wind come online). Conservationists use AI to track wildlife and predict poaching incidents (combining ranger patrol data with AI predictions to patrol more effectively in parks like Kruger in South Africa).



National Case: Ghana's holistic approach

Ghana's government has taken a broad approach: establishing a national AI centre, integrating AI discussions into its digital strategy, and even piloting AI in the judiciary (like an AI system to assist in clearing case backlogs by prioritising cases). This holistic approach signals political will; Ghana also works with international partners to train youth in AI (through initiatives like Ghana-India Kofi Annan Centre of Excellence). If sustained, Ghana could become a regional leader in AI policy and innovation.





CONCLUSION AND POLICY RECOMMENDATIONS

5.1. Key Findings: Africa at a Crossroads in the Global AI Economy

This study's analysis has highlighted both significant challenges and substantial opportunities for Africa in the age of AI. On one hand, Africa currently occupies a peripheral position in the global AI ecosystem.¹⁴³ This structural position resembles previous patterns of dependency where raw inputs (including data and minerals) flow out and finished tech products flow in. However, this situation is not immutable. Africa also has unique advantages and has shown it can chart alternative paths (as it did with mobile telephony leapfrogging). The abundant youthful human capital, the mobile-first digital infrastructure, and natural resources provide foundations for an alternate trajectory where Africa can claim a more central role. Encouragingly, an emerging continental coordination is evident. The African Union's Continental Strategy for AI and the landmark Africa AI Declaration indicate unprecedented political will to approach AI collectively. This offers Africa a chance to pool resources and speak with one voice.¹⁴⁴ Similarly, regional initiatives like Smart Africa's blueprint on AI provide shared frameworks that countries can adapt. Such coordination yields collective bargaining power (when negotiating partnerships or purchases with big tech), economies of scale (e.g., joint investments in regional AI research centres or data centres), and knowledge sharing mechanisms among countries. Africa is developing the institutional foundations not to face the AI revolution as 55 fragmented markets but as one larger bloc with aligned goals – a critical shift in the political economy calculus.



There is now a window of opportunity for African stakeholders to shape AI's integration, such that it underpins instruments like the AfCFTA and aids in achieving sustainable development goals

Sectorally, this study shows a nuanced picture: readiness and impact vary by sector. Financial services stand out as a sector where Africa is relatively advanced; the success of fintech and mobile money means AI adoption here is building on strong

¹⁴³ Its participation in AI invention and high-value production is minimal, accounting for roughly 0.3 per cent of global AI investments and about 1 per cent of global AI computing capacity. Few African countries host advanced AI infrastructure, and the continent imports most of its AI technologies.

¹⁴⁴ For example, the proposed 60 billion USD Africa AI Fund (if realised) would be a game-changer, bringing public, private, and philanthropic capital together to invest in African AI capacity.

digital rails (resulting in tangible inclusion gains).¹⁴⁵ A recurring theme is the importance of aligning AI with Africa's development priorities.¹⁴⁶ There is now a window of opportunity for African stakeholders to shape AI's integration, such that it underpins instruments like the AfCFTA¹⁴⁷ and aids in achieving sustainable development goals.¹⁴⁸ However, risks are real and must be proactively addressed. Without intervention, AI could exacerbate unemployment (through automation without safety nets), widen the digital divide (if only elites have AI access), and compromise sovereignty (if critical systems are foreign-controlled black boxes). The findings in this study underscore that governance and local capacity are the determining factors: AI is not inherently good or bad for Africa; its impact will depend on who controls it, how it is deployed, and whether Africans are in the driver's seat.

5.2. Strategic Recommendations

Africa's ability to shape its AI trajectory depends on targeted interventions across the seven structural pillars outlined in the analytical framework. Drawing on the analysis, AFRODAD hereby proposes a multi-faceted strategy for enhancing Africa's participation and benefit in the global AI economy. Each recommendation below responds directly to the constraints and opportunities identified in the pillar analysis. The responsibilities of national governments, regional institutions, private sector actors, and civil society are integrated into each recommendation to ensure clarity of implementation and accountability.

Strengthen Compute Capacity through Regional Infrastructure and Coordinated Investment	Africa's limited access to affordable and reliable compute capacity remains one of the most significant structural barriers to AI development. National governments should invest in domestic data centres, secure cloud services, and resilient broadband networks, while also adopting coordinated procurement models to reduce costs. Regional institutions, including the African Union and the Regional Economic Communities, can establish shared compute facilities and trusted cloud arrangements that pool resources and reduce duplication. Private sector actors, including telecommunications firms and cloud service providers, should expand infrastructure within Africa and participate in public-private investment models. Civil society and academic institutions can contribute by advocating for transparent data-hosting standards and participating in oversight of cloud governance arrangements.
Support African-led and African-adapted Model Development	Africa's dependence on proprietary models developed abroad limits its ability to ensure that AI systems reflect local languages, cultural contexts, and development priorities. National governments should facilitate partnerships between universities, research institutes, and industry actors to develop domain-specific and fine-tuned models that build on local datasets. Regional institutions should coordinate pooled model development initiatives, including open-source model repositories and shared training environments. The private sector can expand model-as-a-service solutions tailored to public-interest applications in health, agriculture, and finance. Civil society organisations and academic experts should participate in evaluation processes to ensure that model development aligns with ethical norms, public values, and local development needs.

¹⁴⁵ Agriculture and healthcare, while lagging in digitization, could see outsized benefits from targeted AI interventions given their importance to livelihoods and well-being. We also see that public services can achieve efficiency gains through AI (like better targeting of social programs or tax collection) but require robust governance frameworks to avoid misuse.

¹⁴⁶ (AU Agenda 2063 goals of inclusive growth, job creation, improved quality of life). AI solutions that further these goals: e.g., AI for precision agriculture to boost food security, or AI tutoring to expand quality education, should be prioritised over applications that might increase inequality or serve narrow interests.

¹⁴⁷ By facilitating trade (imagine AI streamlining customs or matching cross-border supply and demand).

¹⁴⁸ (e.g., SDG 13: AI for climate action in reforestation monitoring)

Build Robust Data Governance Systems that Protect Rights and Enable Public-Interest Innovation	Data remains a foundational input in the AI value chain, yet African states face fragmented laws, cross-border data dependence, and limited public-interest data infrastructures. Strengthening Africa's position in the global AI economy requires data-governance systems that both protect rights and enable public-interest innovation. National governments should invest in building and stewarding public-sector datasets, indigenous-language corpora, and sector-specific information assets that reflect African societies and support local model development. Harmonised data-protection and data-sharing frameworks are needed to ensure that datasets are collected lawfully, used responsibly, and governed transparently. Regional institutions, including the African Union and Regional Economic Communities, can establish continental standards on data access, interoperability, and valuation, and create mechanisms for secure cross-border data flows that preserve privacy and sovereignty. Private-sector actors should comply with local data laws, contribute anonymised data under public-interest agreements where appropriate, and refrain from extractive practices that undermine sovereignty. Civil society, academic institutions, and community organisations should participate in the design and oversight of data-governance mechanisms and ensure that marginalised groups are represented in emerging data infrastructures. Embedding rights-based governance while building public-interest data assets will reduce dependence on external datasets and create conditions for Africa-centred AI development.
Establish Coherent and Adaptive AI Governance Frameworks across the Continent	AI governance institutions across Africa remain fragmented, under-resourced, and unevenly aligned with global developments. National governments should adopt comprehensive AI strategies that define responsibilities across ministries, establish risk-based regulatory mechanisms, and introduce clear accountability requirements for both public and private systems. Regional bodies, including the African Union, should support standards harmonisation, promote Africa's participation in global standards forums, and coordinate training for regulators. Private sector actors, especially technology companies and developers, must implement responsible AI practices including documentation, transparency, and independent auditing requirements. Civil society organisations and researchers should contribute to oversight mechanisms and participate in public consultations to ensure that governance frameworks remain rights-centred and inclusive.
Expand Reliable Energy Systems to Support AI and Digital Infrastructure	Energy reliability remains a foundational barrier to compute expansion, data centres, and digital public infrastructure. National governments should prioritise investments in renewable energy, grid stabilisation, and independent power projects that support digital infrastructure needs. Regional institutions can develop cross-border energy pooling mechanisms, enabling data centres and digital systems to operate from locations with surplus capacity. Private sector actors, including utilities and renewable energy companies, should participate in co-investment models that link energy development with data centre expansion. Civil society organisations can help ensure that energy projects align with environmental and community standards and do not exacerbate existing inequities.

Accelerate AI Applications in Priority Sectors through Coordinated Public-Private Partnerships	Africa's most significant development gains will come from scaling AI applications in sectors such as agriculture, health, finance, and public administration. National governments should establish procurement frameworks that prioritise trustworthy AI, local participation, and interoperability. Regional institutions can facilitate shared regulatory sandboxes and cross-border pilots, particularly in agriculture and health. Private sector companies should co-develop solutions with public institutions, share technical expertise, and invest in local adaptation of AI systems. Civil society organisations and community groups should provide input on accessibility, fairness, and usability to ensure that deployed systems meet the needs of diverse populations.
Develop a Scalable and Inclusive Talent Pipeline for AI and Digital Skills	Talent shortages remain a critical constraint for both AI creation and adoption. National governments should expand university programmes, vocational institutes, and continuous professional training in AI and digital fields, while establishing clear incentives to retain skilled graduates. Regional institutions can coordinate continental training programmes, support centres of excellence, and promote mobility of researchers across borders. Private sector actors should invest in training programmes, internships, and apprenticeships that build practical skills and create pathways into the AI workforce. Civil society, universities, and community organisations should ensure that training programmes reach under-represented groups, including women, rural populations, and marginalised youth, to promote equity in the emerging AI economy.

5.3. Implementation Considerations

Having recommendations is one thing; implementing them is another challenge altogether. Effective implementation will require coordination across multiple levels of governance (local, national, sub-regional, and regional) as well as securing financing and establishing monitoring mechanisms to track progress.

Establishing clear leadership and coordination bodies for AI initiatives at each level is important. At the continental level, the African Union Commission should perhaps create a dedicated AI and Digital Innovation Unit (or empower the existing Department of Information Society to specifically oversee AI strategy implementation). This body can coordinate with Regional Economic Communities to align efforts. At the national level, governments should set up National AI Task Forces or Councils that include various ministries (education, ICT, industry, finance, etc.), private sector representatives, and academics. This ensures a whole-of-government approach and that AI plans do not remain siloed in just the ICT ministry.¹⁴⁹ Furthermore, sector-specific working groups (e.g., for health and agriculture) can drive domain integration of AI under the national council's agenda.

It is also crucial to involve local government and community levels in some respects, especially for last-mile adoption in sectors like agriculture and education. For instance, provincial education boards should be part of deploying AI learning tools in schools. Community leaders can help shape culturally appropriate AI solutions and mediate any social impact issues.

¹⁴⁹ Some countries like Mauritius and Tunisia have such councils already; others should follow.

Implementing these recommendations requires mobilising significant resources. Besides the continental-level AI Fund (which itself will need contributions from multiple sources), countries should explore a variety of financing avenues. Domestically, governments might allocate a portion of their budgets to a national AI program (this could be justified as part of economic stimulus or modernisation plans). Innovative financing, like technology bonds or public venture funds, could attract investors by tying returns to the success of AI-driven improvements (e.g., a social impact bond for AI in healthcare that pays returns if maternal mortality drops).

The private sector, especially big African companies in telecom, finance, and retail, should be incentivised to contribute (perhaps via a Digital Development Fund they pay into, or co-investment deals as part of CSR commitments). Internationally, development partners and multilateral banks are increasingly prioritising digital transformation. Africa can tap into programs like the World Bank's Digital Economy for Africa (DE4A)¹⁵⁰ or seek support from the new African Development Bank's Innovation Fund, etc. Also, engaging global tech companies should encourage them to invest in Africa's digital capacity, not just for market expansion but also as a mutual growth plan. For example, an alliance of tech companies might collectively fund an AI institute in Africa that benefits all by growing the market and talent pool.

To ensure progress and accountability, robust monitoring and evaluation systems are needed. An African AI Observatory function (could be within that AU AI Unit) that tracks key indicators: digital infrastructure roll-out, AI skills graduates, number of AI startups, AI adoption metrics in sectors, etc. It can publish an annual Africa AI Index Report to measure where each country stands (fostering a bit of positive competition). Additionally, specific projects (like an AI-enabled e-health rollout) should have outcome metrics (e.g., reduction in patient wait times, increase in disease detection rate) evaluated after implementation. Monitoring should not just be about numbers but also about impacts on equity and rights (for instance, surveying if farmers indeed find advisory AI useful, or if citizens trust government AI services, to gauge adoption barriers or issues).

There should also be mechanisms for feedback and course correction. If an approach is not yielding results, policymakers should iterate (that agile mindset from tech can benefit policy, too). Peer learning among countries (e.g., if Ghana's approach to AI in tax yields a good revenue increase, others can adapt it); if an approach fails somewhere, others can avoid that pitfall.

5.4. Concluding Vision: Toward an Inclusive and Sovereign AI-Driven African Future

Africa stands at an inflexion point as the Fourth Industrial Revolution accelerates. The continent's current marginalisation AI is not a fixed destiny. With strategic action grounded in principles of economic justice and sovereignty, Africa can shift from being a mere consumer of foreign AI solutions to becoming an innovator and co-creator of technologies that address African and global challenges. This transformation must ensure that African society has the space to generate its own solutions, with development owned and driven by its people rather than dominated by markets and international financial institutions.

The continent's approach to AI financing must avoid the debt traps that have historically constrained African development. AI infrastructure investments must be sustainable, transparent, and aligned with long-term continental objectives rather than creating new forms of technological dependency. Public investments should be anchored in constitutionalism, backed by legal frameworks, and supported by

¹⁵⁰ World Bank Group, The Digital Economy for Africa Initiative <<https://www.worldbank.org/en/programs/all-africa-digital-transformation>> Accessed 10 August 2025.

strategies for long-term sustainability. Africa's path to AI prosperity does not need to replicate Silicon Valley or Shenzhen; it must leverage distinctive strengths within a framework of Pan-African solidarity. Individual African countries are part of the greater African nation, and collective wisdom should inform national policies for the benefit of all. This collective approach recognises that technological sovereignty cannot be achieved in isolation but requires coordinated continental action.

Africa must position itself as a rule-maker, not a rule-taker, in global AI governance, establishing its own ethical frameworks, technical standards, and development priorities rather than passively adopting external models. The continent's approach should remain human-centric, rooted in solving real problems: helping farmers grow food sustainably, enabling doctors to serve patients effectively, or empowering students in remote villages with world-class resources.

Technology alone is not a panacea. AI will yield benefits only if integrated with improvements in governance, education, and infrastructure within frameworks of sustainable resource mobilisation. AI investments must be productive, generating returns that strengthen rather than compromise Africa's fiscal sovereignty. The costs of technological development are often disproportionately borne by women and marginalised communities, while benefits rarely prioritise their rights. Africa's AI development must explicitly address these intersectional impacts, ensuring technological advancement reduces rather than exacerbates existing inequalities.

The coming decade (2025–2035) will be pivotal. If Africa acts now (implementing strategic pathways that prioritise sovereignty, sustainability, and social justice) by 2035 we could see an Africa that is far more digitally and AI-empowered: local tech industries thriving within sustainable financing frameworks, AI solutions made in Africa being exported, and AI contributing significantly to GDP and social outcomes without compromising fiscal sovereignty or democratic governance.

AFRODAD's call to collective action

We choose to be optimistic, grounded in principles of justice and collective action. We shall strengthen bonds of solidarity between all African peoples, inspired by common struggles that can only be overcome through collective action. AI, properly harnessed within frameworks of democratic participation and sustainable development, could unlock a new era of growth and innovation, enabling Africa to lead global efforts on climate change, health, and cultural exchange, but only if these technologies strengthen African agency and sovereignty. The call to action is clear: let 2025 be remembered as the year Africa collectively took charge of its digital future within a framework of democratic participation, sustainable financing, and Pan-African solidarity. By moving decisively from plans to implementation while maintaining focus on transparency, accountability, and citizen participation, Africa can secure a meaningful place in the AI-driven world order, not as a peripheral consumer, but as a confident innovator and rule-maker.

SELECT BIBLIOGRAPHY

- Adebara, I., Toyin, H. O., Ghebremichael, N. T., Elmadany, A. A., & Abdul-Mageed, M. (2025). Where are we? Evaluating LLM performance on African languages. *Proceedings of the 63rd Annual Meeting of the Association for Computational Linguistics*, 32704–32731.
- Adebisi, Yusuff Adebayo et al. "Revisiting the issue of access to medicines in Africa: Challenges and recommendations." *Public Health Challenges* Volume 1, Issue 2 (2022): e9.
- Adeoye, Aanu. "Google has opened its first Africa Artificial Intelligence lab in Ghana." CNN 2019.
- African Development Bank. (2025). *African Economic Outlook 2025: Africa's Short-term Outlook Resilient Despite Global Economic and Political Headwinds*. Abidjan: AfDB.
- African Union. (2022). *Continental Strategy for Artificial Intelligence in Africa*. Addis Ababa: African Union Commission. (Provides an AU-wide framework emphasizing ethical AI, capacity building, and a \$60B AI fund initiative).
- African Union. (2024). *Continental Artificial Intelligence Strategy*. Addis Ababa: African Union Commission.
- African Union. (2025). *Africa Declaration on Artificial Intelligence*. Kigali: Fourth Industrial Revolution Centre Rwanda.
- African Union. *Africa Mining Vision*. February 2009.
- Aiello, A. E., Renson, A., & Zivich, P. N. "Social Media- and Internet-Based Disease Surveillance for Public Health." *Annual review of public health* 41(2020): 101–118.
- Alsop, Thomas. "AI chips - statistics & facts." Statista 2025.
- Andreoni, A. and F. Tregenna. "Escaping the middle-income technology trap: a comparative analysis of industrial policies in China, Brazil and South Africa." *Structural Change and Economic Dynamics* 54 (2020): 324.
- Banerjee, Abhijit & Paul Niehaus & Tavneet Suri. "Universal Basic Income in the Developing World." *Annual Review of Economics* vol 11(1)(2019).
- Beck, Thorsten, Lemma Senbet, and Witness Simbanegavi. "Financial inclusion and innovation in Africa: An overview." *Journal of African Economies* 24 (2015): i3–i11.
- Benjamin, R. (2019). *Race after technology: Abolitionist tools for the New Jim code*. Polity Press.
- Bekoe, Dorina A. et al. "Rare Earth Elements in Africa: Implications for U.S. National and Economic Security." Institute for Defence Analysis 2022.
- Bijker, W. E., Hughes, T. P., & Pinch, T. J. (Eds.). (1987). *The social construction of technological systems: New directions in the sociology and history of technology*. MIT Press.
- Birhane, A. (2021). Algorithmic injustice: A relational ethics approach. *Patterns*, 2(2), 100205.
- Bloomberg. "Nvidia, Cassava's AI Factory in Africa Tie-Up to Cost \$720 Million." April 2025.
- Bofo, James, Jacob Obodai, Eric Stemn, Philip Nti Nkrumah. "The race for critical minerals in Africa: A blessing or another resource curse?" *Resources Policy* Volume 93 (2024): 105046.
- Bown, C. P. (2020). How the United States marched the semiconductor industry into its trade war with China. *East Asian Economic Review*, 24(4), 349–388.
- Brookings Institution. (2025). *Leveraging AI and Emerging Technologies to Unlock Africa's Potential: Foresight Africa 2025–2030*. Washington, DC: Brookings.
- Bughin, J., et al. (2018). *Notes from the AI Frontier: Modeling the Impact of AI on the World Economy*. McKinsey Global Institute. (Seminal report estimating AI could add ~\$13 trillion to global GDP by 2030 and discussing uneven adoption).

- Bughin, Jacques et al. "Notes from the AI frontier: Modeling the impact of AI on the world economy." McKinsey Global Institute September 4, 2018.
- Bureau of Labor Statistics. "Occupational Outlook Handbook: Software Developers, Quality Assurance Analysts, and Testers." 2024.
- CGIAR. Open Data and Open Access.
- Chang, H.-J. (2001). Intellectual property rights and economic development: Historical lessons and emerging issues. *Journal of Human Development*, 2(2), 287–309.
- Chang, H.-J. (2002). *Kicking away the ladder: Development strategy in historical perspective*. Anthem Press.
- Chatrabhuj, Kundan Meshram, Umank Mishra, Upaka Rathnayake. "Application of artificial intelligence in agri-tech, environmental and biodiversity conservation." *Array* Volume 26 (2025): 100412.
- Couldry, N., & Mejias, U. A. "The decolonial turn in data and technology research: what is at stake and where is it heading?" *Information, Communication & Society* 26(4)(2021): 786–802.
- Couldry, N., & Mejias, U. A. (2021). *The decolonial turn in data and technology research: What is at stake and where is it heading?* *Information, Communication & Society*, 26(4), 786–802.
- Couldry, N., & Mejias, U. A. (2019). *The costs of connection: How data is colonizing human life and appropriating it for capitalism*. Stanford University Press.
- Crawford, K. (2021). *Atlas of AI: Power, politics, and the planetary costs of artificial intelligence*. Yale University Press.
- Daigle, Brian. "Data Protection Laws in Africa: A Pan-African Survey and Noted Trends." *Journal of International Commerce and Economics* February 2021.
- Daum, Thomas, Roberto Villalba, Oluwakayode Anidi, Sharon Masakhwe Mayienga, Saurabh Gupta, Regina Birner. "Uber for tractors? Opportunities and challenges of digital tools for tractor hire in India and Nigeria." *World Development* Volume 144 (2021): 105480.
- de Vries, Alex. "The growing energy footprint of artificial intelligence." *Joule* Volume 7, Issue 10 (2023): 2191–2194.
- Deberdt, Raphael. "The Democratic Republic of the Congo (DRC)'s response to artisanal cobalt mining: The Entreprise Générale du Cobalt (EGC)." *The Extractive Industries and Society* Volume 8, Issue 4 (2021): 101013.
- Ding, J. (2018). *Deciphering China's AI Dream: The Context, Components, Capabilities, and Consequences of China's Strategy to Lead the World in AI*. Oxford: Future of Humanity Institute.
- Drahos, P., & Braithwaite, J. (2002). *Information feudalism: Who owns the knowledge economy?* Earthscan.
- Dushime, Aimée. "What role will private equity play in Africa's AI future?" *World Economic Forum* 2025.
- Effoduh Jake Okechukwu (2025) "Modest Germinations: Toward Decoloniality in AI Governance in Africa", Policy Brief No. 205 – August 2025, Centre for International Governance Innovation, Canada.
- Effoduh Jake Okechukwu. *A Global South Perspective on Explainable AI*. Carnegie Endowment 2024.
- Effoduh Jake Okechukwu (2024). *Africa's Energy Poverty in An Artificial Intelligence (AI) World: Struggle for Sustainable Development Goal 7*. *The Journal of Sustainable Development, Law and Policy*. Vol. 15:3. 32–63. DOI:10.4314/jsdlp.v15i3.2.

- Effoduh Jake Okechukwu (2024). Artificial Intelligence and Human Rights in Africa. In C Ncube, D Oriakhogba, I Rutenberg, T Schonwetter (eds) *Artificial Intelligence and the Law in Africa*. LexisNexis https://store.lexisnexis.co.za/___data/assets/pdf_file/0016/1052071/9781776174331-2.pdf
- Effoduh Jake Okechukwu "The Fourth Industrial Revolution by Klaus Schwab." *The Transnational Human Rights Review* 3 (2017).
- Effoduh J. O. and Mundayi M. O. "TWAiling AI Governance: Will Third World Countries Be Left Behind?" *Third World Approaches to International Law Review* (7 August 2025)
- Eljechtimi, Ahmed. "Morocco to build data centre powered by renewable energy." *Reuters* June 2025.
- Empower Africa. "LifeBank: This health-tech startup is transforming medical supply chains in Nigeria and beyond." 2023.
- Feenberg, A. (1999). *Questioning technology*. Routledge.
- Fuchs, C. (2014). *Digital Labour and Karl Marx*. New York: Routledge.
- Fuchs, Christian. "The power and political economy of social media." In *Social Media: A Critical Introduction*. London: SAGE Publications Ltd, 2014: 97-125.
- Galal, Saifaddin. "Adult literacy rate in Africa as of 2023, by region." *Statista* 2023.
- Galal, Saifaddin. "African countries with the lowest median age as of 2023." *Statista* 2023.
- Galal, Saifaddin. "Demographics of Africa - statistics & facts." *Statista* 2025.
- Ghaddaripouri, K., Ghaddaripouri, M., Mousavi, A. S., Mousavi Baigi, S. F., Rezaei Sarsari, M., Dahmardeh Kemmak, F., & Mazaheri Habibi, M. R. "The effect of machine learning algorithms in the prediction, and diagnosis of meningitis: A systematic review." *Health science reports* 7(2) (2024): e1893.
- Griffiths, F., Watkins, J. A., Huxley, C., Harris, B., Cave, J., Pemba, S., Chipwaza, B., Lilford, R., Ajisola, M., Arvanitis, T. N., Bakibinga, P., Billah, M., Choudhury, N., Davies, D., Fayehun, O., Kabaria, C., Iqbal, R., Omigbodun, A., Owoaje, E., Rahman, O., et al. "Mobile consulting (mConsulting) and its potential for providing access to quality healthcare for populations living in low-resource settings of low- and middle-income countries." *Digital health* 6 (2020): 2055207620919594.
- Gebru, T., Morgenstern, J., Vecchione, B., Vaughan, J. W., Wallach, H., Daumé III, H., & Crawford, K. (2021). Datasheets for datasets. *Communications of the ACM*, 64(12), 86–92.
- Gwagwa, Arthur, Emre Kazim, Airlie Hilliard. "The role of the African value of Ubuntu in global AI inclusion discourse: A normative ethics perspective." *Patterns* Volume 3, Issue 4 (2022): 100462.
- Harvard Business School. "How \$40 Loans Lifted Lives in Kenya." *Working Knowledge* 2025.
- Hawkins, Zoe and Lehdonvirta, Vili and Wu, Boxi. "AI Compute Sovereignty: Infrastructure Control Across Territories, Cloud Providers, and Accelerators." June 20, 2025.
- Hornuf, Lars, Kulondwa Safari, Johannes Voshaar. "Mobile fintech adoption in Sub-Saharan Africa: A systematic literature review and meta-analysis." *Research in International Business and Finance* Volume 73, Part A (2025).
- IA Maroc. "Smart Irrigation Solutions: AI for Water Conservation in Morocco." 2024.
- Inria. "Machine Learning: AI technology to help small farmers in Africa." April 2020.
- International Monetary Fund. "AI Preparedness Index (API)." 2023.
- International Monetary Fund. (2024, April 29). *Harnessing Sub-Saharan Africa's critical mineral wealth*. International Monetary Fund.
- Ishkhanyan, A. (2025). The sovereignty-internationalism paradox in AI governance: Digital federalism and global algorithmic control. *Discover Artificial Intelligence*, 5(1), 123.
- ITU & UNESCO. (2019). *Artificial Intelligence and Inclusion: Africa*. Geneva: ITU. (Examines digital divide implications of AI in Africa and calls for inclusive AI capacity development).

- Jansen, Bernardus, Natalia Kadenko, Dennis Broeders, Michel van Eeten, Kevin Borgolte, Tobias Fiebig. "Pushing boundaries: An empirical view on the digital sovereignty of six governments in the midst of geopolitical tensions." *Government Information Quarterly* Volume 40, Issue 4 (2023): 101862.
- Ji, Xuan. "How many AI engineers are there in USA." Byteplus.
- Kallot, K., & Marivate, V. (2024). "Positioning Africa in Global AI Governance." *Communications of the ACM*, 67(4), 32-35. (Discusses African values like Ubuntu in AI ethics and need for African voices in standards).
- Kandemir, Mahmut. "Why AI uses so much energy—and what we can do about it." *Penn State University* 2025.
- Kara, Siddharth. *Cobalt Red: How the Blood of the Congo Powers Our Lives*. 1st ed. St. Martin's Publishing Group, 2023.
- Kergroach, Sandrine and Julien Héritier. "Early divides in the transition to artificial intelligence." *OECD Regional Development Papers* No. 147, OECD 2025.
- Khan, Saif M. "AI Chips: What They Are and Why They Matter." *The Centre for Security and Emerging Technology, Georgetown University* 2020.
- Kim, Soojong et al. "Rethinking Artificial Intelligence: Algorithmic Bias and Ethical Issues| Questioning Artificial Intelligence: How Racial Identity Shapes the Perceptions of Algorithmic Bias." *International Journal of Communication* Vol 18 (2024).
- Kwet M. "Digital colonialism: US empire and the new imperialism in the global south." *Race & Class* 60(4)(2019): 3-26.
- Lawson, Cina et al. "NOVISSI TOGO: Harnessing Artificial Intelligence to Deliver Shock-Responsive Social Protection." *Social Protection and Jobs Discussion Paper* No 2306, September 2023.
- Lee, Kai-Fu. *AI Superpowers: China, Silicon Valley, and the New World Order*. Houghton Mifflin Harcourt, 2018.
- Liu, Yang, Ruo Jia, Jieping Ye, Xiaobo Qu. "How machine learning informs ride-hailing services: A survey." *Communications in Transportation Research* Volume 2 (2022): 100075.
- Lynch, C. R. "Contesting Digital Futures: Urban Politics, Alternative Economies, and the Movement for Technological Sovereignty in Barcelona." *Antipode* (2019).
- Mazzucato, Mariana. *The Value of Everything: Making and Taking in the Global Economy*. Penguin London, 2018.
- Maas, M. M. (2025). *Architectures of global AI governance: From technological change to human choice*. Oxford University Press.
- McCampbell, M., Adewopo, J., Klerkx, L., & Leeuwis, C. "Are farmers ready to use phone-based digital tools for agronomic advice? Ex-ante user readiness assessment using the case of Rwandan banana farmers." *The Journal of Agricultural Education and Extension* 29(1)(2021): 29-51.
- McKinsey & Company. "The economic potential of generative AI: The next productivity frontier." June 2023.
- McKinsey and company. "AI power: Expanding data center capacity to meet growing demand." 2024.
- Microsoft & PwC. (2023). *Harnessing AI for Africa's Growth*. Johannesburg: Microsoft Africa. (Highlights AI use-cases in African agriculture, healthcare, and estimates AI could boost Africa's GDP by ~5% by 2030).
- Mies, M., & Shiva, V. (2014). *Ecofeminism*. London: Zed Books.
- Minhans, Kritika et al. "Artificial Intelligence and Plant Disease Management: An Agro-Innovative Approach." *Journal of Phytopathology* Volume 173, Issue 3 (2025): e70084.

- Mozilla Africa Mradi. "The Malabo Roadmap: Approaches to promote data protection and data governance in Africa." September 2022.
- Müller, V. C. (2021). AI governance in Africa: Between global standards and local needs. *Technology and Society*, 43(2), 134-148.
- Muldoon, J., Valdivia, A., & Badger, A. (2025). The politics of artificial intelligence supply chains. *AI & Society*. Advance online publication.
- Mustapha, Aminah. "Silicon Savannah or Digital Debt Trap? Unpacking Foreign Tech in Sub-Saharan Africa." *Georgetown Security Studies Review* February 2025.
- National Bank of Rwanda. *The East African Community Crossborder Payment System Masterplan*.
- Naudé, Wim. "Entrepreneurship, Education and the Fourth Industrial Revolution in Africa." *IZA Discussion Papers* 10855, Institute of Labor Economics (IZA), 2017.
- Ndaka, A., Lassou, P. J., Seny Kan, K. A., & Fosso-Wamba, S. "Toward response-able AI: A decolonial perspective to AI-enabled accounting systems in Africa." *Critical Perspectives on Accounting* 99 (2024): 102736.
- New York Times. "Quote of the Day: The Global A.I. Divide." July 2025.
- New York Times. "The Global A.I Divide, Where A.I Data Centres are Located." June 2025.
- Noble, S. U. (2018). *Algorithms of oppression: How search engines reinforce racism*. New York University Press.
- Nyaaba, Albert Apotele, Matthew Ayamga. "Intricacies of medical drones in healthcare delivery: Implications for Africa." *Technology in Society* Volume 66 (2021): 101624.
- Nzimande, N., Murphy, K., Reither, K., Bosman, S., Ayakaka, I., Glass, T. R., Vanobberghen, F., Jacobs, B. K. M., Signorell, A., & Ncayiyana, J. "Performance of CAD4TB artificial intelligence technology in TB screening programmes among the adult population in South Africa and Lesotho." *Journal of clinical tuberculosis and other mycobacterial diseases* 40 (2025): 100540.
- Ohene-Botwe, B., W.K. Antwi, C. Amedu, T.N. Akudjedu, L.-S. Mudadi, B. Chinene, S.N. Adjeley Quaye, M.Y. Dambele, S.S. Mkoloma, C. Barare, M.J. Kumsa, J. Sichone, R. Saizi, S. Mdletshe, J.Z. Dlana, C. Malamateniou, R. Ahmad. "Challenges and strategies for retaining Africa's radiography workforce in the continent amidst a competitive global market: Insights from 17 countries." *Radiography* Volume 31, Issue 4 (2025): 103001.
- Organisation for Economic Co-operation and Development. (2023). *A blueprint for building national compute capacity for artificial intelligence*. OECD Publishing. <https://doi.org/10.1787/876367e3-en>
- Okungbaye, Rotimi. "Payment Security Best Practices in Nigeria." *Flutterwave* 2024.
- Okungbaye, Rotimi. "Understanding Fraud In The Payment Space." *Flutterwave* 2021.
- Olawale, Rukayat Abisola, Mattew A. Olawumi, Bankole I. Oladapo. "Sustainable farming with machine learning solutions for minimizing food waste." *Journal of Stored Products Research* Volume 112 (2025): 102611.
- Owoyemi, A., Owoyemi, J., Osiyemi, A., & Boyd, A. "Artificial Intelligence for Healthcare in Africa." *Frontiers in digital health* 2 (2020): 6.
- Oxford Insights. "Government AI Readiness Index 2024."
- Pasara, M. T. "An Overview of the Obstacles to the African Economic Integration Process in View of the African Continental Free Trade Area." *Africa Review* 12 (1)(2020): 1-17.
- Peters, M. A. "Semiconductors, geopolitics and technological rivalry: The US CHIPS & Science Act, 2022." *Educational Philosophy and Theory* 55(14)(2022): 1642-1646.
- Phiri, M., & Munoriyarwa, A. "Health Chatbots in Africa: Scoping Review." *Journal of medical Internet research* 25 (2023): e35573.

- Pinch, T. J., & Bijker, W. E. (1984). The social construction of facts and artefacts: Or how the sociology of science and the sociology of technology might benefit each other. *Social Studies of Science*, 14(3), 399–441.
- Poostchi, M., Silamut, K., Maude, R. J., Jaeger, S., & Thoma, G. "Image analysis and machine learning for detecting malaria." *Translational research: the journal of laboratory and clinical medicine* 194 (2018): 36–55.
- Régis, Catherine et al. "AI in the Ballot Box." University of Ottawa 2025.
- Ricker, B., Dierwechter, Y., Cinnamon, J. "When Open Data and Data Activism Meet: An Analysis of Civic Participation in Cape Town, South Africa." *The Canadian Geographer* 64(3)(2020): 359–373.
- Roberts H, Cowls J, Morley J. "The Chinese approach to artificial intelligence: an analysis of policy, ethics, and regulation." *AI and Society* 36 (2021): 59–77.
- Rowe, Niamh. "It's destroyed me completely': Kenyan moderators decry toll of training of AI models." *The Guardian* 2023.
- Sadowski, J. (2020). *Too Smart: How Digital Capitalism is Extracting Data, Controlling Our Lives, and Taking Over the World*. Cambridge: MIT Press.
- Sahasranamam, Sreevas & Jaideep Prabhu. "Digital Public Infrastructure for the Developing World." *Stanford Social Innovation Review* March 2024.
- Scheuerer, M., Bahaga, T.K., Segele, Z.T. et al. "Probabilistic rainy season onset prediction over the greater horn of Africa based on long-range multi-model ensemble forecasts." *Clim Dyn* 62 (2024): 3587–3604.
- Schoon, A., Mabweazara, H. M., Bosch, T., & Dugmore, H. "Decolonising Digital Media Research Methods: Positioning African Digital Experiences as Epistemic Sites of Knowledge Production." *African Journalism Studies* 41(4)(2020): 1–15.
- Schwab, Klaus. *The Fourth Industrial Revolution*. Geneva: World Economic Forum, 2016.
- Senbet, L. W., & Simbanegavi, W. (2017). The pursuit of Africa's development in the 21st century: Agenda, progress, and lessons. *Oxford Review of Economic Policy*, 33(4), 493–532.
- Shabangu, Pay. "Artificial Intelligence's (AI's) implications for strategic communication." *Journal for Communication Studies in Africa* Volume 43 (1)(2024): 36–47.
- Shiva, V., & Mies, M. *Ecofeminism*. Bloomsbury Publishing, 2014.
- Sibanda, Mthulisi. "Artificial intelligence (AI) is expected to add US\$1.5 trillion to the African economy by 2030, if the continent captures 10% of the AI global market." *SAP* 2025.
- Signé, L. (2018). *Africa's Consumer Market Potential: Trends, Drivers, Opportunities, and Strategies*. Washington, DC: Brookings Institution.
- Simo, R. Y. "Trade in Services in the African Continental Free Trade Area: Prospects, Challenges and WTO Compatibility." *Journal of International Economic Law* 23 (1)(2020): 65–95.
- Smith, B. (2020). "Ensuring Africa Isn't Left Behind in AI." *New York Times*, June 2, 2020. (Microsoft President's remarks on global AI divide – only 32 countries host AI datacenters, Africa nearly absent – highlighting urgent need for investment).
- Srnicek, N. *Platform Capitalism*. Cambridge: Polity Press, 2017.
- Stanford University Human-Centred Artificial Intelligence. (2025). *Artificial Intelligence Index Report 2025*. Stanford: HAI.
- Staunton, Ciara, Alik Edgcumbe, Lukman Abdulrauf, Amy Gooden, Paul Ogendi, Donrich Thaldar. "Cross-border data sharing for research in Africa: an analysis of the data protection and research ethics requirements in 12 jurisdictions." *Journal of Law and the Biosciences* Volume 12, Issue 1 (2025): Isaf002.

- Suri, Tavneet, and William Jack. "The Long-Run Poverty and Gender Impacts of Mobile Money." *Science* 354 (6317)(2016): 1288–92.
- TechRepublic (Abdullahi, A.). (2025). "Global Divide: Only 32 Countries Host AI Data Centers." *TechRepublic*, June 23, 2025. (News article summarizing Oxford University research: US & China dominate >90% of AI datacenters; Africa & S. America largely missing; calls it a sovereignty issue).
- U.S. International Development Finance Corporation. *Tackling Critical Need Data Center Infrastructure Across Africa*.
- UNDP. "AI-powered fact-checking tool iVerify, piloted during Zambia election, shows global promise." November 2021.
- UNDP. *2024 Africa Sustainable Development Report*. 2024.
- UNESCO. "From readiness to ethical AI adoption and localization: UNESCO elevates Africa's voice in Bangkok." July 2025.
- UNESCO. *Recommendation on the Ethics of Artificial Intelligence*. Adopted on 23 November 2021.
- United Nations Economic Commission for Africa. "Zambia and DRC to implement an Innovative transboundary battery and Electric vehicle Special Economic Zone." April 2024.
- Vecchietti, Giuseppe, Gajendra Liyanarachchi, Giampaolo Viglia. "Managing deepfakes with artificial intelligence: Introducing the business privacy calculus." *Journal of Business Research* Volume 186 (2025): 115010.
- Walther, Cornelia C. "Universal Basic Income: A Business Case for the AI Era." *Forbes* June 2025.
- Wang, Di, Xuefeng Shao. "Research on the impact of digital transformation on the production efficiency of manufacturing enterprises: Institution-based analysis of the threshold effect." *International Review of Economics & Finance* Volume 91(2024): 883–897.
- Whitehead, Sean. "Morocco to Launch AI and Digital Engineering School Under Digital 2030 Strategy." July 2025.
- Winner, L. (1980). Do artefacts have politics? *Daedalus*, 109(1), 121–136.
- World Bank Group. *The Digital Economy for Africa Initiative*.
- World Economic Forum. "Chatbots RESET Framework: Rwanda Artificial Intelligence (AI) Triage Pilot Insight Report." March 2022.
- World Economic Forum. (2025). *Three New Centres for the Fourth Industrial Revolution Announced: C4IR Network Impact Report 2023–2024*. Geneva: WEF.
- Zuboff, S. *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*. First Trade Paperback Edition. New York: PublicAffairs, 2019.
- Zwetsloot R, Toner H, Ding J. "Beyond the AI arms race: America, China and the dangers of zero-sum thinking." *Foreign Affairs* November 16, 2018.



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