

AI Technology in African Enterprise Management: A New Engine for Leapfrog Development

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Abstract. Africa is engaging more with technology and artificial intelligence (AI) and is no longer playing catch-up to the rest of the world in terms of technology and innovation. This paper examines how companies in Africa are employing AI to generate new sources of value through local enterprises. The findings demonstrate that the time-to-market of financial products can be reduced by up to 50 percent with AI and other operational efficiencies can be accumulated. Moreover, this research analysed the most significant barriers for companies across all eight sectors identified in adopting AI sustainably (i.e., infrastructure shortcomings, talent shortage, regulation-related challenges). The study demonstrates that the value or economic effects of AI could generate in the range of \$100 billion per year; nonetheless, it suggests that realizing this value is not simply a matter of doing 'more of the same' (e.g., developing 'one-size-fits-all' Western solutions), but necessitates 'localised' adaptations for specific regions and countries. In the final section, recommendations for policymakers regarding cross-border data governance, and for investors to develop computationally efficient infrastructure based on renewable energy sources that will bridge the digital divide and enable smart economies are put forth. The research results of this article provide a basis for understanding how AI promotes enterprise development.

Keywords: African Enterprise Management, Artificial Intelligence, Digital Transformation, Leapfrog Development, Smart Economy

1. Introduction

1.1. Research background and motivation

A technological race is currently playing out in the global economy among the developed economies, but the developing African continent is also adopting artificial intelligence technology in a manner never before witnessed. Formerly seen as a "technical follower," the continent is now opening up sensational possibilities. Studies show that generative AI alone could drive \$100 billion worth of annual economic value for African economies, while the value potential for conventional AI along with machine learning may be more than twice this amount [1]. The uptake of AI in Africa is not incidental – it is based on experiences gained from taking on other new technologies such as mobile payment systems that are popular in Kenya and cloud technology adoption. Those

experiences have given a foundation for Africa to take advantage of what generative AI has to offer to become an intelligent economy.

1.2. Literature review

Most academic studies on digital transformation in Africa have primarily been concentrated on "first wave" mobile financial services, including the pursuit of financial inclusion through platforms such as M-Pesa and connecting citizens to the internet (i.e. basic connectivity). However, as the focus turns away from "first wave" technology and towards employing intelligent technologies, the breadth of academia's scope is evolving. For example, Arakpogun et al.'s work presented some of the structural impediments to AI adoption in African countries - while there are certainly opportunities for African states to take advantage of AI technologies, they face significant governance and infrastructure challenges, thus policymaking must be context-specific and not simply "copy-paste" as is typical in North America and Western Europe [2]. Further, in the public sector, the ability for AI-based human resource management systems to improve service delivery efficiencies in South Africa will depend on the barriers from a lack of necessary skill sets [3]. The CIPIT State of AI Report suggests that Africa is now transitioning away from being only a consumer of AI technologies to being a creator of indigenous AI technologies - representing a critical inflexion point along the technological timeline for Africa [4]. Nevertheless, there has been very limited research at the intersection of generative AI and enterprise management efficiency with prior findings largely focused on narrowly defined applications for the use of technology.

1.3. Research contents and significance

This paper aims to bridge this gap by analysing the specific application scenarios of AI in African enterprise management and the challenges faced during this transition. By reviewing the "dividends systematically" stimulating the growth and the "bottleneck" constraining the growth, the study elucidates the mechanism of AI-driven leapfrog development. In theory, it contributes to the literature on digital economics in the context of emerging markets. In terms of practical implications, it offers a guide for business and government to tame the African intelligent economy and turn the "digital divide" into a "digital opportunity."

2. Africa's "unique dividends" in AI development

2.1. Population and market: the "digital native power"

The population of Africa now stands at 1.4 billion, and almost 70 percent of these people are younger than 30. Since these women and men are "digital natives" who have grown up with mobile technology, they are also likely to be early adopters of technologies such as Artificial Intelligence. These are the people who will be using and developing AI applications in the future and so this keeps driving the growth of the African AI sector. Already with more than 580 million mobile internet users, there is a solid foundation for rolling out AI. Moreover, traditional industries have no "legacy baggage," allowing them to "leapfrog" with AI [5].

2.2. Policy and industry: acceleration from "planning" to "implementation"

African countries are actively seeking to use AI. The African Union (AU) introduced the Continental Artificial Intelligence Strategy to support countries in building ethical and sustainable technologies,

positioning AI as a strategic enabler for realising the AU Agenda 2063 aspirations [6]. The industrial vigour is as formidable with more than 700 AI firms in South Africa, 450 in Nigeria and 204 in Kenya. Almost half were established recently, suggesting a move from theory to practical development.

2.3. International cooperation

As Africa's largest trading partner, China is now pushing "digital cooperation" with the continent. Programs such as the "China-Africa Digital Technology Cooperation Center" are to implement digital infrastructure projects, including transmission lines and communication backbone networks. Those are the facilities that deliver the "basic guarantee" for the implementation of AI in the whole continent.

3. Core application scenarios of AI in African enterprise management

The application of artificial intelligence in African enterprise management is reflected in various industries. This article will focus on describing its 8 core application scenarios. Table 1 presents 8 key sectors, AI application scenarios, core disadvantages and key benefit.

Table 1. Eight areas where AI is being applied in African businesses

Sector	Core Disadvantages	AI Application Scenario	Key Outcome/Benefit
Banking	Template-based marketing and slow efficiency	Generative AI for customized plans	Time-to-market reduced by ~50%
Finance	High unbanked population ("Financial Desert")	AI credit portraits via non-traditional data	Increased financial inclusion
Retail	Disconnected online/offline experience	AI "Personal Shopping Assistants"	Purchase time reduced by >50%
Telecom	High volume of manual customer queries	Real-time "Solution Templates" (CRM)	Improved satisfaction & efficiency
Mining	Unsorted data and loss of expert knowledge	Voice-activated maintenance assistants	Effective work time +40%
Education	Teacher shortages and language barriers	Local language LLMs and personalised tutoring	2 years of learning in 6 weeks
Agriculture	Low yields and reliance on weather	Remote sensing and disease ID apps	Yields +20%; Water usage -40%
Infrastructure	Security risks & urban congestion	AI Vision Hubs & Smart Policing	15-second response to intrusions

3.1. Banking: a value chain revolution

Previously, monotonous template marketing caused processing bottlenecks in the African banking industry. The advent of generative AI is changing this terrain. Sub-Saharan African banks have started to leverage large language models (LLMs) to create tailored marketing strategies for particular segments of customers. These not only help make the promotional content relevant, but also reduce product time-to-market by close to 50% through AI-automated compliance reviews [1].

3.2. The financial sector: breaking the "financial desert"

Africa used to be home to 270 million unbanked people. AI is puncturing that wall, rapidly building "credit profiles" for unbanked people based on alternative data, such as mobile payment data. PiggyVest and other startups use AI algorithms to study how people spend and set savings goals for

them automatically, enabling more than 4 million users to build financial habits. Also in the crypto realm, JetBolt utilises AI to collect and synthesise market volatility, serving as a "smart strategist" for investors.

3.3. Retail: seamless shopping experiences

Now digital retail giants are taking their place in the ring, and competition is strong. Local retailers are deploying generative AI-powered conversational bots that serve as "personal shopping assistants" in their migration to digital platforms. These assistants cut interface jumps, reducing the time to make a purchase by over 50%. In the creative industries, artisans in Ghana leverage AI to scout worldwide fashion trends for batik designs, while Nigerian woodcarvers create 3D models for metaverse exhibitions, leading to a substantial increase in international orders.

3.4. Telecommunications: transforming service

Customer service has been a barrier to entry in the growing telecom industry. Employees are equipped with an "intelligent plugin" through generative AI and not replaced. For instance, a West African operator incorporated AI into its CRM to offer real-time solution templates, turning voice consultations into text. This shift allows staff to focus on more complex issues and enhances human capabilities. In addition, the AI-based billing systems like MPA solution in Kenya, caters for millions of concurrent users and enable deliveries to be more efficient by 70%.

3.5. Mining and heavy industry: smart factories

Heavy industry in Africa's is its own beast, and it's got a ton of operational data, mostly trapped in hand-written logs. AI puts those pieces together into a "navigation map." A South African mining company developed an AI-based maintenance assistant which communicates through voice, that enables retrieval of manuals and fault cases. An expected result of this innovation was a 40% increase in the productive working time of technicians. Furthermore, CITIC Dicastal's Morocco factory, as the sector "LF" (Lighthouse Factory), utilises AI vision inspection cutting defect rates by 31.1%

3.6. Education: breaking "digital silence"

With over 2,000 languages, many African regions face a "digital silence." Companies like Lelapa AI are training large models on local languages like Hausa and Yoruba. In terms of curriculum, AI platforms in Nigeria provide customized tutoring adapted to local textbooks. Research indicates that students using AI teachers (Copilot) achieved the equivalent of two years of traditional classroom training within six weeks.

3.7. Agriculture: from traditional to smart

African agriculture is leapfrogging development. Satellite remote sensing and drone aerial image in conjunction with AI algorithm make crop monitoring and soil evaluation. Smart irrigation systems incorporate weather predictions, resulting in a 30%-50% water savings. In Kenya, for instance, the "Digital Farm" initiative reaches 50,000 small farmers with a 20% average yield increase.

3.8. Digital infrastructure and smart cities

AI improves security and management in cities. In the Djibouti Free Trade Zone, a dual-drive architecture based on AI Vision and 3D processing enables to respond to perimeter intrusions within 15 seconds. Likewise, Ethiopia's smart policing systems employ big data to identify suspects in a matter of hours, bringing a new level of efficiency to law enforcement.

4. Challenges: the "required course" for African AI growth

4.1. Infrastructure: the "hardware shortcoming"

Reliable electricity and strong computing power – both of which are in short supply in Africa – are a prerequisite for AI development. Because the rate of electrification across the continent stands at just over 55%, and because power outages are a regular occurrence, the reliability of AI running on servers and data centers is under threat. The region also lacks local cloud infrastructure. As IEEE (2019) states, robotics and AI have tremendous potential, but without industrial infrastructure it is a major challenge to scale such technologies [7].

4.2. Talent gap: the "software bottleneck"

Although Africa has a youthful demographic, there is an acute shortage of well-trained people within the labour force for the AI industry. At the same time, there is a growing E-need for digital skills (banking, ecommerce, telecommunications, etc.), especially concerning the increasing need for machine learning and big data analysis, as well as prompt engineering, as these E-business needs grow exponentially. The education system has been too slow to adapt to meet these emerging skill sets. Most universities are still basing their programmes on traditional software engineering with glaring gaps in capacity to support high-end research and development capabilities of AI within Africa. Consequently, African tech firms are now left with the undesirable option of developing their AI capability through "internal training, combined with vendor support from outside of Africa," a model that is not only costly and difficult to scale. Accentuating this phenomenon of "brain drain," in which many of Africa's best talent have left for "better opportunities" in North America and Europe, only furthers this already critical issue. Without a mass of local experts knowledgeable in both technology and local context, African businesses will have considerable difficulty in building their own AI solutions and depend heavily on imported AI solutions.

4.3. Data and regulation: the "rules exam"

The regulatory and ethical frameworks surrounding AI in Africa are diverse and still developing, in addition to the issues surrounding AI tech-related barriers. One of the biggest barriers is the "localisation adaptation", which means that many data governance systems don't have the ability to adapt to local markets. When the author takes AI models from Western markets, like credit scoring, the author is likely to get poor performance (biased and/or inaccurate) because they can't account for how people in Africa consume goods and services (e.g., cash-based economies) or how much they make (very significant variances vs. the West). This can lead to people who are eligible to borrow being excluded from accessing credit. Furthermore, data scarcity and privacy problems are also major problems for many African nations, and they do not have the same level of data protection laws as developed Western countries (such as the GDPR). This makes these countries very difficult to do business in and has a negative impact on the confidence of consumers/users in using these

services. Additionally, with the absence of A.I. standards that have been locally customised to their environment, AI technologies will remain difficult to implement by enterprises/organisations, because there will be no guarantees of compliance and/or effectiveness.

5. Breakthroughs and future landscape

5.1. Addressing the talent gap

As a result of the pressing need for skilled workers, universities, private businesses and international agencies have taken steps toward providing leadership in correcting the critical shortage through a multi-pronged approach. African universities are fundamentally redesigning their curriculum to provide future software engineers not with just general software development skills but also with the particular skill sets necessary to take advantage of AI in their future careers working in R&D. The change is being supported by projects such as the Mastercard Foundation EdTech Fellowship which offers access to technology-enabled learning opportunities for people living in rural/underserved areas, thus helping build an equitable access to AI education. Targets have also been established through national-level government involvement. For instance, Nigeria's National AI Strategy (NAIS) declares it is going to train 5,000 AI professionals (i.e. computer scientists who can work with and develop AI) in the next 3 years. As they focus on training for industries essential to building the continent (i.e., agricultural technology and the medical diagnostics) through these programs, they will also be ensuring that the talent of their future pool meets the continent's very needs, contributing to developing a sustainable digital innovation environment.

5.2. Localising data and governance

Addressing the data adaptation challenge is key to a responsible and successful use of AI. The African Union is at the forefront in this respect, spearheading the development of "AI Ethics Guidelines" that place greater emphasis on local context than on imported standards. Countries at the national level are taking a pragmatic path of "many pilots + gradual standardisation". High-stakes models, like AI credit scoring algorithms, are also being tested in places, or sandboxes, where companies can amass local data and refine their products before rolling them out nationally. The cyclical nature of it helps guard against bias and serves to build public trust, he said. At the same time, the private sector is coming up with solutions to the data gap. Industry-specific model OpenAI-style models:EqualyzAI, for example, is developing an industry-specific model, called AfroSLM 1.0. Because they train these models on local languages and datasets, they beat global products in translating finance-related conversations in Nigeria, proving that localised AI isn't just fairer, but commercially better [8].

5.3. Infrastructure innovations

The supply of hardware is being resolved through international collaborations to raise the needed capital and technical know-how. The NVIDIA and Cassava partnership forms the first AI factory in Africa through a cumulative investment of \$720 million and pools 12,000 high-performance GPUs across the continent as a distributed computing power network. The infrastructure for distributed computing power will be an "intelligent bridge between youth creativity and the technology resources that are accessible around the world." Therefore, the infrastructure will bring down the barriers to start-up and research so that people will be able to use AI for the development of a whole industry, not just by a handful of large IT companies. There is also a growing focus on "Green AI"

as new data centers are being fueled by Africa's rich solar and wind resources, mitigating energy security and environmental sustainability concerns [9,10].

6. Conclusion

Africa has turned its narrative around from technology laggard to intelligent era trailblazer. This paper has shown how a number of African firms are using AI strategically (in the areas of banking, farming, and education), to attain significant efficiency gains and address longstanding structural challenges. The "leapfrog" aspect of this evolution is clear as the region skips over traditional industrial stages to take on generative AI technologies, which could generate huge economic value. The combination of a young "digital native" population and forward-leaning policies offers strong prospects for future growth.

However, this transition is not without significant hurdles. The "hardware shortcomings" of electricity and computing power, alongside a critical talent gap and the need for localised data regulation, remain persistent challenges. While international cooperation and government strategies are beginning to address these issues, the pace of infrastructure development must accelerate to match the speed of AI adoption. Future development relies not merely on importing technology, but on cultivating an indigenous AI ecosystem that respects local contexts, ensuring that the intelligent economy benefits all sectors of African society.

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