

Last Call for Africa: The AI Revolution as the Final Frontier to Escape the Vicious Circles of History

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Abstract

This study argues that the artificial intelligence revolution represents the final and most critical opportunity for Africa to overcome its historical development constraints and achieve transformative development. The study is based on an integrated theoretical framework consisting of Jared Diamond's geographical determinism, Daron Acemoglu and James A. Robinson's institutional analyses, and Yuval Noah Harari's technological evolution theses. Through this theoretical lens, it examines how AI technologies can enable African nations to bypass traditional industrialization paths through technological leapfrogging. The research methodology is based on a qualitative approach. It includes a comprehensive literature review, scanning of internet news, examination of reports published by international organizations and think tanks, and a synthesis of a quadruple case analysis covering Rwanda, Nigeria, South Africa, and Kenya, which represent the continent's different dynamics. Research findings reveal that Africa's demographic advantage, combined with increasing digital infrastructure penetration, creates a unique and temporary window of opportunity for AI-driven development in the forthcoming decades. However, realizing this potential is strictly dependent on critical factors such as building inclusive institutions, creating strategic and adaptive policy frameworks, and avoiding digital dependency traps like "data colonialism" and the formation of an "economically useless class." The study concludes that this process represents a historically unprecedented "last call" opportunity for Africa, and missing this opportunity could condemn the continent to a permanent peripheral status in the global economy.

Keywords : Africa, artificial intelligence, technological leapfrogging, digital transformation, data colonialism.

Introduction

The African continent has remained an unsolved puzzle at the center of development literature and international policies for more than half a century since the end of colonialism, yet awaiting solutions (Easterly, 2006). Despite having rich natural resources, a dynamic demographic structure, and cultural diversity, much of the continent has remained in the shadow of chronic problems such as poverty, instability, weak governance, and infrastructure deficiencies (Collier, 2008, p. 3-8). This situation has kept the question "Why do some nations prosper while others remain poor?" constantly on the agenda in Africa, which has become a laboratory for basic theories of development economics (Acemoglu & Robinson, 2012). Fundamental debates such as whether geography is destiny (Diamond, 1997), the primary role of institutions (Acemoglu et al. 2001), and the impact of cultural factors (Landes, 1998) have offered different explanations in the face in Africa's complex reality. However, none has alone

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presented a magical and effective formula that could change the continent's trajectory. This historical context points to the existence of self-reproducing vicious cycles that hinder the continent's progress. Weak institutions lead to poor economic outcomes, and poor economic outcomes lead to social conflicts and even weaker institutions (North et al., 2009).

The global historical stage is full of critical turning points where technological revolutions have rewritten the fate of societies. Today, we are experiencing a new era called the Fourth Industrial Revolution (Schwab, 2016). In this age, technological and scientific advances progress exponentially. Artificial intelligence (AI), which is at the center of this revolution, has the potential to fundamentally transform not only production processes but also forms of governance, social structures, and international hierarchies (Harari, 2016). In the midst of this technological revolution, the African continent stands at one of the most complex and simultaneously most promising crossroads in its history. For Africa, which has struggled with development challenges for centuries due to geographical misfortunes, the legacy of extractive institutions from colonialism, and its peripheral position in the global economic system (Easterly, 2006; Collier, 2008), the AI revolution will either be a final escape ramp from historical vicious cycles or a trap reinforced by new generation dependency and exploitation relations (Acemoglu & Robinson, 2012; Diamond, 1997). This study stands at the intersection of optimistic and pessimistic scenarios. It claims that the AI revolution, when managed with the right strategies, represents perhaps the last and most important opportunity historically for Africa to achieve sustainable development and take its rightful place on the global stage - a "last call." This window of opportunity emerges when combined with the continent's unique demographic dynamics and the speed of digital technology diffusion. However, the fact that this window will not remain open indefinitely increases the urgency of the thesis (Ramaite, 2024; GSMA, 2023).

Africa's AI ecosystem presents a complex picture. As of 2025, the continent's AI investments have reached \$2-3 billion, yet this amount constitutes only 1-1.5% of global AI investments (Agwaibor, 2024). Compared to the US's \$90-100 billion AI investment, Africa's situation clearly reveals the risk of the technological gap widening (Dushime, 2025). According to Statista data, the artificial intelligence market in Africa is expected to reach \$5 billion this year (Statista, 2025). However, despite this growth, the continent's share of global AI capacity is only one percent. This situation emphasizes the urgency of Africa overcoming the digital divide.

This study's analytical framework is built upon an integrated framework that draws from three fundamental intellectual traditions. First, Jared Diamond's (1997) thesis of "geographical determinism," presented in his work *Guns, Germs, and Steel* provides a starting point for understanding the basic environmental and geographical obstacles that have shaped Africa's historical development path. According to Diamond, factors such as the continent's north-south axis, the limitation of plant and animal species suitable for agriculture, and high disease burden have slowed the spread of technological and social developments (Diamond, 1997, p. 176-191). However, "placeless" technologies like AI offer the potential to radically reduce the importance of these geographical constraints and rewrite the rules of the game. Second, Daron Acemoglu and James A. Robinson's (2012, 2019) institutional economics analyses emphasize that the ultimate determinant of development is not geography but the quality of political and economic institutions that societies build. Their distinction between "inclusive" and "extractive" institutions is a powerful tool for explaining why many countries in Africa cannot escape the poverty trap despite rich natural resources (Acemoglu & Robinson, 2012). From this perspective, AI

can be a control and surveillance tool that could further strengthen existing extractive institutions, or it can be a catalyst that accelerates the construction of inclusive institutions by increasing transparency, improving public services, and reducing bureaucracy. Third, Yuval Noah Harari's (2016, 2018) arguments about technological evolution and the "dataism" belief system help us understand the existential risks and opportunities brought by the AI age. Harari presents a perspective within this framework. According to Harari, in a new age where authority passes from humans to algorithms, those who possess data and can process it will also dominate the future (Harari, 2016, p. 327-335). This situation brings new threats such as "data colonialism" and technological dependency on global technology giants to the forefront for Africa, while also containing tremendous potential for using local data to produce solutions to local problems. The synthesis of these three theses constitutes the basic analytical tool of this article for comprehensively understanding Africa's position in the face of the AI revolution - the declining importance of geography, the critical role of institutions, and the deterministic power of technology.

AI is not merely a tool that increases efficiency but a general-purpose technology with the potential to redefine the basic building blocks of society from production relations to governance forms, from health to education (Brynjolfsson & McAfee, 2014). Unlike previous industrial revolutions, the diffusion of AI promises new and alternative development paths built on digital infrastructure and qualified human capital by reducing absolute dependence on capital-intensive large factories, railway networks, or advanced physical infrastructure. This situation can enable the most radical and comprehensive version of the "technological leapfrogging" phenomenon for Africa. In other words, it can enable the continent to be directly integrated into an information, data, and service-based economy by skipping some costly and slow stages of the industrialization era (Travaly and Muvunyi, 2020; Swartz et al., 2023, p. 11-13). Africa's possession of the world's youngest population and the remarkable increase in mobile technology penetration over the last decade provides the two fundamental dynamics necessary for this leap - human potential and basic digital access (GSMA, 2023; Cumbi, 2025). This study argues that precisely at this critical juncture, the AI revolution represents a "last call" for Africa. This expression constitutes an analytical framework that emphasizes the temporality of opportunity and the urgency of action rather than a pessimistic prophecy.

To bring the theoretical framework together with empirical ground, the study adopts a qualitative research methodology (Creswell & Clark, 2017). This methodology is built on three pillars: comprehensive literature review, analysis of current reports and datasets, and a quadruple case study. The literature review covers fundamental academic works in the fields of development economics, African studies, technology policies, and AI ethics. Report analysis includes the most current data and sectoral analyses published by international organizations such as the World Bank, African Development Bank, United Nations, African Union, GSMA, and think tanks like McKinsey and Microsoft. The case studies that form the empirical core of this article focus on four key countries reflecting the continent's different geographical, economic, and institutional structures. Rwanda, recognized as East Africa's visionary power in technology and governance; Nigeria, West Africa's economic giant with a dynamic technology ecosystem; South Africa, the continent's most industrialized but deeply unequal economy; and Kenya, which stands out with its technology center known as "Silicon Savannah." These countries follow different paths in terms of AI adoption, policy development processes, and challenges they face. This diversity aims to provide a rich comparative ground for drawing broader lessons that can be valid across the continent.

1. Theoretical framework: Africa at the intersection of geography, institutions, and algorithms

Understanding Africa's development narrative and future trajectory requires a multidimensional approach that transcends the boundaries of a single theory. To fully grasp the complex situation the continent finds itself in and the potential offered by the artificial intelligence (AI) revolution, we need an integrated theoretical framework that brings together the long shadow of geography, the persistent impact of institutions, and the disruptive power of technology. This study aims to present such a framework by synthesizing Jared Diamond's geographical-environmental determinism (1997), Daron Acemoglu and James A. Robinson's institutional economics theory (2012; 2019), and Yuval Noah Harari's technological evolution and dataism analysis (2016; 2018). These three perspectives serve as complementary lenses that illuminate Africa's past, present, and possible futures at different scales and in a wholistic, collaborative perspective rather than individualistic. While geography determines the initial conditions of the game, institutions shape how players behave under these conditions and the rules of the game, while technology has the potential to fundamentally change the game itself.

Jared Diamond's (1997, p. 9-14) groundbreaking work "Guns, Germs, and Steel" presents a historical panorama by attributing the origins of wealth and power differences between continents to biogeographical and environmental factors. According to Diamond, Eurasia, by extending along the east-west axis, allowed the rapid spread of plants, animals, technologies, and ideas across similar climate zones. This provided the foundation for early development of agriculture, the emergence of large and settled societies, political centralization, and the accumulation of technological innovations (Diamond, 1997, p. 183-185). In contrast, Africa, due to its extension along the north-south axis, was divided by massive geographical barriers like the Sahara Desert, slowing diffusion between different climate zones. According to Diamond, Africa's equatorial climate, disease burden, and lack of agricultural diversity caused the continent to historically lag economically. Additionally, the continent faced a series of ecological disadvantages such as the relative scarcity of domesticable large mammalian animals and high-yield grain species, and the restriction of agriculture and livestock by tropical diseases like sleeping sickness spread by the tsetse fly. This led to the formation of smaller, more scattered, and technologically more slowly-progressing societies (Diamond, 1997, p. 398-401). However, the artificial intelligence (AI) revolution offers the potential to reduce the environmental constraints proposed by Diamond's geographical determinism thesis. The AI revolution creates a historical anomaly that tests and potentially transcends the validity of Diamond's thesis. AI makes geographical distances and barriers largely meaningless through infrastructures like cloud computing and satellite internet. Intercontinental fiber optic cables and increasing mobile internet penetration theoretically allow a software developer in Lagos, Nigeria, to compete in the same global digital ecosystem as a colleague in Silicon Valley (Atiase et al., 2020, p. 5-7; Arakpogun et al., 2021, p. 377). AI-powered drones used for precision agriculture can optimize crop yields even in areas with poor soil (Sang, 2025; Shaikh et al., 2022). Similarly, in healthcare, the microbe-related challenges Diamond mentioned (p. 195-200) can be overcome with AI's potential in diagnosis, drug development, and epidemic control (Microsoft, 2024, p. 10-15). AI-supported systems can facilitate early diagnosis of diseases even in remote areas with limited health infrastructure, enhance the capabilities of medical specialists, and expand access to healthcare. Particularly, AI applications accessible through mobile devices can make healthcare more inclusive by eliminating geographical barriers (Ezeaka, 2024, p. 147; African Union, 2024, p. 38). Therefore, it is possible to say that the geographical and environmental determinisms Diamond laid out are no longer

absolute destinies in the artificial intelligence age and can be largely mitigated through technological innovations. AI developments and technological advances can largely erode geographical barriers. AI can enable Africa to use its natural resources more efficiently, increase its resilience against the negative effects of climate change, and turn geographical disadvantages into advantages (Effoduh, 2024; Microsoft, 2024, p. 62; Mienye et al., 2024, p. 7).

However, the fact that technology alone cannot be a savior has been strongly demonstrated by Acemoglu and Robinson's (2012; 2019) work. According to them, the ultimate cause of a country's wealth or poverty is not geography, culture, or education level, but the nature of the economic and political institutions that country possesses. Acemoglu and Robinson divide institutions into "inclusive" and "extractive." Inclusive economic institutions are those that allow broad masses of people to participate in economic activities, secure private property rights, ensure contract enforcement, and offer equal opportunities to everyone (Acemoglu & Robinson, 2012). Such institutions encourage innovation and investment. Inclusive political institutions are pluralistic systems that spread political power to a broad base and establish checks and balances against the abuse of power. On the other hand, extractive economic institutions are designed to increase the wealth of one segment of the population at the expense of another segment, under the control of a narrow elite. Extractive political institutions concentrate power in the hands of this narrow elite and try every means to protect this power (Acemoglu & Robinson, 2012, p. 81). According to the authors, chronic poverty and instability in Africa are based on these extractive institutions that were established during the colonial period and continued by local elites after independence. In this context, AI is a double-edged sword. On one hand, extractive regimes can use AI as a "digital tyranny" tool to monitor citizens, suppress opposition, spread disinformation, and make corruption networks more efficient (African Union, 2024, p. 53). On the other hand, AI can also be a powerful ally for building inclusive institutions. For example, AI-based e-government services can make public services more transparent and accessible by reducing bureaucratic barriers and bribery. Smart contracts and blockchain technology can secure land records and property rights, while AI-supported judicial systems can reduce court workloads and speed up access to justice (Jejenywa et al., 2024, p. 760-762). Therefore, what will determine AI's ultimate impact in Africa will not be the technology itself, but the institutional framework within which it is implemented and whose interests it serves. On the other hand, while reformist leaders and civil society in the continent have the opportunity to use AI as a lever to increase inclusiveness (Afolabi and Raifu, 2025; African Union, 2024) and established autocratic structures; and leaders also have the potential to use it as a weapon to preserve the status quo (Benamara, 2025; Acemoglu & Robinson, 2019, p. 115-118).

Yuval Noah Harari's works *Sapiens: A Brief History of Humankind* (2014) and *Homo Deus: A Brief History of Tomorrow* (2016) address major transformations in human history and potential future developments from a broad perspective. *Sapiens* examines fundamental events that shaped humanity such as the cognitive revolution, agricultural revolution, and scientific revolution while emphasizing the importance of humans' ability to cooperate on a large scale through collective imagination (Harari, 2014, p. 21-27). *Homo Deus* focuses on humanity's next stage, the quest to become "Homo Deus", emphasizing goals of overcoming death, engineering happiness, and gaining divine abilities (Harari, 2016, p. 21-27). He argues that we are witnessing the rise of a new and all-encompassing ideology he calls "dataism". Dataism sees the universe as a data flow and measures the value of any entity or phenomenon by its contribution to data processing (Harari, 2016, p. 320-323). In this new "religion", the

most sacred value is the freedom of information flow, and the distinction between humans and machines becomes increasingly meaningless; both are seen as different data processing mechanisms, i.e., "algorithms" (Harari, 2018). This perspective raises two major and interconnected existential problems for Africa: data colonialism and the emergence of the "useless class." Since data is considered the new oil of the AI age (The Economist, 2017), global technology giants (Google, Meta, Amazon, Tencent, etc.) are conducting data extraction operations worldwide. Africa, with its young and rapidly digitalizing population, is a massive and not yet fully processed data mine for these companies. The concept of "data colonialism" describes the process of extracting this data from Africa with very little participation or economic benefit for Africans, processing it in centers in Silicon Valley or Shenzhen to transform it into AI algorithms, and then selling these services back to Africans (Elmi, 2020; Couldry & Mejias, 2019). This situation risks being a digital repetition of the raw material export and manufactured product import cycle from the colonial period and could push Africa into a permanent technological dependency position. The second major threat is the destruction that AI automation will create in the global labor market. AI has the potential to automate not only routine factory jobs but also high-skilled jobs such as driving, customer service, and even doctoring and lawyering. Harari (2018) predicts that the biggest economic and political problem of the 21st century could be billions of people becoming economically useless and forming the "useless class" (Harari, 2018, p. 27-31). This threat is particularly serious for Africa, where more than 60% of the population is under 25 and millions of young people enter the labor market every year (Mpemba and Munyati, 2023; Ramaite, 2024). If these young people cannot acquire the new skills required by the AI age and cannot participate meaningfully in the economy, the continent's greatest potential strength - its demographic power - could experience a process of demographic troubles that could result in mass disappointment and social explosions.

In conclusion, the synthesis of these three theoretical traditions provides a powerful and multilayered framework for analyzing Africa's position in the AI age. Looking through Diamond's lens, AI's potential to overcome geography's historical constraints becomes evident. Acemoglu and Robinson's perspective reminds us that this potential can only transform into reality when inclusive institutions are built; otherwise, it could further deepen existing inequalities. Harari's vision shows that this process involves not only economic and political but also deeper existential issues such as data sovereignty and humanity's future role. The combination of these three theories reveals that Africa's development trajectory cannot be determined by technology alone, nor solely by institutions; rather, the complex interaction of these two forces will be shaped within the continent's historical and geographical context. Therefore, the "last call" for Africa is not just about adopting a new technology, but also a call to use this technology wisely and strategically to transform its own institutions, create geographical advantages, and avoid the dystopian futures Harari envisions.

2. Methodology

This study has adopted a multiple research methodology to comprehensively evaluate the development potential of the artificial intelligence revolution in Africa. The multidimensional and evolving nature of the subject reveals that quantitative data alone would not be sufficient, and that an in-depth interpretive approach is necessary. Therefore, a synthesizing methodology that brings together multiple qualitative data collection and analysis techniques has been adopted to understand the phenomenon holistically (Creswell and Clark 2017). The methodological framework of the research is built on three main pillars:

(1) Comprehensive and systematic literature review, (2) Analysis of reports and gray literature published by international organizations, governments, and think tanks, and (3) Comparative case analysis covering four countries (Rwanda, Nigeria, South Africa, Kenya) reflecting the continent's diversity. This approach aims to combine theoretical depth with empirical evidence, so as to provide both a general panorama of AI diffusion in Africa and to reveal the specificity of local contexts.

The first stage of the research includes a systematic literature review aimed at mapping the existing academic knowledge accumulation on the subject. This review was conducted in leading academic databases such as Google Scholar, JSTOR, Scopus, and Web of Science using keywords such as "artificial intelligence," "Africa," "development economics," "technological leapfrogging," "institutional change," "digital divide," and "data colonialism." The reviewed literature covers fundamental theories of development economics (e.g., Acemoglu & Robinson, 2012; Diamond, 1997), sociology of technology and society (e.g., Schwab, 2016; Harari, 2016), and specific studies on technology policies in Africa (e.g., Mdladla et al., 2024; Mienye et al., 2024). This process not only formed the theoretical framework of the study (Diamond, Acemoglu & Robinson, Harari synthesis) but also played a critical role in identifying gaps in existing research and determining the original contribution this article would make to the literature. The literature review revealed that AI's impacts in Africa are usually addressed either from an overly optimistic technology-deterministic perspective or from a pessimistic critical theory perspective, but there is a lack of studies that combine these two extremes and bring theory together with concrete policy recommendations.

The second methodological pillar is the analysis of primary source studies that have not gone through the peer review process of academic journals but provide extremely current and valuable data. In this scope, reports published by international organizations such as the World Bank, United Nations Development Programme (UNDP), African Development Bank (AfDB), International Monetary Fund (IMF), GSMA (Groupe Spéciale Mobile Association), and OECD were examined. These reports provide the most current quantitative data and comparative analyses on subjects such as mobile internet penetration rates, digital literacy levels, AI investment trends, and national AI strategies in the continent (GSMA, 2023; World Bank, 2022). Additionally, internet news and publications from think tanks related to the subject were also examined. These documents and the information gathered as an indispensable resource for understanding the real situation in the field and the practical challenges faced by policymakers, complementing the theoretical nature of academic literature. To ensure the reliability and consistency of data, the data obtained from different sources were cross-checked, and these sources were transparently cited in analyses.

The third and most important pillar forming the empirical foundation of the research is the comparative case analysis method. This method was chosen to show how AI's abstract potential is concretized in specific national contexts. As Yin (2018) notes, case analysis allows for in-depth examination of a phenomenon within its real-life context while seeking answers to "how" and "why" questions. The four countries selected for this study - Rwanda, Nigeria, South Africa, and Kenya - form a strategic sample representing the political, economic, and technological diversity of the African continent. The basic rationale in this selection is based on the principle of "maximum variation." Rwanda, with its small, centralized, and reform-oriented state structure, represents the "visionary state" model that takes the most conscious and strategic steps in using AI as a tool for national development (Republic of Rwanda

Ministry of ICT and Innovation, 2019). Nigeria, with its massive population, dynamic entrepreneurship culture, and chaotic but equally innovative "Fintech" ecosystem, is an example of how AI can spread with bottom-up force (Agunbiade, 2019). South Africa, despite having the continent's most developed industrial infrastructure, strong universities, and research capacity, struggles with deep structural inequalities and unemployment problems, presenting the "dual economy" model where the "disruptive impact" that AI will bring can be most clearly seen (World Bank, 2022). Finally, Kenya, with its technology center known as "Silicon Savannah" ecosystem and mobile money revolution (M-Pesa) experience, is an "innovation center" case that contains important lessons on how technological leapfrogging can be achieved (Microsoft, 2024, p. 4; Ramaite, 2024). This multilayered methodological approach aims to ensure both the theoretical rigor and empirical validity of the study, supporting the "Africa's Last Call" thesis with strong and convincing evidence.

3. Findings and discussion: Africa's Artificial Intelligence pathways through four countries

Africa's trial with artificial intelligence (AI) emerges as a mosaic of numerous different trajectories shaped within their own historical, institutional, and economic contexts rather than a single monolithic narrative. In this section, the AI adoption processes, challenges faced, and emerging opportunities will be examined in depth through the four key countries mentioned in the methodology section - Rwanda, Nigeria, South Africa, and Kenya. These case analyses reveal the concrete manifestations of the complex interaction between geography, institutions, and technology that form the study's theoretical framework. The analysis shows that AI is not just a technology transfer but also requires deep institutional adaptation, strategic policy design, and social transformation processes (Mienye et al., 2024, pp. 11-12).

3.1. Rwanda: visionary state and top-down Artificial Intelligence Revolution

Rwanda's progress from rising from the ashes of the 1994 Tutsi genocide to becoming one of Africa's most ambitious technology and innovation centers today is often referred to as an "African miracle" (World Bank, 2019; Bizoza, 2022, p. 104). This approach, supported by long-term plans like "Vision 2050" under President Paul Kagame's leadership (Rwanda Ministry of ICT & Innovation, 2020), follows a proactive strategy that places AI at the center of national development. The National Artificial Intelligence Policy published in 2023 (Access Partnership, 2023) and digital public service platforms like Irembo are concrete indicators of the government's determination. Although political pluralism is limited in the country politically, the state has focused on laying the foundations of inclusive economic institutions in areas such as fighting corruption, ease of doing business, and digitalization of public services (World Bank, 2019, pp. 14-16). The AI revolution is seen by the Rwandan government as the next stage of this vision. The country has become one of the first countries in Sub-Saharan Africa to publish a comprehensive National Artificial Intelligence Policy (Republic of Rwanda Ministry of ICT and Innovation, 2019). This policy document not only sets technological goals but also provides a concrete roadmap for how AI will transform key sectors such as economy, health, agriculture, and education. The main pillars of the policy include: (1) developing human capital in the AI field, (2) strengthening data infrastructure and access, and (3) creating a regulatory framework to support the AI ecosystem (Republic of Rwanda Ministry of ICT and Innovation, 2019). This strategic determination

points to the importance of inclusive institutions emphasized by Daron Acemoglu and James A. Robinson (2012, p. 370-375); the Rwandan government has taken important steps in building inclusive institutions and encouraging technological development adopting a centralized but forward-looking approach.

Concrete examples of Rwanda's approach are already visible. In healthcare, through collaboration with global health organization Zipline, blood and medical supplies are transported to remote health centers with AI-powered autonomous drones (UNDP, 2024). This application directly overcomes the logistical barriers created by the mountainous geography and inadequate road infrastructure that Diamond (1997) pointed to, saving lives in emergencies (Microsoft, 2024, p. 57; Mureithi, 2022). In the agricultural sector, mobile applications using AI-based image recognition technologies help farmers instantly diagnose diseases and pests that damage their crops, increasing the productivity of small-scale farmers (Gikunda, 2024, p. 1; ITU, 2020). However, there are important question marks about the sustainability and scalability of the Rwanda model. To what extent can this top-down, state-led revolution encourage private sector innovation and bottom-up entrepreneurship (Republic of Rwanda Ministry of ICT and Innovation, 2019)? In line with Harari's (2018) warnings, the intensive use of AI by the state, especially in a context where political freedoms are limited, carries the risk of turning into a surveillance and control tool. Although Rwanda has data protection and privacy laws, the transparency of implementation and the strength of independent audit mechanisms will be critical in eliminating these risks. Rwanda's experience shows how important political will and strategic vision are in using AI as a lever for development despite geographical and structural disadvantages. However, how this centralized model will affect creativity and democratic participation in the long term is an issue that should be carefully monitored.

3.2. Nigeria: organized chaos, fintech revolution, and bottom-up innovation

With its population of approximately 220 million and the title of Africa's largest economy, Nigeria presents a completely opposite picture to Rwanda. Nigeria, struggling with chronic problems such as weak institutional structures, widespread corruption infrastructure deficiencies, and political instability, can be seen as a typical example of Acemoglu and Robinson's (2012, pp. 372-376) "extractive institutions" trap. The state is generally perceived as an obstacle rather than playing a leading role in development. However, this "organized chaos" environment has also created an unexpected ground for innovation and creativity for the country's greatest asset - its young, dynamic, and entrepreneurial population. In areas where the state falls short, the private sector and civil society fill the gaps with technology-focused solutions. The area where this dynamism is most evident is the financial technologies sector, i.e., "Fintech", where AI is also used intensively (Arakpogun et al., 2021, p. 380). The inadequacy of banking services in the country and the fact that a large portion of the population remains outside the formal financial system has led to the birth of Nigerian Fintech giants like Interswitch, Flutterwave, and Paystack (Mutiosa, 2024; Oxford Business Group, 2022; Ezinwa and Bello, 2025). These companies use AI and machine learning algorithms to provide credit to millions of people and small businesses that traditional banks cannot reach (One Safe, 2024). AI-based credit scoring models can evaluate credit risk by analyzing alternative data sets such as mobile money movements, bill payment habits, and even social media data instead of an individual's formal credit history (Microsoft, 2024, p. 4). This situation has the potential to create a revolution in increasing

financial inclusion. AI is also utilized in the education sector; online learning platforms and AI-based tutors played an important role in ensuring the continuity of education, especially during the pandemic period (UNDP, 2024; Tangmoh and Nyugha, 2024). Additionally, in Nigeria, AI is used to improve access to healthcare; AI-supported diagnostic tools and telemedicine applications aim to reach rural areas where specialist doctors are limited (African Union, 2021; Ezeaka, 2024, pp. 145-147; Sang, 2025; Microsoft, 2024, p. 57).

Nigeria's AI ecosystem is not limited to Fintech and education. Technology centers like "Yabacon Valley" in Lagos host hundreds of start-ups operating in various fields such as health (health diagnostic platforms), e-commerce (personalized recommendation engines), and entertainment (content distribution algorithms) (Onyemachi, 2023; Dan-Awoh, 2024). However, there are some serious obstacles at this juncture. First, basic infrastructure deficiencies such as reliable electricity and internet are a serious source of cost and inefficiency for digital businesses. Second, Harari's warning (2018) about "data colonialism" is particularly relevant for Nigeria. While global technology platforms collect large amounts of data from Nigeria's massive market, it is unclear how much of the value created by this data remains within the country. Although the country implemented the Nigeria Data Protection Regulation (NDPR) in 2019, the effectiveness of implementing this regulation and its bargaining power against technology giants is limited (Agunbiade, 2019). Third, there is a deep gap between the high-skilled human capital required by AI and the country's education system. Nigeria's experience shows how pure entrepreneurial energy and market size can ignite an AI ecosystem even without a strong state vision (Benamara, 2025). However, for this organic growth to be sustainable and for its benefits to spread to society in general, it is important for the state to assume at least a "facilitating" role that provides basic infrastructure, offers a predictable regulatory framework, and invests in human capital.

3.3. South Africa: dual economy, structural inequalities, and the automation dilemma

South Africa starts the AI race with clear advantages as the continent's most developed and industrialized economy. The country has Africa's best universities, most competent research centers (for example, CAIR - Centre for Artificial Intelligence Research), and most developed digital infrastructure (Ferrein & Meyer, 2012). It is no coincidence that it hosts the most AI-focused startups across the continent and that global giants like IBM and Google have opened their first AI laboratories in Africa here (Arakpogun et al., 2021, p. 376). The government has revealed its intention to strengthen its leadership in this field by launching the National Artificial Intelligence Framework in 2024 and investing in AI research even in the military field (DAIRU - Defence Artificial Intelligence Research Unit) (Bennett, 2025; Ajibade, 2024). AI applications are rapidly spreading in various sectors such as health, finance, mining, and retail. For example, in the health sector, AI is used to support diagnosis and treatment in regions with low doctor-patient ratios, while in the finance sector, banks heavily utilize AI for fraud detection and customer services (Mdladla et al., 2024, p. 12; Hassan, 2024). This situation shows that South Africa is the most technologically and institutionally prepared African country for the AI revolution. However, behind this bright picture lie the country's "dual economy" structure and deep structural inequalities that are the legacy of the apartheid regime (Azaroual, 2024). On one side, there is a modern and technology-intensive economy integrated with the global economy; on the other side, there is a second economy characterized by poverty and inequality of opportunity, where millions of

people work in low-skilled jobs or are unemployed (Mdladla et al., 2024, p. 16).

This dual structure makes AI's impact in South Africa extremely complex and potentially dangerous. Harari's (2018) prophecy of the "useless class" is not an abstract threat but a concrete possibility for South Africa, which has one of the world's highest unemployment rates and widespread despair especially among young people (Statistics South Africa, 2024). While the productivity increases brought by AI and automation can enhance the country's global competitiveness, they also risk massively eliminating existing low and medium-skilled jobs in mining, manufacturing, and service sectors (Mienye et al., 2024; African Union, 2020). This situation could further strain the already fragile social fabric and bring existing inequalities to the breaking point. Acemoglu and Robinson's (2012) institutional analysis suggests that the root of this problem lies in the fact that political institutions, despite achieving political inclusion in the post-apartheid period, have not been equally successful in achieving economic inclusion. Chronic inadequacies in the education system cause a large majority of the population to be deprived of the skills required by the digital economy (OECD, 2024, p. 91). The South African government is aware of this danger and is trying to develop a strategy with initiatives like the "Fourth Industrial Revolution Presidential Commission" (Chilamphuma, 2025; Arakpogun et al. 2021, p. 377).

It is also necessary to mention the positive aspects of AI for South Africa. In South Africa, AI is used in screening and monitoring diseases such as tuberculosis and HIV (Mienye et al. 2024). AI-based chatbots can answer patients' basic health questions, provide medication reminders, and facilitate appointment systems (Tangmoh and Nyugha, 2024). Additionally, AI can be used to predict the spread patterns of epidemic diseases, accelerate drug development processes, and optimize the allocation of health resources. However, to ensure that AI's benefits are distributed fairly and do not lead to social catastrophe, the technology adoption process must be carried out together with very comprehensive socio-economic policies such as radical reforms in education, active labor market policies, and strengthening social protection systems.

3.4. Kenya: Silicon Savannah, mobile money revolution, and leapfrogging potential

Kenya is one of the most symbolic examples of how the concept of technological leapfrogging can turn into reality in the African context. The country created a revolution by directly transitioning to mobile technologies in an environment where fixed-line telecommunications infrastructure was weak, and through the mobile money transfer system, M-Pesa, launched by Safaricom in 2007, incorporating millions of people into the financial system (Jack & Suri, 2014, p. 183-187). This experience strengthened faith in technology-based innovation in Kenya and transformed Nairobi into East Africa's most vibrant technology center, known as "Silicon Savannah" (Diallo et al. 2025, p. 8). The country has focused on mobile-based AI solutions, especially in fields such as agriculture (agritech) and finance (fintech). While micro-insurance firms like Pula protect millions of small farmers against climate risks using AI and satellite data (Scala, 2025), M-KOPA provides access to assets like smartphones and solar energy for masses who previously could not access the banking system through AI-supported credit scoring (Microsoft, 2024, p. 58). These initiatives present inspiring examples of how AI can be used in a grassroots, inclusive, and locally-focused manner. The government has also established an AI task force in 2018 to support this process and positioned AI as a strategic tool in priority sectors (agriculture,

health) on the basis of 2022-2032 National Digital Master Plan (Diallo et al., 2025, p. 8). This ecosystem has become a center of attraction for both local entrepreneurs and global technology giants like Google, Microsoft, and IBM (Microsoft, 2024). The government has supported this organic growth with initiatives like the Blockchain and Artificial Intelligence Task Force established in 2019, setting out the goal of making Kenya a "digitally-driven economy" (African Union, 2020; OECD, 2024).

AI applications in Kenya are concentrated on areas where the country is strong. In the agricultural sector, companies like Twiga Foods use AI-supported logistics platforms to directly connect farmers with vendors in urban markets, eliminating intermediaries and both increasing farmers' income and reducing food waste (Squatrito, 2025). In healthcare, mobile applications like Ada Health provide preliminary diagnosis to users through AI-based symptom checkers, lightening the burden on the health system (Wanjiru, 2025). In finance sector, the massive data pool created by M-Pesa has enabled companies like Tala and Branch to develop AI-based credit scoring models that provide instant micro-credits for millions of Kenyans (Motanyaduncun, 2023). Kenya's success is based on the combination of three factors: (1) widespread mobile penetration and digital literacy, (2) regulatory institutions (especially the Central Bank) taking a flexible attitude that allows innovation, and (3) a strong entrepreneurship culture. However, Kenya also faces serious challenges. Data privacy and security concerns are increasing, especially due to aggressive data collection and debt collection methods of mobile credit platforms (Mbiti and Weil, 2015; Van Hove and Dubus, 2019). The mismatch between the high-skilled jobs created by AI and the skills of the general workforce is also a source of concern for Kenya, though not to the same extent as that in South Africa (Arakpogun et al. 2021). Additionally, the extent to which innovations and success stories in Silicon Savannah spread to the country's rural and poor sections and create inclusive development is debatable (Gikunda, K. 2024; ISS African Futures, 2025). Kenya's experience reveals that technological leapfrogging is possible, but for this leap to be sustainable and inclusive, it is essential to support the innovation ecosystem through strong legal and ethical frameworks and policies that ensure benefits spread to society in general (African Union, 2020; Arakpogun et al. 2021; Benamara, 2025).

4. Discussion: Is Artificial Intelligence Africa's great transformer?

Africa's historical development journey has been characterized by obstacles such as geographical disadvantages, extractive institutions, and marginalization in global power balances. However, the emerging artificial intelligence (AI) revolution offers the continent the potential to "leapfrog" traditional development stages and enter a unique growth trajectory. This discussion addresses AI's transformative role in Africa and the challenges faced by combining Jared Diamond's geographical determinism, Daron Acemoglu and James A. Robinson's institutional analysis, and Yuval Noah Harari's theses on technological evolution and humanity with the case studies presented in earlier sections.

The leapfrogging argument is based on the idea that underdeveloped countries can follow a faster development path by directly adopting the latest technologies, skipping the typical stages of industrial revolution (Perez and Soete, 1988). Rosenberg (2013) expresses this process through combined development through a Marxist system reading. The widespread adoption of mobile phone and mobile banking (like M-Pesa) systems in Africa, largely bypassing traditional fixed-line telephone and branch-based banking infrastructure, is one of the most concrete examples of this leapfrogging potential (GSMA, 2023). Artificial intelligence has the capacity to take this leapfrogging model to the next level

(Mienye et al., 2024, p. 3). In a context where digital infrastructure is limited but mobile impact is high, AI-based mobile applications can fundamentally change access to basic services within the realms of health, education, agriculture and finance (African Union, 2020, p.55). For example, the use of drone technology and AI in medical supply delivery in Rwanda demonstrates how geographical barriers imposed by Diamond (1997) can be overcome through technological innovation. Similarly, fintech innovations in Kenya and Nigeria have incorporated a broad population segment into the financial system by bypassing the traditional banking system (Copper Digital, 2024). This is an indicator of AI's potential to provide not only efficiency increases but also inclusiveness and accessibility (Mignamissi and Dijijo, 2021).

However, the success of AI-supported leapfrogging requires more than just technology adaptation. As advocated by Acemoglu and Robinson (2012), the existence and quality of inclusive institutions are of critical importance. Case studies clearly reveal the importance of these institutions. Rwanda's success in AI-focused development strategies is directly related to strong political will and a transparent governance structure that fights corruption. In contrast, although countries like Nigeria have a strong entrepreneurship ecosystem and fintech innovations, institutional weaknesses (corruption and regulatory uncertainties) can prevent AI from fully realizing its potential. If AI technologies are concentrated in the hands of unaccountable or extractive institutions, this technology can become a tool that deepens existing power imbalances rather than increasing social welfare (Acemoglu & Robinson, 2019, pp. 5-10). This can bring the risk of restricting individual freedom or algorithmic discrimination, especially considering big data collection and analysis capabilities (Mienye et al. 2024). Therefore, for AI to be adopted inclusively, it is essential to establish solid legal and ethical frameworks, protect data sovereignty, and implement governance reforms (Arakpogun et al. 2021). Although structural and political obstacles do not make this very possible, demographic factors (new generations growing up with the internet and better able to perceive global developments) and international institutions (African Union's particular attention to this issue) are important sources of hope in this framework.

AI's automation potential can bring the risk of large-scale unemployment, especially in economies based on unskilled or low-skilled labor (Harari, 2018, pp. 28-31). Given Africa's young and rapidly growing population, this risk is particularly worrying for the continent. As seen in the South Africa example, while investments in AI research are important, the impact of increasing automation on existing high unemployment rates must be carefully managed (Ramaite, 2024; African Union, 2020). To mitigate this threat, urgent and comprehensive investments must be made to equip education systems with skills such as digital literacy, critical thinking, and problem-solving required by the AI age (Gatera, 2025). Otherwise, AI will risk creating a large "useless class" by deepening inequalities in the continent as Harari predicted. Therefore, the "demographic power" presented as Africa's greatest strength during this period is essentially like a two-sided coin. In a way, AI's relationship with demographic policies is also quite strong. This issue also emerges as another study topic.

The issue of data sovereignty is also a critical component of the AI-supported leapfrogging argument. As Harari (2016, pp. 70-73) stated, "whoever owns data owns the future." The collection of large amounts of data from Africa by global technology giants can cause the continent to face the threat of digital colonialism. If African countries cannot control their own data and cannot process and evaluate this data in line with their own development goals, they will not be able to fully benefit from the

potential benefits offered by AI and will remain in a dependent position in the global data hierarchy (Coleman, 2018). Therefore, national data strategies, data protection laws, and supporting local AI innovation ecosystems are vital to securing the continent's digital independence (Salami, 2024, p. 9-10). In conclusion, artificial intelligence offers a unique opportunity for Africa to leapfrog to a sustainable and inclusive welfare model by overcoming historical development barriers. This "last call" requires not only technological adaptation but also strong and inclusive institutional reforms, ethical data governance, and strategic investments in human capital. Although the leapfrogging argument is attractive, it should not be forgotten that AI can have complex social, economic, and ethical consequences in the African context. To maximize the positive potential of this technology and minimize its negative risks, it is essential for African countries to develop proactive, collaborative, and forward-looking policies. Otherwise, this "last call" will be missed and the continent may be condemned to a permanent peripheral position with the new inequalities to be brought by the digital age.

Conclusion: historical window of opportunity and inevitable policy choices

This study has argued that the artificial intelligence (AI) revolution is not merely a technological innovation wave for the African continent, but a turning point that has the potential to fundamentally change the historical development path carrying unprecedented opportunities and equally serious risks. We are today at the threshold of this turning point and witnessing it. The study conducted through a theoretical lens that synthesizes Jared Diamond's geographical determinism, Daron Acemoglu and James Robinson's institutional analysis, and Yuval Noah Harari's technological evolution paradigms has shown that AI can be a powerful tool for overcoming Africa's historical disadvantages (geographical barriers and weak infrastructure), but that realizing this potential inevitably depends on the quality of institutions and strategic policy decisions to be taken. Case studies regarding Rwanda, Nigeria, South Africa, and Kenya have revealed that this process is not shaped through a single model across the continent, but through different paths that each country follows within its own unique conditions. At the point reached, the main thesis of the article, the "last call" argument, lies at the intersection of two fundamental elements. On one hand, there is a time-limited demographic and technological window of opportunity created by the continent's young population and increasing digitalization speed, while, on the other hand, there is the risk of new generation dependency relations and deepening social crises that will emerge if this opportunity is missed or mismanaged.

AI is already providing concrete benefits in Africa. From life-saving medical drones in Rwanda to AI-based credit systems that increase financial inclusion in Nigeria; from logistics platforms that optimize agricultural productivity in Kenya to automation solutions that improve industrial processes in South Africa, AI's transformative power is no longer a theoretical possibility. These applications are concrete evidence of how AI can be a catalyst for "technological leapfrogging." The continent has the potential to transition directly to a data-based, service-oriented digital economy by skipping the heavy and costly stages of the traditional industrialization model. However, this potential is not a self-fulfilling prophecy. The most important conclusion revealed by the study is that technology is not neutral and its effects are determined by the institutional framework within which it operates. As Acemoglu and Robinson (2012; 2019) emphasize, in an environment where extractive institutions dominate, AI can become a tool that strengthens the power of elites, increases surveillance, and deepens inequalities. As seen in the South Africa example, technological progress, when not supported by inclusive social

policies, can lead to mass unemployment and social instability. Therefore, the most urgent and fundamental task for African countries is to build or strengthen inclusive institutions that secure transparency, accountability, rule of law, and property rights in parallel with the AI revolution.

In addition to this institutional transformation, African policymakers need to proactively confront the existential threats that Harari points to. "Data colonialism" is at the forefront of these threats. Passively accepting a model where Africa's most valuable 21st-century raw material, data, is processed by global technology giants and sold back to the continent as services would mean the erosion of economic and political sovereignty through digital means. To avoid falling into this trap, it is vital for African countries to create solid data protection laws (like Nigeria's NDPR) at both national and pan-African levels, encourage the storage and processing of data within the country, and most importantly, support a local AI ecosystem that uses local datasets to produce solutions to local problems. The second major threat, the risk of the "useless class," requires a radical revolution in education systems. Instead of current rote-based education models, rapid adoption of new curricula that center 21st-century skills such as critical thinking, problem-solving, creativity, and digital literacy is mandatory. The only way to prevent the demographic dividend from turning into a demographic bomb is to equip millions of African youth to work together with AI and fill the new job areas will create.

In conclusion, the path ahead for Africa is not an easy one, and success is not guaranteed. The continent faces a masive and urgent task: establishing sovereignty over its own data and avoiding digital colonialism on one hand while fundamentally reforming education systems and creating new job areas to prepare its population against the employment crisis that automation will create on the other. This is a historical crossroads. If African countries act individually and collectively bearing strategic vision, bold policies, and the will to build inclusive institutions, they can take advantage of the AI revolution as a "last call" to break historical vicious cycles and build a sustainable and prosperous future. However, inaction, weak governance, and lack of strategic vision will lead to missing this historical opportunity and the continent becoming a permanent periphery of the global economy, chained by new generation algorithmic dependencies. How history will progress depends on how Africans will be responding to this call.

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