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Double-edged sword : Navigating AI Opportunities and the Risk of Digital Colonization in Africa

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ABSTRACT

The recent evolution of AI technologies has ushered in digital transformative potentials across various sectors around the globe; Africa is making steps towards a faster uptake of Artificial Intelligence (AI). AI stands at the forefront of solving critical issues in Africa, from farming to the health sector. However, this wave of technological innovation has also raised concerns about digital colonization, particularly in low-resource settings such as Africa, where the digital divide and external control over digital resources can exacerbate existing inequalities. This paper aims to dissect the multifaceted relationship between AI development and digital colonization in Africa, highlighting the emerging strategic challenges and opportunities. We highlight the dual nature of AI as both a beacon of opportunity and a harbinger of risk, particularly the threat of digital colonization—a phenomenon where the control and benefits of AI technologies are disproportionately held by foreign entities, potentially exacerbating existing inequalities and fostering new dependencies. There's a need to decolonize African AI by addressing power dynamics and data colonialism within technology development.

Keywords

Artificial intelligence, Digital colonization, Africa, Low-resource, AI, AI Opportunities

INTRODUCTION

The rapid stride of advanced AI technologies, including GPT-4, ChatGPT, deepfakes, and voice cloning, is set to transform numerous sectors such as business, healthcare, agriculture, and education. These AI tools offer promising avenues for contributing to achieving Sustainable Development Goals (SDGs) in Africa. The integration of AI in these fields demonstrates the potential for technological innovations to drive significant improvements in societal outcomes on the African continent (Taddeo & Floridi, 2018; Vinuesa et al., 2020). However, the deployment of these technologies also presents considerable challenges, particularly in the context of content moderation, where the requirement for human labor is needed to detect toxic content, highlighting the need for AI literacy and robust regulatory frameworks to ensure their responsible use, especially in regions with limited resources (Vinuesa et al., 2020).

The concept of digital colonization becomes a critical concern in this context. The predominance of foreign entities in developing and controlling AI technologies poses a risk of perpetuating existing global inequalities and dependencies, underscoring the importance of fostering local expertise and governance capabilities in AI (Taddeo & Floridi, 2018). OpenAI, as a forefront entity in AI development, has shown the transformative potential of AI systems like ChatGPT in addressing critical challenges within the African continent. Their initiatives highlight the beneficial impacts of AI but also signal the necessity for careful consideration of the socio-economic and political dynamics that accompany the adoption of these technologies in Africa (Ouyang et al., 2022).

Moreover, implementing AI in Africa is fraught with obstacles, including the potential for a new dependency on foreign corporations and governments that control these technologies. This concern is amplified by issues such as data collection and privacy, the lack of AI literacy among the broader population, and the absence of comprehensive regulatory frameworks to effectively manage the application and utilization of AI technologies. The phenomenon of digital colonialism, characterized

by the exploitation of user data by Western tech companies and the control over crucial infrastructure and connectivity, further exacerbates these challenges. The absence of stringent data protection laws to protect African citizens' interests allows for the unregulated extraction and use of their data, contributing to profit and influence for foreign entities (Taylor & Broeders, 2015).

The rest of this paper is structured as follows: The first section examines the potential of AI to drive social economic growth, spur innovation, and improve public services. Following this, we delve into the risks of digital colonization and the implications of foreign control over AI technologies in Africa. The subsequent section proposes strategies and policies to navigate these challenges effectively, emphasizing the development of local AI capacities, regulatory frameworks, and international cooperation. This paper aims to contribute to the ongoing discourse on AI in Africa, providing insights and recommendations to stakeholders at all levels—policy-makers, entrepreneurs, and civil society—on leveraging AI for sustainable development. Our research, therefore, intends to answer these questions:

1. How can Africa leverage AI technologies to foster socio-economic development, spur innovation, and improve public services?
2. What risks does AI adoption pose regarding digital colonization in Africa?
3. What strategies and policies are essential to balance AI opportunities and digital colonization risks in Africa?

BACKGROUND

The legacy of colonialism in Africa has profoundly impacted its socio-political and economic development. Historical analyses indicate that the establishment of colonial rule fundamentally altered the economic trajectories of African nations, often instigating economic models that prioritized extraction and exportation to benefit the colonizing powers at the expense of local development. This colonial economic structure has contributed to enduring inequalities and economic challenges post-independence (Heldring & Robinson, 2012).

AI has ushered in a new era of technological innovation with profound global impacts, transforming industries, economies, and societies (Smith et al., 2014). AI technologies, ranging from machine learning algorithms to advanced robotics, are redefining the boundaries of what is possible, offering solutions to some of the world's most pressing challenges while posing new ethical and societal dilemmas (Russell & Norvig, 2016). However, the growing presence of AI in Africa has raised crucial questions about its impact on the continent. Recently, research has started to delve into the complexities and possibilities of AI, from fairness in machine learning (Rajkomar et al., 2018), bias to the challenges facing the development of AI in Africa (Anicet Kiemde & Dooguy Kora, 2020).

The significance of AI in Africa cannot be overstated. With a population projected to double by 2050, the continent stands at a crossroads where the strategic deployment of AI technologies could leapfrog traditional developmental pathways and catalyze socio-economic transformation (United Nation, 2019). However, this optimistic outlook is tempered by the risks associated with digital colonization, data privacy concerns, and the potential for widening the digital divide (Coleman, 2019). These dual aspects of AI underscore the necessity for a balanced approach to its adoption in Africa, which harnesses the benefits while mitigating the risks. Africa's journey in AI is characterized by its potential to leapfrog infrastructure challenges and catalyze economic and social inclusion. Leaders and entrepreneurs across Africa are exploring innovative AI applications tailored to address the continent's unique challenges (Gikunda, 2023)

GENERAL APPROACH AND METHODOLOGY

Our research methodology is characterized by a comprehensive and systematic examination of Africa's technology and AI policy landscape. To achieve a holistic understanding, we extensively reviewed scholarly articles from Google Scholar, policy documents, and reports from reputable databases such as the United Nations (UN), African Union Development Agency (AUDA NEPAD), African Center for Economic Transformation (ACET). This rigorous literature review aimed to map out the strategic initiatives underway across the continent, assess the current state of AI development, and forecast future trends and directions in AI policy and implementation in Africa. Central to our methodological approach was the innovative use of large language models (LLMs), mainly focusing on the capabilities of ChatGPT. ChatGPT's advanced natural language processing (NLP) abilities were instrumental in extracting rich insights and synthesizing complex information from vast textual data.

African Union Development Agency

The African Union Development Agency (AUDA-NEPAD) is a strategic framework for pan-African socio-economic development. It is led by African leaders to address the continent's critical challenges, such as poverty, development, and international marginalization. It provides unique opportunities for African countries to control their development agendas fully, work more closely together, and cooperate more effectively with international partners NEPAD (New Partnership for Africa's Development). The agency plays a crucial role in incubating innovative programs across various fields, such as technology, research and development, and data analytics. It aims to create a supportive environment for achieving the goals and priorities of Agenda 2063, recently they launched white paper on AI roadmap (AUDA-NEPAD, 2023) . The roadmap focused on six (6) pillars; Education skills and works, data infrastructure and needs, policy regulations and IP's, economic investments, partnership ecosystem and building monitoring and evaluations (AUDA-NEPAD, 2023).

The role of the United Nations in Setting International AI Rules

The UN's AI advisory board's "Governing AI for Humanity" interim report, released in December 2023, underscores the pressing need for global AI governance frameworks due to recent AI advancement. The report underscores the importance of governance to mitigate AI risks and maximize its inclusive benefits, advocating for AI use that aligns with the UN's principle of leaving no one behind. Previous AI regulation discussions were limited to the Global North, highlighting a lack of inclusivity and diversity. This interim report marks a shift towards inclusive AI governance, integrating stakeholders from both the Global South and North, across the private sector, public entities, and academia. It proposes enhancing global AI governance through seven key functions, including risk monitoring and fostering international collaboration on data and resources to achieve the SDGs. The report also emphasizes the need for increased accountability and equal representation for all countries. The report positions the UN as a leader in guiding AI development towards equitable, inclusive, and human-centric outcomes, aiming to leverage AI's potential responsibly and equitably (United Nation, 2023)

The African Center for Economic Transformation (ACET)

As pan-African economic policy organization supporting Africa's long-term growth through transformation, and resilience, offering a collaboration framework for stakeholders to support development. This report. emphasizes that economic transformation is crucial for developing resilient African economies. It highlights untapped growth potential within the manufacturing sector, noted for its higher labor productivity compared to agriculture and services. Addressing job creation, a significant hurdle in Africa's economic advancement, particularly for its expanding youth population, is essential. The report advocates for a coherent industrial policy to guide labor towards boosting manufacturing efforts, steering away from the low-wage, low-productivity informal sector, to harness this potential fully. Multi-faceted strategy in economic policy-making, recognizing that true transformation requires attention to a broad spectrum of economic indicators and outcomes, not just GDP growth rates (ACET, 2022)

ANALYSIS AND DISCUSSION

Artificial Intelligence Opportunities in Africa

Economic Growth through Sectoral Innovation

AI can significantly boost Africa's economic development, enhancing agriculture through precision farming for higher yields and resource efficiency (Vinuesa et al., 2020), reducing manufacturing operational costs and improving quality (UNCTAD, 2021), and aiding in the prediction and prevention of disease outbreaks (Etori et al., 2023). These AI advancements promise job creation and improved global competitiveness for Africa, fostering broad economic growth. From a sector-specific perspective, AI is expected to drive substantial growth and value across most sectors, as shown in Figure 1 below. AI adoption in key sectors like Travel, Agriculture, Healthcare, and the Public Sector—vital to Africa's economy—promises significant benefits.

Fostering Innovation and Entrepreneurship through AI

AI Startups and innovation hubs across the Africa develop solutions tailored to local challenges and needs. Case studies of African startups, such as Zipline in Rwanda, which uses drones powered by AI for medical deliveries, Ubenwa in Nigeria, an AI-powered app for detecting infant asphyxia, Masakhane a grassroots initiative aimed at building natural language processing (NLP) technologies for African languages and Zindi connects data scientists with social challenges faced by organizations across Africa. Refer to Table 1 below.

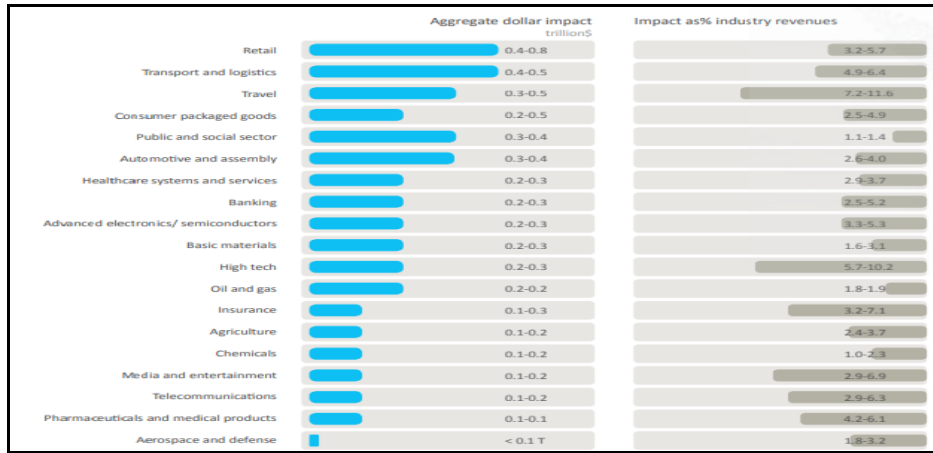


Figure 1. Potential value of AI across different sectors (Source: McKinsey & Co.)

Enhancing Public Services through AI Integration

Senegal AI Strategy, has pledged to equip 90,000 of its citizens with data science skills by the year 2028. This commitment is further evidenced by its initiative to establish a sub-regional hub for excellence in data science and AI to serve the broader West African community. Concurrently, South Africa has embarked on a pioneering pilot program within its educational framework, integrating AI and coding into the curriculum for primary or elementary school learners. Rwanda’s Seed Investment Fund, under national AI strategy (Republic of Rwanda, 2023), promote an environment enabling the government to co-invest alongside angel and venture capital investors in AI companies. Egypt AI strategy (Republic of Egypt, 2021) is geared to increase funding offered to AI start-ups, create AI start-up incubators, and incentivize companies to purchase AI products locally instead of importing. The (Republic of Mauritius, 2018) AI strategy has different innovation and commercialization schemes that provide fiscal incentives to different AI actors, including research institutions, academia, private companies, start-ups, and innovation.

THE RISK OF DIGITAL COLONIZATION

Definition and Background

Digital colonization is a form of dominance where data and digital technologies, primarily owned and controlled by entities from developed countries, are used to exert influence or control over developing countries. This concept mirrors historical colonization, where powerful countries imposed their control over other territories for economic gain. And it manifests through the control over digital infrastructures, platforms, and data, leading to imbalances in power, wealth, and knowledge. The historical context of digital colonization traces back to the early days of the internet and digital technology proliferation, where most of the infrastructure and platforms that dominate the digital landscape were developed and controlled by companies and institutions from the Global North and Africa being used as a Guinea pig to test new solutions (Coleman, 2019; Kwet, 2019).

AI and Data Sovereignty

AI systems require large datasets to learn and make decisions. When sourced from developing countries but processed and stored by companies in developed countries, this data raises concerns over data exploitation and loss of sovereignty. Foreign entities owning and controlling this data can lead to neo-colonialism, where the value generated from this data benefits those entities far more than the source communities. The concerns extend to privacy, ethical use of data, and the potential for such data to reinforce biases within AI systems, further exacerbating inequalities. Digital Colonialism in Africa involves strategically extracting and controlling user data by leveraging the continent’s resources and infrastructure, predominantly facilitated by Western tech companies and advertising firms. These entities exert significant influence by providing technology for data harvesting aimed at advertising and surveillance, thereby securing dominance and profits. Additionally,

the scenario is compounded by local entities engaging in this data monetization cycle, often unbeknownst to the citizens. A crucial element of this dominance is the control over connectivity infrastructure, coupled with a lack of robust data protection laws in many African nations, creating a fertile ground for digital exploitation. This situation allows for a disproportionate influence and market control by foreign companies, with minimal returns or protections for the local populace (Coleman, 2019; Kwet, 2019).

Dependence on Foreign AI Technology

The introduction of AI into Africa presents substantial risks, particularly the threat of digital colonization. This phenomenon refers to the domination of AI markets by foreign corporations that control the data and AI technologies. Such dominance can lead to a form of neo-colonialism, where African countries may become overly dependent on foreign technology and expertise, which poses a threat to their sovereignty and economic independence. The reliance on foreign AI technologies poses significant risks for developing countries. This dependency undermines local industries and innovation and exposes countries to vulnerabilities in national security, economic stability, and cultural integrity. Importing AI technologies often means that the algorithms and models are not tailored to the local context, potentially leading to ineffective or inappropriate solutions. Moreover, this reliance can stifle the development of local expertise and infrastructure in AI, perpetuating a cycle of dependency (Coleman, 2019; Kwet, 2019).

NAVIGATING AI LANDSCAPE IN AFRICA

Strengthening AI Literacy and Education

It is imperative to enhance AI literacy and education across Africa. Strategies to achieve this include integrating AI curricula in schools and universities, promoting science technology engineering and math's (STEM) education focusing on AI technologies, and offering online courses and workshops to widen access. Collaborations between governments, educational institutions, and private sectors can facilitate the development of tailored programs that address local needs and contexts. Public awareness campaigns about AI's potential benefits and challenges can help demystify AI technologies, encouraging broader engagement and innovation (Boateng et al., 2023).

Establishing Robust AI Policies and Regulations

For AI to positively impact Africa, there must be a concerted effort to establish comprehensive AI policies and regulations. These policies aim to protect the interests of African citizens, promote ethical AI development, and encourage innovation and growth within the AI sector. Key considerations include data protection, privacy, transparency, and accountability of AI systems. Engaging a wide range of stakeholders in the policy-making process can ensure that regulations are inclusive and reflective of societal values. Additionally, international cooperation can help harmonize standards and practices, facilitating cross-border collaboration and learning (AUDA-NEPAD APET Technology Report on Artificial Intelligence for Africa: Harnessing Artificial Intelligence for Africa's Socio-Economic, 2021).

Developing Local AI Solution

Developing local AI solutions is crucial for addressing African communities' unique challenges and needs. Local development ensures that AI applications are relevant and culturally sensitive and solve unique problems that African populations face. Encouraging local startups and innovators through funding, mentorship, and access to data can drive the creation of AI solutions in healthcare, agriculture, education, and more. Furthermore, fostering a collaborative ecosystem that includes academia, industry, and government can accelerate the development and adoption of homegrown AI technologies (United Nation, 2023). The AI industry is growing across Africa – with over 2,400 companies specializing in AI, 41% of which are startups as shown in Figure 2 below – estimates shows technology could contribute US\$1.5 billion to the continent's GDP by 2030.

DIGITAL COLONIZATION CASE STUDIES

The Hidden Human Labor in AI Development: A case Study of OpenAI and Sama

OpenAI was reported to employ Kenyan workers through Sama, a San Francisco-based outsourcing firm, to moderate content for ChatGPT, with wages reportedly less than \$2 per hour. This moderation work involved filtering out toxic content, including violence, hate speech, and sexual abuse, to train the AI to detect such content in user interactions. Despite the foundational importance of this work for enhancing the AI's safety and usability, concerns have been raised regarding the

compensation and working conditions of these workers. Reports suggest that the data labelers were paid a take-home wage from around \$1.32 to \$2 per hour, this highlights a significant ethical concern in the AI industry's (Ngozi Nwanji, 2023).

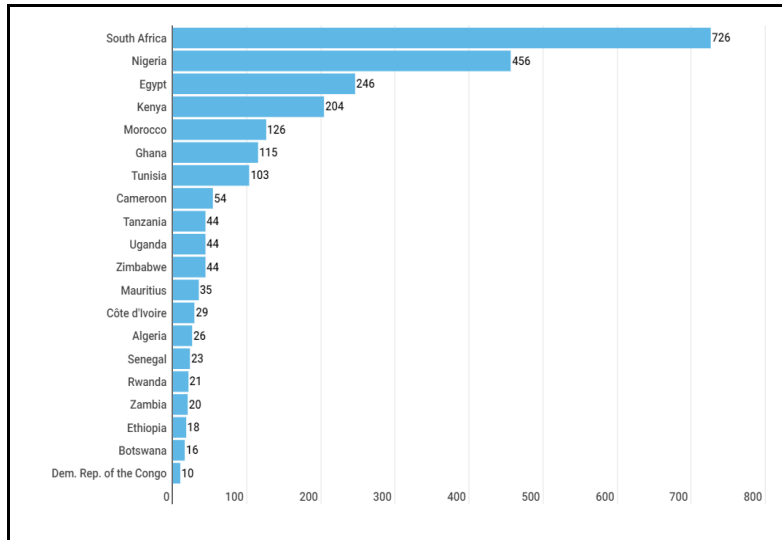


Figure 2. No. of companies specialized in AI by country (Source: Ngila, F. (2022, June 23))

No.	Company	Technology	Innovation Gap	Country	Year
1.	Gotbot	AI	customer service and business efficiency	South. A	2016
2.	Clevva	Conversational Agent	Virtual agents in IT services and Consulting	South. A	2011
3.	Zindi	ML & AI	Connecting data scientists with organizations	South. A	2018
4.	Isazi	AI & ML	Solving Business and Educational Problems	South. A	2023
5.	Lelapa AI	NLP	Chatbot, Transcription, NLP as a service	South. A	2022
6.	Intron Health	NLP & AI	Clinical Speech Recognition	Nigeria	2020
7.	AT Instruments	GPU capabilities	Anomaly detection, video streaming, analytics	Egypt	2020
8.	Coradash	virtual intelligence	real-time remote monitoring of heart health	Tunisia	2022
9.	ATLAN Space	Aeronautics	Ariel networks for marine environmental threats	Morocco	2016
10.	Yobante Express	Web & Mobile	Transportation and logistics industry	Senegal	2018
11.	Afya Intelligence	AI & ML	Data-Driven Healthcare Solutions	Tanzania	2021
12.	Yamaachi Biotech	Bioinformatics & AI	Cancer detection and cure strategies	Ghana	2020
13.	Afya Recod	AI and Blockchain	Patient-Centric Health Data Platform	Kenya	2020
14.	CLINICARGO	AI & IoT	Agriculture Technology (Soil Analysis)	Cameroon	2021
15.	Jaguza Tech	Agtech & ML	Agriculture Technology (Dairy science)	Uganda	2014

Table 1. Samples of AI Startup Companies in Africa with technology focus(<https://www.sovtech.com/top-100-ai-companies-in-africa>)

Cambridge Analytica versus African General Elections

Foreign companies provide free communication services and search engines, tracking user data to sell to advertisers and political campaigners for targeted advertising. Social networks like Facebook play a significant role in shaping public opinion and political outcomes in Africa. However, misinformation spread through these platforms has led to severe consequences,

such as tribal violence in Kenya and fear-inducing false reports in Nigeria. The involvement of Cambridge Analytica in political campaigns underscores foreign influence, exploiting emotions like fear and hate to undermine democracy and stability (Justina Crabtree, 2018).

Limitation of Data Protection Laws

The absence of uniform regulations across Africa creates inconsistency in safeguarding user data, allowing tech companies to exploit jurisdictions with weaker regulations. Limited enforcement mechanisms and resources make holding these companies accountable for data extraction and privacy breach violations challenging. Additionally, the historical disregard for data privacy laws by tech companies undermines the effectiveness of such regulations. Penalties and sanctions imposed for breaches may also be inadequate to deter exploitative practices, especially given the financial gains from data extraction. This enables them to control user data without facing competitive pressures (Kwet, 2019).

ADDRESSING AI CHALLENGES AND RECOMMENDATIONS

As shown in Figure 3; Infrastructure gaps like unreliable internet and electricity (Etori et al., 2023; Vinuesa et al., 2020), along with critical shortage of AI-trained manpower (*Egypt AI National Strategy*, n.d.) and data issues, such as bias and privacy, hinder AI access and development in Africa (Rajkomar et al., 2018). Less than ten African countries have national AI policies or strategies (Rwanda, Benin, Egypt, Morocco, Mauritius, Tunisia, Sierra Leone, and Senegal) as of January 2024. Underscoring the need for enhanced infrastructure, robust legal frameworks, local dataset and ethical guidelines. Addressing these challenges requires investments to bridge the digital divide, partnerships for educational programs, and a regulatory framework that balances innovation with privacy and security concerns (UNESCO, 2019; World Bank, 2021), alongside setting clear KPIs for AI adoption and impact..

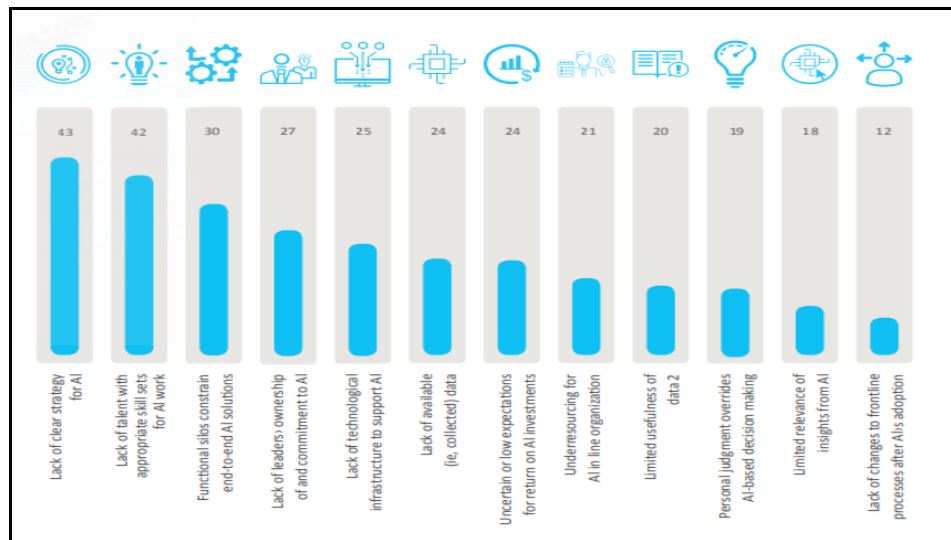


Figure 3: Most significant barriers organizations face in adopting AI (Source: McKinsey& Co.)

CONCLUSION

We examined the multifaceted role of AI in Africa, highlighting its potential to drive socio-economic development while cautioning against the risks of digital colonization. Through analysis, we've articulated the need for Africa to cultivate local AI capabilities, advocate for equitable technology governance, and foster global partnerships that respect African agencies. Going forward, it is imperative that AI deployment in Africa is approached with a strategy that not only harnesses its potential for innovation and growth but also safeguards against exploitative practices, ensuring a trajectory towards sustainable and inclusive development. This balanced approach will be crucial in leveraging AI as a cornerstone for Africa's progress in the digital age.

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