

# Artificial Intelligence and Rwanda's Economic Transformation: A Strategic Policy Review of Sectoral Readiness, Challenges, and Opportunities

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**Abstract:** This strategic policy review critically examines the role of artificial intelligence (AI) in Rwanda's broader economic transformation agenda, focusing on the alignment between national development goals and sectoral realities. Rwanda, still largely agrarian with 82% of employment in informal sectors, is pursuing an ambitious shift toward a knowledge-based economy as outlined in Vision 2050, the Smart Rwanda Master Plan, and the National Artificial Intelligence Policy (2023). These policy frameworks position AI as a catalyst for socioeconomic development, targeting key sectors such as agriculture, healthcare, education, finance, and public administration. The paper synthesizes labor force statistics, digital economy data, and sector-specific AI case studies to assess Rwanda's current readiness for AI integration. While flagship initiatives—such as VIEBEG's AI-enabled health logistics and Farmonaut's precision agriculture tools—demonstrate localized impact, national-level adoption remains uneven. Key challenges include inadequate data infrastructure, limited AI skills, low awareness among SMEs, and a persistent rural-urban digital divide. Comparisons with Kenya and Ghana further contextualize Rwanda's progress and limitations within the regional AI ecosystem. This review highlights that despite Rwanda's strong political will and high-level coordination, significant barriers must be addressed to achieve inclusive AI adoption. It concludes with forward-looking policy recommendations centered on human capital development, regulatory frameworks, public-private innovation, and regional collaboration. The findings aim to inform policymakers, researchers, and development stakeholders seeking to leverage AI for inclusive growth and to align Rwanda's digital trajectory with its Vision 2050 goals.

**Keywords<sup>3</sup>:** Artificial intelligence in Rwanda, digital transformation Africa, Vision 2050 policy review, sectoral AI readiness, informal economy and automation, Smart Rwanda Master Plan, AI adoption barriers Rwanda.

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## I. Introduction

**Background:** Rwanda has emerged as a prominent advocate for digital transformation in Africa, articulating a vision to transition from an agrarian economy to a knowledge-based society. This ambition is encapsulated in national frameworks such as Vision 2050, the Smart Rwanda Master Plan, and the National Artificial Intelligence Policy (2023). These policies position artificial intelligence (AI) as a pivotal driver for socioeconomic development, aiming to enhance productivity, service delivery, and innovation across various sectors. Despite these strategic commitments, the nation's workforce remains predominantly engaged in informal and low-skilled labor, with over 82% employed in agriculture and informal trade. This dichotomy underscores the complexities of aligning technological aspirations with prevailing economic realities.

**Problem Statement:** While Rwanda's policy landscape demonstrates a strong commitment to AI integration, there exists a significant gap between these ambitions and the practical readiness of key economic sectors. Challenges such as limited digital infrastructure, low digital literacy, inadequate data governance frameworks, and a scarcity of local AI expertise hinder the effective adoption of AI technologies. Moreover, the uneven distribution of digital resources exacerbates existing socioeconomic disparities, particularly between urban and rural populations. Without a comprehensive understanding of these barriers and the current state of sectoral readiness, efforts to implement AI-driven solutions risk being ineffective or exacerbating existing inequalities.

**Objectives:** This paper aims to conduct a strategic policy review to assess Rwanda's preparedness for AI integration across critical sectors, including agriculture, healthcare, education, finance, and public administration. The objectives are to:

1. Evaluate the current state of AI readiness within these sectors, identifying existing initiatives and their outcomes.
2. Identify the primary barriers impeding AI adoption, encompassing infrastructural, educational, regulatory, and socio-economic factors.
3. Analyze Rwanda's position relative to regional counterparts, such as Kenya and Ghana, to contextualize its progress and challenges.
4. Provide actionable policy recommendations to bridge the gap between strategic ambitions and sectoral capabilities, ensuring inclusive and effective AI integration aligned with Vision 2050 goals.

Through this analysis, the paper seeks to inform policymakers, stakeholders, and researchers about the critical factors influencing AI adoption in Rwanda, facilitating evidence-based strategies for sustainable economic transformation.

## **II. Methodology, Conceptual Framing, and Scope**

This study employs a qualitative, document-based methodology to conduct a strategic review of Rwanda's preparedness for artificial intelligence (AI) adoption across key economic sectors. The analysis draws on national policy frameworks—Vision 2050, the Smart Rwanda Master Plan, and the National AI Policy (2023)—alongside labor data from the 2023 Labor Force Survey and global digital economy reports from DataReportal, UNESCO, and the World Bank. Sectoral case studies and practitioner insights were sourced from institutions such as the African Development Bank, Access Partnership, and NEPAD. The review triangulates government data, academic literature, and regional comparisons—particularly with Kenya and Ghana, two peers with formal AI strategies—to contextualize Rwanda's digital readiness and identify cross-sectoral gaps. The approach prioritizes policy relevance, consolidation of existing evidence, and a multi-stakeholder perspective.

Conceptually, the paper is framed within the discourse on digital transformation in low-income contexts, using a policy-analytic lens that links technological ambition with institutional capacity. It draws from digital economy planning, inclusive innovation, and comparative AI governance frameworks to synthesize how Rwanda's national strategies align—or misalign—with sectoral realities. The paper contributes by offering a structured, sector-specific diagnosis that connects strategic policy intent with implementation gaps. It also positions Rwanda as a replicable test case for other resource-constrained but digitally aspirational nations seeking ethical and inclusive AI adoption.

While grounded in secondary data, the review maintains temporal relevance by focusing on sources from 2023–2025. Although it does not apply a formal theoretical model, it offers a practical framework that connects policy narratives, sectoral readiness, and implementation barriers. Ethical concerns—such as data privacy, AI regulation, and public trust—are considered in the recommendations. While Rwanda is the focal case, its trajectory offers valuable insights for comparable economies navigating similar digital transitions. This pragmatic, policy-oriented approach is intended to inform both scholarly inquiry and real-world decision-making in the Global South.

## **III. Sectoral Analysis**

### **Rwanda's Economy and Employment Landscape**

Rwanda's economy remains predominantly agrarian and labor-intensive. In 2023, about 43.5% of Rwanda's employed population worked in agriculture, with 39.8% in services and only 16.7% in industry (Labour Market Information System [LMIS], 2023). Within agriculture, roughly half of all farmers produce mainly for subsistence (about

20.3% of total employment) while the other half operate market-oriented farms (23.2%) (LMIS, 2023). The nation's population is largely rural ( $\approx 82\%$  rural in 2023), and much of the farming is smallholder, low-technology, and informal (DataReportal, 2023). In fact, over 82% of all employed Rwandans work in the informal sector (LMIS, 2023), often in small family farms, street vending, or casual labor. Even within the formal sector, nearly 90% of jobs are classified as “informal employment” (small enterprises or unpaid family work) (LMIS, 2023). Women make up roughly 47% of the labor force (mostly as farm labourers or market traders), and youth unemployment remains high (over 20% among ages 16–30). The average income from a formal wage job is low ( $\approx 68,500$  RWF per month,  $\sim$ USD 65) (LMIS, 2023). These facts underscore that Rwanda's workforce is dominated by low-skilled, labor-intensive occupations (especially in agriculture and trade) and that informality is the norm.

Rwanda's government has articulated ambitious development goals (Vision 2020, Vision 2050, and the National Strategy for Transformation). These all emphasise moving Rwanda toward a knowledge-based economy. For example, Vision 2050 explicitly identifies technology and innovation as core tenets of development, aiming for high- and upper-middle-income status by 2050 (Johns Hopkins School of Advanced International Studies [SAIS], 2023). The Smart Rwanda Master Plan (2015–2020) and the subsequent Vision 2050 build ICT into their economic strategies (SAIS, 2023; ICTworks, 2023). In practice, Rwanda has invested heavily in ICT infrastructure (e.g. fiber networks, national broadband, e-government platforms like Irembo) to become a regional digital hub. Nevertheless, the country remains resource-constrained, with challenges of rural electrification and affordability (SAIS, 2023). Internet penetration is still modest (around 30% of the population in early 2023), despite high mobile connectivity ( $\sim 76\%$  SIM penetration) (DataReportal, 2023). These structural realities shape Rwanda's capacity to absorb advanced technologies like AI.

### **Digital Transformation and AI Policy Context**

Rwanda has proactively pursued a digital economy vision. Its flagship ICT strategy (Smart Rwanda Master Plan, updated to Vision 2050) aims to “drive economic growth, improve quality of life, and position Rwanda as a global innovator” (ICTworks, 2023). In line with this, Rwanda became the first African country to approve a dedicated National Artificial Intelligence Policy in April 2023 (Access Partnership, 2023). This policy frames AI as a national strategic asset. It explicitly builds on Vision 2050 and the Smart Rwanda plans to harness AI for “sustainable and inclusive growth” (ICTworks, 2023). The AI policy's vision is to make Rwanda “a global center for AI research and innovation” with a mission to “leverage AI to power economic growth, improve quality of life and position Rwanda as a global innovator for responsible and inclusive AI” (ICTworks, 2023). Its objectives include “positioning Rwanda as Africa's AI lab and responsible AI champion” and “building 21st century skills and AI literacy” (ICTworks,

2023). In practice this means investing in AI education (from schools to universities), developing data infrastructure, and driving AI adoption in both public and private sectors (ICTworks, 2023).

The policy explicitly targets key sectors. An official announcement in March 2025 noted that the government plans to develop 50 AI applications across four years, focusing on healthcare, education, agriculture, finance, and public administration (AllAfrica, 2025). These domains reflect Rwanda's development priorities. For example, in healthcare the goal is to improve service delivery and reduce stockouts; in agriculture to enhance productivity and food security; in finance to expand inclusion; and in governance to "streamline government operations through automation and data-driven decision-making" (AllAfrica, 2025). Likewise, the Access Partnership review of Rwanda's AI policy notes that it "outlines a comprehensive plan to leverage AI's transformative potential in key sectors, including healthcare, agriculture, public services, education, finance, and smart cities" (Access Partnership, 2023). Thus Rwanda's strategy aligns closely with the country's socioeconomic needs.

### **Current AI Awareness and Integration**

Rwanda's AI ecosystem is nascent but growing. Government initiatives have raised awareness, but penetration into organizations and workplaces remains limited. A 2022 review found that Rwanda (with Kenya) leads the East African Community in AI readiness, aided by strong political support and tech initiatives (KT Press, 2022; Thomson Reuters Foundation, 2022). For example, Rwanda set up a Responsible AI Office (first in Africa) and engages with UNESCO on ethical AI standards (ICTworks, 2023). Universities like Carnegie Mellon (CMU) Africa in Kigali are producing AI research, even training models in Swahili to ensure local relevance (SAIS, 2023). Public servants and students have increasing exposure to AI via workshops and international programs (New Times Rwanda, 2023; SAIS, 2023).

However, broad awareness among the general business community is still low. In large companies (e.g. telecoms, banks) there is some knowledge of AI through corporate ICT units or reliance on foreign consultants, but many small and medium enterprises (SMEs) remain unaware or under-informed. A survey of Rwandan auditors found that larger firms reported higher AI awareness, while cost and skills were major barriers (ResearchGate, 2023). Informal sector actors (street vendors, small farmers) have virtually no direct exposure to "AI", although many use digital tools like mobile money and simple phones. NGOs and faith-based organizations are also just beginning to explore digital tools, mainly for information management and remote monitoring, not yet for true AI. Overall, Rwanda's organizational AI readiness is mixed: the government and a few progressive firms are strongly engaged, but most entities have limited capacity and funding to pursue AI projects.



## Sectoral Use-Cases of AI in Rwanda

Despite overall low adoption rates, several sectors in Rwanda have seen concrete AI-based initiatives. The most notable are:

**Healthcare:** AI tools are being trialed to improve diagnostics and logistics. For example, VIEBEG Technologies (a Rwandan startup) uses AI-driven supply-chain management to eliminate drug stock-outs. VIEBEG's platform connects health clinics directly with medical suppliers, using machine learning to predict demand and automate ordering. This reduces costs and shortages; one report noted a 40% cost reduction by cutting intermediaries (African Development Bank [AfDB], 2023). The African Development Bank backed VIEBEG's AI platform through the Rwanda Innovation Fund (AfDB, 2023). By 2022, VIEBEG had served 2 million patients across 500 facilities in Rwanda and begun expansion into Kenya and Burundi (AfDB, 2023). This case exemplifies how AI can solve practical problems in Rwanda's public health system (Fig. 1).



Figure 1. A conceptual illustration of AI/IoT in Rwandan agriculture and food systems (image: Farmonaut).

**Agriculture:** The government's latest agricultural strategy (PSTA5, launched Dec 2023) explicitly emphasizes AI and IoT to drive productivity (Farmonaut, 2025). Prototype solutions include drone surveillance and AI analytics: Rwandan agritech startups and research groups are piloting AI-powered drones that survey fields and identify crop diseases or weed infestations. For instance, the African Union's NEPAD reports that Rwandan companies are already using "AI-equipped drones to identify and map weed infestations, guiding targeted herbicide application" (NEPAD, 2025). This precision weeding can drastically reduce labour and chemical use on small farms. The government is also exploring AI-driven

extension advice: mobile tools to give real-time farming recommendations based on local soil and weather data (NEPAD, 2025). One agriculture startup, Farmonaut (a company co-founded by Rwandans), offers an AI-based advisory system (“Jeevn AI”) that uses satellite imagery and sensors to forecast crop yields and suggest optimal planting times (Farmonaut, 2025). While these innovations are still at pilot scale, they demonstrate growing awareness of AI in Rwanda’s 60% of workforce engaged in farming.

**Finance and Microfinance:** Rwandan banks and fintechs have begun experimenting with basic AI for credit scoring and fraud detection. Microfinance institutions seek to use machine learning on transaction data to evaluate lending risk for small borrowers (who often lack formal credit history). For example, a local fintech reportedly piloted an AI model to predict loan repayment likelihood from mobile money usage patterns. AI chatbots for customer service in mobile banking have been tried, albeit at low volumes. However, financial-sector AI remains at a nascent stage, mostly driven by partnerships with international fintech providers rather than homegrown solutions.

**Public Administration and E-Government:** Rwanda’s e-government platform (Irembo) has not widely adopted AI yet, but pilots exist. There have been reports of RAG-based chatbots (e.g. using retriever-augmented generation) to make government service portals more user-friendly (Kawalsky, 2025). Some ministries are experimenting with data analytics (e.g. predictive models for crop insurance or health outbreaks). The Smart Rwanda blueprint envisages using AI for tasks like traffic management in Kigali or automated monitoring of public infrastructure, though these are still on drawing boards. The new AI policy calls for creating a National AI R&D Hub to share data and expertise between government, academia and industry (AllAfrica, 2025), and has a priority “Trustworthy AI adoption in the public sector” (Access Partnership, 2023).

**Education and Skills Development:** AI tools for learning have only begun to surface. For example, CMU Africa students mentioned building a Swahili-language large language model to support education (SAIS, 2023). The government’s AI policy urges adapting curricula to emphasize digital and AI literacy (ICTworks, 2023), and Rwanda plans to fund AI research programs at universities (ICTworks, 2023). But actual AI in classrooms (adaptive tutors, automated grading) is very limited at present.

**NGOs and Faith-Based Initiatives:** International NGOs operating in Rwanda (e.g. in health, agriculture, or social services) have started small AI projects, often in partnership with tech firms or donors. For instance, some global health

NGOs use simple machine learning to analyze disease surveillance data. Others use AI-driven drones (in partnership with companies like Zipline) for blood delivery, though Zipline's drones rely more on logistics automation than AI per se. Faith-based development agencies, which often work in rural areas, are largely at the “awareness” stage, using digital mapping or SMS services, but not complex AI analytics.

**Informal Sector and Labor-Intensive Sectors:** There is virtually no direct AI use in Rwanda's vast informal economy (street vending, artisan shops, manual labour). People working day-to-day in agriculture or construction might use a smartphone for market prices or mobile payments, but not AI-driven decision tools. In labor-intensive manufacturing (garments, small textiles), automation is minimal and AI is rare. One area of growth is informal transport: ride-hailing companies (like safeMotos) use GPS data and simple algorithms to optimize routes, hinting at rudimentary predictive analytics. But on-the-ground, the average informal trader or farmhand has little access to AI beyond generic mobile apps.

**Entrepreneurial Startups:** Despite the challenges, several Rwandan tech startups focus on AI. A market snapshot (April 2025) lists dozens of “AI startups in Rwanda”, including health-tech (DoctorAI, DreamOval), agritech (FarmCrowdy Rwanda), IoT (Ligter), data analytics (Insightiv), and media/education (Digital Umuganda). For example, DreamOval's TeleClinic uses an AI chatbot to deliver basic medical advice via phone and web. Galaika provides AI translation services, and Ligter uses IoT sensors (though not full AI) for livestock tracking. VIEBEG (health supplies) and Farmonaut (agtech) we have mentioned. These ventures are still young (many founded in the last 3–5 years) and often incubated at hubs like kLab or the SMART Africa Smart Factory in Kigali. Their impact is starting to show locally, but most are focused on domestic or regional markets, not yet scaling globally.



Figure 2. VIEBEG's team in Kigali demonstrates an AI-based medical-supply ordering system (image from VIEBEG).



## Benefits and Drivers of Adoption

Across sectors, potential AI benefits are recognized by policymakers and early adopters. AI promises improved efficiency, cost savings, and better decision-making in key development areas (AllAfrica, 2025; AfDB, 2023). In healthcare logistics, VIEBEG's AI reduced procurement lead times and cut wastage—reportedly saving 40% of costs (AfDB, 2023). In agriculture, predictive analytics can help farmers forecast yields and manage resources, aligning with Rwanda's goal of 6.5% agrigrowth under PSTA5 (Farmonaut, 2025). In public services, AI-driven automation can free up staff and reduce errors in citizen services (for example, by auto-processing permits or using chatbots to answer queries). Rwanda's own Vision documents explicitly link ICT/AI to achieving the Sustainable Development Goals (SDGs) and its 2050 high-income target (ICTworks, 2023; University College Dublin [UCD], 2025).

Rwanda's leadership sees AI as a strategic enabler of its “digital economy.” The government has pledged to host 100 African AI companies (with tools in education, healthcare, agriculture) to drive job creation (UCD, 2025; AllAfrica, 2025). Policies emphasize that AI could become a new export sector (e.g. AI services and research hubs attracting foreign universities to Kigali) (SAIS, 2023; Global Policy Watch, 2025). International investors and development partners (World Bank, AfDB, GIZ, UNESCO) have supported AI pilot projects, indicating confidence that AI can support growth. For example, UNESCO worked with Rwanda's development board on a training program for AI/digital transformation, and the Africa AI panel (APET) specifically urged Rwanda to use AI in agriculture (NEPAD, 2025; UNESCO, 2023).

## Readiness and Barriers

Despite enthusiasm, Rwanda faces significant barriers to scaling AI. On the positive side, Rwanda has certain readiness assets. It has high mobile penetration, growing broadband, and a government-run data center (the Caisse des Dépôts datacenter). The country is ranked highly on AI readiness indices – e.g. one 2023 global index placed Rwanda among Africa's top AI-ready nations (Thomson Reuters Foundation, 2023). Rwanda's public education system is stable (literacy ~78%) and the government is rapidly expanding STEM programs (e.g. computer labs in schools, CMU Africa, new ICT institute partnerships) (ICTworks, 2023). The presence of tech hubs (KLab, Norrsken Kigali) and accelerator programs provides an ecosystem for startups. The government's commitment (AI policy, strategy, R&D hub, training programs) signals political will to overcome obstacles.

Nonetheless, gaps remain in infrastructure, skills, and investment. Internet penetration (~30%) and unreliable electricity in rural areas limit where AI can reach (DataReportal, 2023). Many rural districts have no broadband or only 2G coverage, hampering data collection and AI tool use. The digital divide (urban vs rural, rich vs

poor) is wide. Data barriers are also severe: Rwanda lacks large, high-quality digitized datasets in local languages; most official data are in Kinyarwanda or French/English but not in machine-readable formats. This makes it hard to train AI systems relevant to local contexts (e.g. no large tagged Swahili text corpus, limited digital medical records).

Human capacity is a key constraint. Rwanda has very few data scientists or AI engineers per capita. While universities have some AI research groups, overall talent is scarce. There are only a handful of PhDs and Masters graduates specializing in AI in-country; most skilled IT workers are software developers, network engineers, etc., with limited ML expertise. Building this workforce is a slow process (as Rwanda's AI policy acknowledges) (ICTworks, 2023). Many enterprises – especially SMEs and NGOs – lack the technical know-how or budgets to experiment with AI. They may not understand how AI differs from “general IT” and often perceive it as expensive or risky. Anecdotally, local business owners cite issues like cost of compute, lack of local language support, fear of job losses, and uncertainty about regulations as concerns.

Other hurdles include institutional and cultural factors. Regulation for data privacy and AI ethics is in early stages; companies worry about compliance and liability in a still-undefined legal environment. Some Rwandans hold mistrust of opaque algorithms (concerns about bias or surveillance), making adoption slower in public-facing services. Moreover, the high level of government control means that local innovation often depends on state endorsement. While this can mobilize resources, it can also stifle independent entrepreneurs if policies are not well-communicated. For example, Rwanda's cautious stance on data sovereignty may discourage foreign tech partnerships, and its emphasis on “national control” sometimes clashes with the global, open nature of AI research (UCD, 2025).

Comparing sector-by-sector, readiness varies. In the formal public sector (ministries, agencies), there is clear commitment and planning, but implementation is just starting (few deployed systems). In large private firms (banks, telecoms), IT departments are exploring AI (e.g. in network optimization or fraud detection) but so far focus on conventional analytics. Small businesses and the informal economy generally have negligible readiness: limited digital literacy and no systematic IT at all. NGOs and educational institutions have pilot projects (e.g. CMU's LLM), but wide-scale adoption (e.g. AI-based e-learning platforms or automated classroom analysis) is mostly future vision.

### **Regional Comparisons: Kenya and Ghana**

As peers, Kenya and Ghana offer useful comparisons. Kenya has a longer history of tech innovation (e.g. mobile money) and a larger private sector. It launched its first National AI Strategy (2025–2030) in early 2025. Like Rwanda, Kenya emphasizes

healthcare, agriculture, finance, and public administration as priority AI sectors (Global Policy Watch, 2025). The Kenyan strategy similarly stresses local data governance and building cloud infrastructure. An analysis notes that Kenya's AI vision is among the most structured on the continent, with plans for research hubs and stronger data sovereignty (Global Policy Watch, 2025). Both countries thus set parallel frameworks. However, Kenya's tech ecosystem (SiliSanSky) has more mature startups and a larger pool of tech talent (e.g. iHub, Google AI Lab in Nairobi). For instance, Kenya's Ushahidi and others have produced open-source AI tools, and Kenyan universities recently opened AI labs. Yet Rwanda is catching up: it was ranked on par with Kenya in East African AI readiness in an IMF study (KT Press, 2023). Moreover, Rwanda's smaller size has allowed swifter government coordination, whereas Kenya's multiple counties and larger economy make policy roll-out more complex.

Ghana's newly unveiled AI Strategy (2023–2033) likewise aims at health, agriculture, finance, and education (UCD, 2025; Digital Watch, 2025). Ghana lists seven focus sectors (including smart grid and environmental management) (Digital Watch, 2025). Both Ghana and Rwanda have established Responsible AI Offices and emphasize ethical AI. A recent comparative study noted that Rwanda's policy is more "problem-solving" and security-oriented, while Ghana's emphasizes attracting investment (UCD, 2025). Both envisage collaborations with global partners (e.g. UNESCO, GIZ). In practice, Ghana's digital economy is somewhat less developed than Kenya's but larger than Rwanda's; it benefits from multinational companies setting up AI labs (e.g. Microsoft in Ghana). Rwanda's advantage is its high-level political drive and reputation as a business-friendly environment, which it hopes will attract AI ventures.

Across all three countries, challenges are similar: scarce skills, infrastructure gaps, and the need to adapt AI to local languages/cultures. For example, while Rwanda and Ghana have bilingual (local/global) populations, Kenya has many languages; AI tools must handle Swahili (in Kenya/Tanzania) and multiple Ghanaian languages. Rwanda's promotion of an AI model in Swahili (through CMU projects) shows awareness of this, and Ghana's strategy similarly highlights language inclusivity (UCD, 2025; Digital Watch, 2025). Each country is navigating how to follow international AI guidelines (e.g. UNESCO's AI Ethics Recommendation) while meeting local development needs (UCD, 2025; UNESCO, 2023).

**IV. Cross-Sectoral Synthesis:** The review reveals that healthcare and agriculture are currently the most advanced sectors in AI integration, with notable cases such as VIEBEG's logistics platform and Farmonaut's precision agriculture tools demonstrating early impact. These initiatives highlight practical applications of AI aligned with Rwanda's development priorities.

Despite policy momentum, common readiness gaps persist across all sectors. Key barriers include limited digital infrastructure in rural areas, low AI literacy, scarcity of local AI expertise, and inadequate, non-standardized datasets—especially in local languages. These gaps are particularly pronounced in informal and underserved areas.

A clear pattern emerges in the public-private adoption dynamic. The public sector—backed by strong political will—has taken the lead through national strategies and pilot programs. Some large private firms are exploring AI, but adoption remains limited among SMEs, NGOs, and the informal economy, where awareness and capacity are low.

Emerging trends point to a slowly maturing ecosystem: growth in AI startups, the expansion of innovation hubs, the integration of AI in academic programs, and strategic partnerships with global institutions. However, the urban-rural digital divide and underfunded local innovation ecosystems continue to limit inclusive progress.

Sector	AI Integration Level	Key Use Cases	Barriers	Opportunities
Healthcare	Moderate to High	Logistics optimization (VIEBEG), medical chatbots (TeleClinic)	Data access, cost of tools, limited expertise	Improve stock management, expand access to care
Agriculture	Moderate	Precision farming (Farmonaut), AI drones, mobile advisory tools	Low infrastructure, rural illiteracy, scaling issues	Boost yields, optimize input use, rural tech integration
Finance	Emerging	Credit scoring, fraud detection, chatbots	Regulatory uncertainty, technical capacity gaps	Expand financial inclusion, SME credit risk tools
Education	Low	Swahili LLMs, AI education policy, limited classroom tools	Lack of tools, digital literacy, funding	Promote 21st-century skills, localized AI tools
Public Administration	Low	Chatbots, predictive analytics, e-gov pilots	Institutional delays, skill gaps, policy execution	Automate services, improve public efficiency
Informal Sector	Very Low	Mobile payments, ride-hailing algorithms	No AI exposure, digital divide, affordability	Introduce basic tools via mobile platforms

*Table 1: AI Readiness Across Sectors in Rwanda*

**Benefits, Barriers, and Policy Implications for Vision 2050**

Rwanda's Vision 2050 envisages a "knowledge-based economy" and sets targets such as 10% GDP share for ICT and significant poverty reduction. Accelerated AI adoption has clear synergies with these goals. In education, equipping youth with AI skills could foster a new high-tech job sector, aligning with the policy's emphasis on 21st-century skills (ICTworks, 2023). For entrepreneurship, AI-driven startups (like VIEBEG in health or Farmonaut in agri-tech) could diversify exports beyond coffee and tourism, boosting digital services trade. Economically, AI-powered efficiency gains in agriculture and manufacturing could raise productivity in Rwanda's labor-intensive economy, helping lift workers out of low-productivity subsistence activities. Socially, better health logistics or personalized learning systems could advance SDG targets in health and education. In essence, AI is seen as a catalyst that could accelerate Rwanda's trajectory toward middle/high-income status.

However, the barriers noted above mean that benefits are not automatic. Vision 2050's aspirational targets will require closing the gap in AI readiness. This implies continued investment in digital infrastructure (e.g. expanding rural broadband, reliable data centers) and an AI talent pipeline (through scholarships, diaspora engagement, and partnerships with global tech companies). The national policy's focus on education reform and university research (ICTworks, 2023) is well-placed, but must be monitored for actual outcomes (e.g. number of AI graduates). Similarly, digital economy strategies (e.g. National Digital Acceleration Plan) must now include explicit AI components – from data governance laws to innovation grants for AI solutions. Recent moves (AI R&D Hub, startup support, ethics guidelines) are positive signals that Rwanda is addressing these needs.

A mixed academic and practitioner assessment suggests Rwanda is a leader among comparable African countries in AI ambition and coordination. Its policy objectives and inter-ministerial efforts are advanced for the region (Access Partnership, 2023; Global Policy Watch, 2025). Yet real-world adoption is still embryonic outside a few sectors. Therefore, policymakers should temper expectations: many development challenges (rural unemployment, informal economy) will not be solved by AI alone. Instead, AI should be integrated into broader digital transformation and sectoral development plans. For example, agricultural extension services could include simple AI tools (weather alerts, mobile farm advice) as part of existing agri-support programs. Health reforms can leverage AI for supply chains (as VIEBEG showed) but also invest in telemedicine and basic e-records.

Key recommendations emerging from this analysis include:



- **Strengthen Data Ecosystems:** Invest in national data infrastructure – open data portals, digitization of health and agricultural records, support for local language datasets. A secure cloud and accessible data will enable AI innovation across sectors. This aligns with Rwanda’s data strategy priorities (ICTworks, 2023; Access Partnership, 2023).
- **Build Human Capital:** Deepen AI education at all levels. Maintain the push for AI curricula in schools, scholarships for AI research, and professional certification programs. Partnerships with international universities (e.g. Carnegie Mellon, HEC Paris in Kigali) and tech companies can fast-track skill development.
- **Facilitate Public-Private Innovation:** Ensure the planned AI R&D hub becomes operational and inclusive. Provide incentives (grants, tax breaks) for local startups and foreign companies to pilot AI projects in Rwanda’s priority sectors. Use proof-of-concept partnerships (like VIEBEG) to showcase success.
- **Address Regulatory and Ethical Frameworks:** Continue to refine regulations on data privacy, cybersecurity, and AI ethics (building on UNESCO’s recommendations) (UNESCO, 2023). Ensure that these frameworks protect citizens without stifling innovation. Embrace transparency (e.g. explainable AI in public services) to build trust.
- **Leverage Regional Collaboration:** Work with EAC neighbors on shared infrastructure (e.g. regional data centers) and harmonized AI policies to create scale. Rwanda can position itself as an “AI lab” for East Africa by hosting conferences and pilot programs that involve Kenya, Tanzania, Uganda and others, drawing on its high readiness ranking (Thomson Reuters Foundation, 2023).
- **Monitor and Evaluate:** Establish indicators to track AI integration (number of projects deployed, sectors covered, citizens reached). Use surveys and case studies to assess on-the-ground awareness, barriers, and benefits. Academic partnerships can publish periodic reports on Rwanda’s AI progress, informing policy adjustments.

**In conclusion,** Rwanda has articulated one of Africa’s most ambitious visions for artificial intelligence, positioning it as a strategic enabler of socioeconomic transformation under Vision 2050. This review finds that while policy frameworks and high-level coordination are commendable, sectoral AI adoption remains limited, with meaningful progress concentrated in healthcare and agriculture. Gaps in infrastructure, digital literacy, data ecosystems, and local expertise continue to hinder inclusive implementation—especially across rural and informal sectors.

Nonetheless, emerging trends—such as AI-driven startups, academic partnerships, and public-sector pilots—signal growing momentum. Rwanda’s comparative standing with Kenya and Ghana affirms its policy leadership, yet also

highlights the need to accelerate practical integration through targeted investments, regulatory clarity, and cross-sector collaboration.

Ultimately, the promise of AI for Rwanda lies not in technology alone, but in its alignment with local development needs, institutional capacity, and inclusive innovation. With sustained commitment, Rwanda can transition from policy ambition to implementation leadership—offering a replicable model for responsible, context-driven AI adoption in the Global South.

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