

Investigating the Nexus between AI Governance and Sustainable Development Goals in Africa

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Abstract

In recent years, the integration of Artificial Intelligence (AI) into governance has become pivotal, particularly in sustainable development contexts. The nexus between AI governance and Sustainable Development Goals (SDGs) carries significant implications, particularly for African states in tackling its intricate challenges. This study adopts a document review approach, combining a systematic literature review on AI governance and sustainable development with diverse case studies. The research highlights the disparity in the development of AI governance structures between African countries and the Global North, which has consequences for the attainment of Sustainable Development Goals (SDGs). Recommendations include establishing tailored regulatory frameworks, prioritizing capacity-building, and fostering collaboration among governments, the private sector, and civil society to ensure responsible AI deployment in African states. Additionally, the paper advocates for promoting transparency and public engagement to uphold accountable AI technologies aligned with Sustainable Development Goals.

Keywords: Artificial Intelligence, Governance, Sustainable Development Goals (SDGs), Responsible AI Deployment, Africa

INTRODUCTION

Received: 1 July 2024

Accepted: 17 September 2024

Published: 31 October 2024

The current state of AI governance reflects the perspectives and initiatives of stakeholders from developed regions, such as North America, Europe, and Asia. AI markets in Europe, North America, and China outpace Africa. Interestingly, the transformative potential of AI in Africa extends across various sectors, from education, agriculture, politics and poverty alleviation to environmental sustainability and healthcare. While foreign tech companies have initiated AI advancements, a growing ecosystem of local networks, startups, and stakeholders seeks to develop culturally sensitive AI systems. This represents a shift towards AI becoming a reality in Africa, shaping socio-cultural dimensions and fostering economic development, albeit with challenges to overcome in the nascent stages of AI deployment.

Thus, a critical gap exists in the discourse—a lack of a comprehensive and convincing narrative on AI from African countries. Despite being on the brink of digitalization, Africa remain underrepresented in discussions surrounding AI, even as AI

applications stand poised to shape the technological future in these countries. This absence is particularly concerning when considering the potential of AI to contribute significantly to the achievement of the United Nations' Sustainable Development Goals (SDGs). In areas crucial to Africa's sustainable development, such as health, agriculture, and education, AI literature predominantly emphasize the positive aspects while largely overlooking ethical concerns. Without a responsible AI that addresses these concerns and aligns with fundamental human principles, Africa risks falling behind in understanding and mitigating its ethical challenges related to AI.

Africa, a land of vibrant cultures with vast potential, stands at a crossroads. While the continent grapples with persistent challenges like poverty, hunger, and inequality, a wave of technological innovation promises to reshape its future. Artificial intelligence (AI), in particular, holds immense potential to address these challenges and propel Africa towards a more sustainable and equitable future. Despite significant strides in recent years, Africa still faces daunting obstacles in achieving the Sustainable Development Goals (SDGs) set by the United Nations. As of 2022, nearly half of the continent's population lives below the international poverty line of \$1.90 per day (World Bank, 2023). Hunger remains a persistent issue, with over 230 million Africans experiencing food insecurity (FAO, 2022). Access to quality education and healthcare remains limited, particularly in rural areas.

Amidst these challenges, AI emerges as a beacon of hope. From healthcare and education to agriculture and climate change mitigation, AI systems offer a plethora of solutions. Machine learning algorithms can diagnose diseases with remarkable accuracy, personalize learning experiences for each student, optimize crop yields, and predict and manage environmental risks (ITU, 2020). For instance, in Rwanda, drones equipped with AI software are being used to deliver essential medical supplies to remote areas, significantly improving healthcare access for rural communities (World Economic Forum, 2023). In Ghana, AI-powered chatbots are providing farmers with real-time weather and market information, empowering them to make informed decisions and improve their livelihoods (CGIAR, 2022). The potential of AI for Africa's development is not merely theoretical. A 2019 McKinsey Global Institute report estimated that AI could add up to \$1.2 trillion to the continent's GDP by 2030, creating millions of new jobs and boosting productivity across various sectors (McKinsey Global Institute, 2019).

However, the path towards harnessing AI's potential is not without hurdles. Unfettered AI development and deployment can exacerbate existing inequalities, perpetuate biases, and threaten individual privacy and security (UNECA, 2020). For instance, AI algorithms trained on biased data can perpetuate discrimination against marginalized groups. Thus, the lack of robust AI governance frameworks poses a significant risk for African countries particularly towards their effort of achieving SDGs. Yet, studies are scanty on the nexus between AI Governance and SDGs in African countries. This examination of the AI governance and SDGs intersection in African states should thus prioritize the inclusion of culturally sensitive narratives, enabling Africa to understand and proactively address its ethical concerns related to AI and, in turn, contribute meaningfully to the global discourse on responsible AI governance and sustainable development. The thrust of this study is to explore the relationship between AI governance and SDGs in Africa. Do African countries currently have the necessary AI governance structures in place? If not, what are the anticipated implications for these countries, specifically concerning their efforts to achieve the SDGs? This study is motivated by the urgent need to ensure that AI serves as a force for good in Africa, contributing to a more just, equitable, and sustainable future. By exploring the interplay between AI governance and the SDGs in Africa, this research aims to:

- i. Assess the presence of adequate AI governance structures in African countries;
- ii. Examine the potential implications for the achievement of Sustainable Development Goals (SDGs) in Africa in the absence of a robust AI governance structure;
- iii. Propose recommendations derived from the study's findings.

This research represents a crucial step towards harnessing the potential of AI for achieving the SDGs in Africa and ensuring that technological advancements contribute to a brighter future for all.

CONCEPTUAL REVIEW

Artificial Intelligence (AI)

AI traces its origins back to 1950 when Alan Turing introduced a test to assess a machine's ability to exhibit human-like intelligence, providing a glimpse into the potential of computational processing advancements. Subsequently, John McCarthy and his team coined the term "artificial intelligence" in 1955, marking approximately seven decades of its existence. According to McCarthy et al. (1955), AI involves dissecting intelligence into manageable components that can be described or programmed, enabling the resolution of specific, well-defined problems at a pace surpassing human capabilities.

McCarthy envisioned the possibility of replicating human intelligence to such a precise extent that a machine could simulate it. Artificial Intelligence involves transferring human intelligence to machines, enabling them to perform tasks traditionally executed by humans and often with improved efficiency. The focus is on developing machines that emulate human behavior, showcasing intelligence capable of reasoning, predicting patterns, and providing explanations based on the training data. Successful implementation depends on access to large and high-quality datasets for optimal performance. AI encompasses a range of technologies and methodologies designed to enable machines to exhibit intelligent behavior. According to Russell and Norvig (2010), AI is the study of agents that receive percepts from the environment and perform actions. These agents can be anything from simple algorithms to complex robotic systems, all with the goal of mimicking human-like cognitive functions. AI systems rely on various techniques, including machine learning, natural language processing, computer vision, and expert systems. Machine learning, in particular, has gained prominence, allowing machines to learn from data and improve their performance over time (Mitchell, 1997). Neural networks, inspired by the human brain, have become a fundamental building block in machine learning algorithms (Goodfellow et al., 2016).

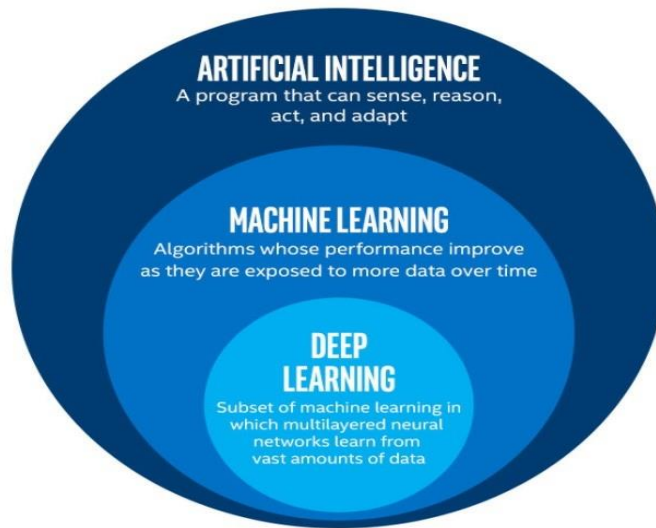


Figure 1a: Components of Artificial Intelligence

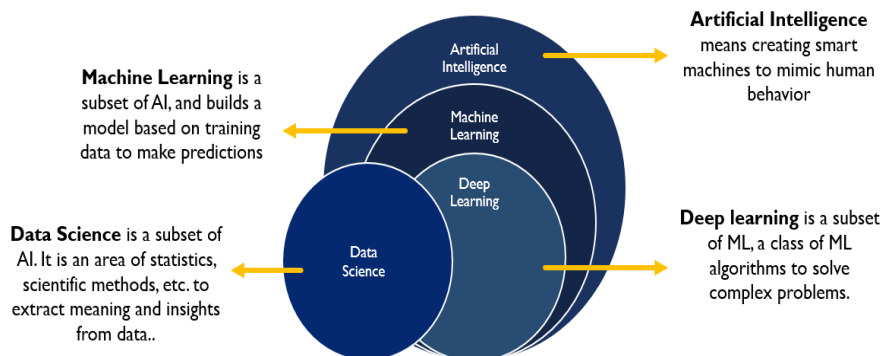


Figure 1b: Components of Artificial Intelligence

The applications of AI are vast and diverse. In healthcare, AI is used for diagnostic purposes, drug discovery, and personalized medicine (Topol, 2019). In finance, AI algorithms power fraud detection and risk management systems (García, 2016). Autonomous vehicles leverage AI for navigation and decision-making (Thrun et al., 2006). Virtual assistants like Siri and Alexa demonstrate the application of natural language processing in everyday tasks (Jurafsky & Martin, 2019). While AI holds

immense promise, it also poses challenges and ethical dilemmas. Issues such as bias in algorithms, job displacement, and concerns about privacy and security require careful consideration (Diakopoulos, 2016). Striking a balance between innovation and responsible development is crucial to harness the benefits of AI while mitigating potential risks.

The latest wave of AI innovation holds transformative potential, not only reshaping the trajectory of technological advancement by accelerating scientific breakthroughs but also creating unprecedented economic opportunities and jobs. Historical technological shifts, such as the printing press, industrial revolution, electrification, and the internet, have consistently driven social and economic changes—both positive, such as higher living standards and improved quality of life, and negative, including disruption, inequality, and insecurity.

As we stand on the cusp of the generative AI revolution, it is crucial to proactively harness the power of AI to enhance economic capabilities, especially in regions like Sub-Saharan Africa. AI is poised to play a critical role in Africa's future socio-economic growth, empowering present and future generations to inhabit a more prosperous, healthy, secure, and sustainable world. However, it is essential to approach the development and deployment of AI responsibly as part of an integrated technological and economic agenda to mitigate significant risks associated with its use. Thus, comprehending the intricacies of AI and its far-reaching consequences is imperative for navigating the complexities of the 21st century. This revolutionary technology transcends mere replication of human intelligence; it involves envisioning a new world and ensuring its advantages are inclusive. Through responsible utilization of its potential, AI emerges as a formidable catalyst for advancement, addressing our paramount challenges and molding a more promising future for everyone.

AI Governance

AI governance refers to the establishment and implementation of rules, regulations, ethical guidelines, and policies that govern the development, deployment, and use of Artificial Intelligence (AI) technologies. It is a multidimensional concept that aims to ensure responsible and ethical practices in the creation and application of AI systems. As AI becomes increasingly integrated into various aspects of society, the need for effective governance becomes paramount to address ethical concerns, potential

risks, and ensure that AI technologies align with societal values. Floridi et al. (2018) in their work on "AI4People," proposed an ethical framework for a society where AI contributes positively. They identified opportunities, risks, and provided principles and recommendations for guiding AI development responsibly. Brundage et al. (2020) focus on mechanisms for verifying claims in AI development, emphasizing the need for trustworthy AI and proposing ways to ensure system reliability. Jobin et al. (2019) conducted a comprehensive analysis of global AI ethics guidelines, offering insights into diverse perspectives on ethical considerations. Diakopoulos (2016) explores the concept of accountability in algorithmic decision-making, emphasizing the challenges and importance of holding AI systems accountable. Bietti et al. (2020) contribute to AI governance discourse by discussing opportunities, risks, and principles for creating a socially beneficial AI society, stressing the importance of stakeholder engagement.

These scholars collectively contribute to the evolving field of AI governance, providing insights, frameworks, and recommendations. Their work guides policymakers, industry leaders, and researchers in shaping responsible AI development and deployment. The dynamic discourse on AI governance reflects ongoing efforts to address ethical challenges posed by AI technologies in contemporary society.



Figure 2: 7 AI Governance Best Practices
(Source: nextgeninvent.com)

At its essence, AI governance upholds four fundamental principles: transparency, accountability, fairness, and human oversight. Transparency insists that AI algorithms and their decision-making processes be accessible for scrutiny, mitigating

the risk of "black box" operations that can fuel suspicion and mistrust (Jobin et al., 2019). Accountability fosters a sense of ownership and responsibility among developers and deployers by ensuring they take responsibility for the consequences of their AI creations. Fairness dictates that AI algorithms must avoid biases and discriminations, treating individuals with equal respect and opportunity, irrespective of their background or circumstances (UNESCO, 2023). Lastly, human oversight serves as a safeguard against unforeseen consequences and maintains ultimate control over AI systems, preventing autonomous algorithms from dictating our future.

Implementing AI principles is not just theoretical; it is a global imperative. A McKinsey report predicts that by 2030, global AI adoption could yield \$13 trillion in economic value (McKinsey Global Institute, 2023). Yet, lacking robust AI governance risks exacerbating social and economic inequalities (ITU, 2020). Encouragingly, strides in responsible AI governance are evident, such as the European Union's proposed AI Act with ambitious standards (European Commission, 2023). Initiatives like the Global Partnership on AI facilitate collaboration for responsible AI development (GPAI, 2023). Navigating the evolving AI landscape requires adaptable frameworks, ensuring inclusivity by incorporating diverse voices. Effective AI governance unlocks technology's potential, fostering a future where AI serves as a force for good for all of society.

Sustainable Development Goals (SDGs)

Sustainable Development Goals (SDGs) are a set of 17 global goals established by the United Nations in 2015, aiming to address various social, economic, and environmental challenges. These goals provide a framework for international cooperation to achieve a sustainable and equitable future by 2030. The SDGs encompass a range of objectives, including eradicating poverty (Goal 1), ensuring quality education (Goal 4), promoting gender equality (Goal 5), and combating climate change (Goal 13). They address various facets of development to create a holistic and inclusive approach (United Nations, 2015). Central to the SDGs is the emphasis on global collaboration. The goals recognize that many challenges, such as climate change and inequality, transcend national borders, necessitating international cooperation (United Nations, 2015). Inclusivity is another critical aspect, with a commitment to leaving no one behind, particularly marginalized populations (United Nations, 2015). An essential feature of the SDGs is their interconnectedness. Progress in one goal often

contributes to advancements in others. For instance, achieving gender equality (Goal 5) positively influences health and well-being (Goal 3) and economic growth (Goal 8) (United Nations, 2015).

Technology and innovation play a pivotal role in SDG implementation. Digital advancements, renewable energy solutions, and sustainable agricultural practices are instrumental in achieving goals related to poverty reduction, health, and environmental sustainability (United Nations, 2019). Recognizing the significance of private sector involvement, the SDGs encourage collaboration with businesses to leverage their resources, innovation, and influence in achieving sustainable development targets (United Nations, 2019). An often-underscored perspective involves the importance of local action and community involvement. Local initiatives, community-led projects, and grassroots efforts contribute significantly to achieving SDGs on a practical level (United Nations, 2015). Monitoring progress and ensuring accountability are integral to the SDGs. Regular assessments and data-driven evaluations help track advancements, identify challenges, and adjust strategies to ensure that the goals remain achievable within the set timeframe (United Nations, 2015).



Figure 3: Sustainable Development Goals
Source: world Bank, 2023

The path towards achieving the SDGs is long and arduous, but every step forward counts. By harnessing the power of advanced technology, collaboration, leveraging innovation, and embracing a shared sense of responsibility, we can weave a future where the promise of the SDGs becomes a reality.

Empirical Review

The discourse on the role of Artificial Intelligence (AI) in global development is grounded in substantial evidence, indicating its significance in various domains for both the Global North and South. In the Global North, policies and academic discourse highlight the multifaceted benefits and challenges of AI (Aicardi et al., 2021). The application of AI in industry, education, and healthcare further underscores its current and future importance (King et al., 2019; Luckin et al., 2016; Bartoletti, 2019).

The United Nations recognizes AI's potential in meeting Sustainable Development Goals (SDGs), organizing summits under 'AI for Good' since 2017 (Trotter, 2021). Many examples demonstrate AI's capabilities in accelerating SDG attainment, with a particular focus on the Global South, notably Africa (Uthmann, 2021). Scholars link AI to specific SDGs, such as poverty alleviation through satellite mapping (Jean et al., 2016), enhanced agriculture for zero hunger (Agbozo, 2018; Vinuesa et al., 2019), and advancements in healthcare for good health and well-being (Boman & Kruse, 2017; Panda & Bhatia, 2018).

AI's role extends to infrastructure development (SDG9) reshaping industries through innovations like IoT sensors and 4D printing (Sachs, 2015; Wakimoto, 2018). Furthermore, scholars argue that AI contributes to peace, justice, and strong institutions (SDG16) by reducing discrimination, corruption, and addressing global cyber threats (Vinuesa et al., 2019; Hudson, 2019; Krawczyk & Targowski, 2019). Despite the universality of the SDGs, certain challenges are more pronounced in the Global South, as seen in Africa's SDG Index (The Sustainable Development Goals Center for Africa, 2020). Notably, health and well-being (SDG3), infrastructure (SDG9), and peace and justice (SDG16) pose significant challenges in Africa.

Focusing on health and well-being challenges (SDG3) in Africa, applying responsible AI becomes crucial. Owoyemi et al. (2020) express concerns about the limited application of AI in African healthcare compared to more developed countries.

They emphasize the need for responsible AI structural policy and governance in the Global South to avoid missing out on the projected benefits, such as significant healthcare cost savings. While Africa exhibits promising AI applications in healthcare and agriculture, challenges like data quality, legal frameworks, and infrastructure hinder its full potential (Owoyemi et al., 2020). The reliance on AI solutions from the Global North raises concerns about management and exacerbates existing inequalities, as evidenced by the dominance of AI companies in African healthcare initiatives. To bridge the AI gap and reduce inequalities, the Global South, particularly Africa, must develop robust AI policy structures and address underlying issues, enabling the region to harness the benefits of AI applications in healthcare and other critical sectors.

The scenario of AI policies

A critical concern, explored further in this section, revolves around the absence of robust policy and governance structures, exacerbating societal inequalities and creating an uneven playing field for responsible AI application. Drawing parallels with regional inequalities in the UK, where disparities prompted the need for a revised strategy (Oxford Insights, 2020), the discourse on AI ethics has shifted to the political arena globally. Governments are formulating national strategies to facilitate responsible AI use, with an emphasis on equitable distribution of AI benefits.

Notably, the most proactive countries in the AI policy landscape are situated in the Global North, such as the USA, Europe, and Asia, with limited participation from the Global South, especially Africa. Despite Africa's digitalization and potential AI application for SDGs, the lack of engagement is notable, considering the vast narratives on AI's pivotal role in addressing health, agriculture, and education challenges in the region. Canada, the first country to develop a national AI strategy, invested significantly in the Pan-Canadian Artificial Intelligence Strategy in 2017 (Canadian Institute for Advanced Research - CIFAR, 2021). However, regional disparities within Canada and its 11th position in the Responsible AI Sub Index highlight challenges in achieving comprehensive inclusivity. In the USA, AI leadership is evident in its AI readiness index, driven by substantial investments and an executive order emphasizing American values in AI development (Select Committee on Artificial Intelligence, 2019). Europe, recognizing the importance of AI in economic growth, combines industrial strength with a regulatory framework based on fundamental values, leading to the development of national AI strategies across member states (Roy, 2020).

Contrastingly, African countries rank lower in the AI readiness index, reflecting historical technological lag. Only five (5) of the fifty-four (54) countries in Africa slightly above the global average in AI readiness index, Mauritius, Egypt, South Africa, Seychelles, and Tunisia. Mauritius takes the lead among African nations due to being the first, in 2019, to publish a comprehensive AI strategy. The government's proactive approach includes establishing national AI bodies, notably an AI Council, to propel the development of an AI ecosystem. Similarly, Egypt follows closely in the ranking, credited to its swift development and publication of a national strategy in 2019. To ensure effective implementation, Egypt has instituted a national AI council and reinforced its commitment by enacting a data privacy law in 2020. These strategic moves signify both countries' commitment to fostering robust AI development and governance. The remaining African countries, particularly in West and Central Africa, exhibit notably low scores in global AI readiness rankings. Oxford Insights (2021) attributes this primarily to the absence of necessary governance structures, specifically lacking adequate regulatory and ethical frameworks for AI. Additionally, contributing factors involve limited investments in the AI sector and infrastructure constraints, notably the absence of comprehensive data repositories in these regions. These challenges collectively hinder the advancement of AI initiatives and underscore the pressing need for enhanced governance, increased investment, and improved infrastructure for sustainable AI development in these countries.

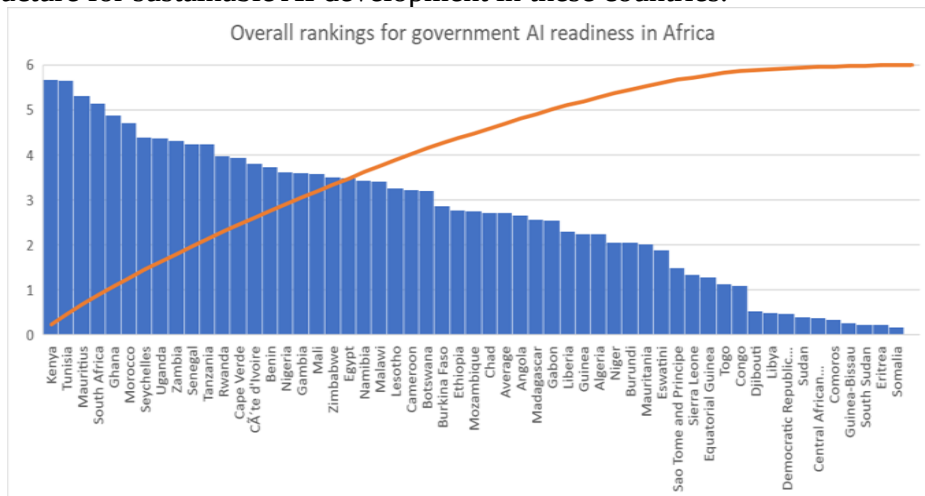


Figure 4: Governance AI Readiness in Africa

Source: Adapted from Sampene, Agyeman, Robert, & Wiredu, 2022

METHODOLOGY

The research employs systematic review of literature to comprehensively investigate the Nexus between AI Governance and Sustainable Development Goals in Africa. A systematic review is conducted, encompassing peer-reviewed journals, conference papers, and official reports from reputable sources. Table 1 shows the overview of Systematic Literature Review employed for the study, and it is also explained visually with PRISMA Diagram in Figure 5.

Table 1:
Overview of Systematic Literature Review (SLR) Process

Stage	Description
Databases Searched	Google Scholar, Scopus, Web of Science, IEEE Xplore
Search Keywords	Artificial Intelligence, AI governance, Sustainable Development Goals (SDGs), Africa, Ethical AI
Inclusion Criteria	Peer-reviewed articles, conference proceedings, reports focused on AI governance in Africa, published within the last 9 years, addressing AI's role in SDG achievement
Exclusion Criteria	Articles not specific to Africa, not focused on governance or SDGs, opinion pieces, duplicate publications
Date Range	Studies published between 2015 and 2024
Search Results	Initial search identified 400 papers. After filtering, 150 were retained for further screening
Final Selection	63 articles were deemed highly relevant after abstract and full-text screening
Data Extraction	Key themes identified: AI governance frameworks, ethical considerations, regulatory challenges, role in achieving SDGs
Analysis Methods	Thematic analysis of the selected articles, identifying patterns, challenges, best practices

Prisma Diagram: Systematic Literature Review Process

A PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) diagram is employed to visually representing the process of article selection during the SLR. The description of the steps for selection process is shown in the figure 5: Prisma Search Strategy.

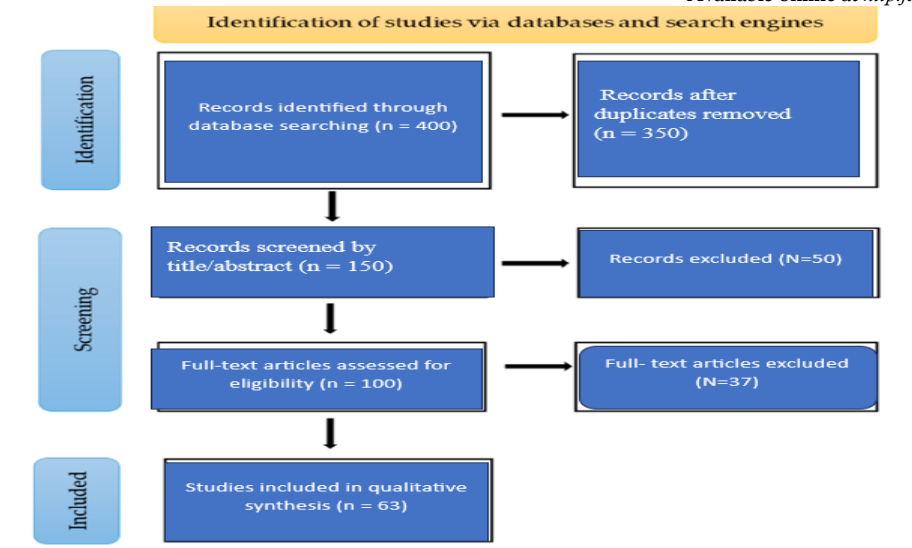


Figure 5: Prisma Search Strategy

The focus is on identifying key themes, challenges, and best practices related to AI governance in Africa. Literature is selected based on relevance to AI governance structures, ethical considerations, and their implications on achieving the Sustainable Development Goals (SDGs) in Africa. Case studies representing various African countries were selected. Each case study is meticulously examined to extract insights into the existing AI governance frameworks, their effectiveness, and their impact on Sustainable Development Goals in the respective African Countries. Comparative analysis is employed to discern commonalities and variations across different cases, shedding light on the diversity of AI governance practices in the Global North and Global South. By combining case studies with a systematic literature review (as shown in table 2), the study offers a holistic assessment of AI governance structures in African countries, and its potential implications for the achievement of Sustainable Development Goals (SDGs) in Africa.

Table 2:
Data Combination and Analysis

Stage	Description	Data Sources	Analysis from Database Search
1. Data Collection	Systematic review and case studies are conducted to gather information on AI governance and its impact on SDGs in Africa.	- Systematic Literature Review (SLR): Peer-reviewed journals, reports, conference papers. - Case Studies: Selected African countries with documented AI governance practices.	- Database Search (Google Scholar, Scopus, Web of Science, IEEE Xplore). - Case Study Review.
2. Data Filtering & Selection	Articles are filtered based on inclusion/exclusion criteria: relevance to AI governance in Africa, focus on ethical AI, and SDG impact. Case studies are selected based on the availability of AI governance data and relevance to the research focus.	- SLR: 63 articles selected from an initial pool of 400 based on criteria. - Case Studies: Countries chosen based on AI governance frameworks (e.g., South Africa, Kenya, Nigeria).	- Inclusion/Exclusion criteria application (SLR). - Selection of key case studies for diversity and relevance.
3. Thematic Categorization	Themes are developed from the literature and case studies to identify major topics related to AI governance, ethics, and SDG implementation.	- SLR: Themes identified from literature, including AI regulatory frameworks, ethics, capacity-building, etc. - Case Studies: Governance frameworks, policy effectiveness, AI projects, sector-specific implementations.	- Thematic Analysis: Identifying recurring themes and sub-themes from the literature and case study data.
4. Cross-Referencing Themes	Themes from the literature are cross-referenced with case studies to identify commonalities and variations between global AI governance practices and African country-specific implementations.	- SLR: Global trends in AI governance and best practices identified in the literature. - Case Studies: African countries' AI governance structures and their alignment with Global trends	

Source: Authors' design, 2024

FINDINGS AND DISCUSSION

This section deals with findings and discussion from the literature reviewed and the case studies explored.

The Nexus Between AI and Sustainable Development Goals (SDGs) in Africa

The research of scholars such as: (Oladipo *et al.*, 2024; Hlongwane *et al.*, 2024; Ade-Ibijola & Okonkwo, 2023; Dwivedi *et al.*, 2021; Gwagwa *et al.*, 2021; Aderibigbe

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et al., 2023; Butcher *et al.*, 2021; Sampene *et al.*, 2022; Patel & Ragolane, 2024; Samuel-Okon & Abejide, 2024) highlights both successes and challenges associated with the integration of Artificial Intelligence (AI) in various sectors across Africa. While notable achievements, such as Togo's efficient social fund distribution and Zambia's effective counteraction of disinformation during elections, showcase the positive impact of AI, several hurdles remain. Instances of harmful AI use, such as the deployment of autonomous weapon systems in Libya and facial recognition surveillance in Zimbabwe, underscore the need for careful regulation and oversight. Despite challenges, certain African nations have emerged as leaders in adopting AI applications. South Africa, Nigeria, Ethiopia, Kenya, Zimbabwe, Togo, Libya, and Ghana have demonstrated significant strides in leveraging AI technologies, albeit facing infrastructure, data ecosystem, STEM education, and governance system challenges (Tapo, Traoré, Danioko, & Tembine, 2024).

The transformative potential of AI is evident across various sectors in Africa:

1. Agriculture Sector: Agriculture Sector: AI tools like Hello Tractor in Mozambique and Apollo Agriculture in Kenya promote sustainable farming practices, contributing to food security (SDG 2) and climate action (SDG 13) (Eke *et al.*, 2023). Similarly, South African startups utilize AI for plant disease diagnosis, price prediction, and financial services (Panel, M. 2019).
2. Health sector: AI solutions contribute to strengthening healthcare systems. IBM Research's machine-learning system in South Africa reduces cancer diagnosis reporting time, aiding timely decisions and policy formulation (Santosh & Gaur, 2022). Mobile-based AI applications like 'Nuru' facilitate remote diagnosis and treatment, addressing healthcare accessibility challenges in remote areas. Initiatives like MinoHealth AI Labs in Ghana and BareApp in Ghana, along with RxAll in Nigeria, leverage AI for automated diagnostics, skin disease diagnosis, and combating counterfeit medicines, aligning with SDG 3 (Eke, Chintu, & Wakunuma, 2023).
3. Financial Sector: According to Rayhan, *et.al.* (2024) AI applications like M-Shwari in Kenya and Debtors Africa in Nigeria streamline loan processes and debt tracking, contributing to economic growth (SDG 8) and poverty alleviation (SDG 1).
4. Security: Eke, *et. al.* (2023) asserts that, AI technologies aids security services, with BACE APIs in Ghana addressing misidentification and AI-powered facial recognition in Kenya supporting policing efforts, supporting peace and justice (SDG 16)

5. Education Sector: AI-powered tools offer personalized learning experiences, improving education accessibility. For examples: M-Shule in Uganda, offering an AI-powered Toolkit for personalized learning, and Eneza Education in Kenya using AI for virtual tutorials, fostering education accessibility and contributing to SDG 4 (Quality Education), (Pratama, Sampelolo, & Lura, 2023).
6. Transportation sector: AI applications enhance efficiency in transportation and logistics, promoting industry, innovation, and infrastructure. For instance, SWVL in Egypt and Kobo 360 in Nigeria enhance efficiency, reducing logistics frictions (SDG 9), (Chung, 2021).
7. Telecommunication sector: Telecommunication operators such as MTN and Safaricom employ AI for customer service, improving user experience and contributing to SDG 9, (Wang, 2021).
8. Public service: Public service delivery sees the deployment of AI-powered robots in Rwanda for public health interventions and AI applications in South Africa fighting gun violence and wildlife poaching, aligning with SDG 3 and SDG 16, respectively (Panic & Arthur, 2024).
9. Politics: AI tools combat misinformation in politics, exemplified by African Check in South Africa, aligning with SDG 16, while the #ENDSARS protests in Nigeria underscore AI's transformative potential in shaping political narratives (Panic & Arthur, 2024).
10. Energy: AI technologies offer solutions to Africa's energy poverty, impacting over 630 million people. These solutions improve the efficiency of energy-supply systems and enhance renewable energy sources. AI's ability to link customer preferences with energy options and market conditions optimizes energy purchasing decisions, making electricity supplies more reliable and tailored to consumer needs (Murshed & Ozturk, 2023).
11. Climate: AI plays a crucial role in climate change impact assessment, connecting global-scale climate models with real-time information to automate and enrich the process (Zhao, *et al.*, 2024; Balogun, *et al.*, 2020; Sebestyén, *et al.*, 2021). This provides more accurate and timely assessments of climate change effects. This integration of AI across diverse sectors in Africa reflects its pivotal role in fostering innovation, addressing societal challenges, and propelling the continent towards sustainable development (Murshed & Ozturk, 2023).

AI Governance in Africa

Governments globally have increasingly focused on crafting legislation to govern the responsible use of artificial intelligence (AI) in various contexts, both personal and commercial (Madhavan *et al.*, 2020; Latonero, 2018; Outeda, 2024; Engstrom *et al.*, 2020). While regions such as North America and the European Union have made notable progress in this regard, the African continent has encountered challenges in keeping pace. The 2019 Government AI Readiness Index by Oxford Insights reveals Africa as the worst-performing region, with no countries within the top 50 spots and only 12 in the top 100, including Kenya, Tunisia, Mauritius, South Africa, and Ghana. Notably, these top-performing countries already possess significantly developed tech ecosystems, highlighting the urgent need for comprehensive AI governance across the continent.

The absence of legislation in many African countries raises concerns, particularly for smaller economies that may face the impacts of AI without established regulatory frameworks. Despite these challenges, some progress has been observed. Countries like Senegal, Kenya, and South Africa have initiated regulatory frameworks, data protection laws, and acts regulating automated decision-making. Additionally, the Index of Regulation of Artificial Intelligence recognizes eight African countries, including Ghana, Kenya, Nigeria, Sierra Leone, South Africa, Uganda, Zambia, and Zimbabwe, for making strides in regulating AI. (Goitom, 2019).

The trajectory of AI development in Africa must align with the principles of being "for Africans by Africans." This approach safeguards against colonial cycles of extraction by Western entities and historical dependence on foreign aid. Emphasizing the importance of economic freedom, African governments should proactively engage in AI governance to ensure a sustainable and locally-driven pathway for the continent's technological future.

Implications Arising from the Absence of AI Governance in Africa

Globally, the importance of AI governance is widely recognized for aligning AI applications with common values and the common good. However, Africa faces challenges due to the absence of robust institutional capacity and regulatory frameworks for AI. This absence poses risks such as compromised data security, threats to privacy,

and potential impacts on cyber and national security. Despite investments from multinational giants and initiatives led by African AI experts, major companies in Africa are not leading AI design and implementation efforts. This reliance on foreign entities raises concerns about neglecting African values and interests in AI system design, emphasizing the need for comprehensive AI governance frameworks (Wilner, 2018; Arakpogun et al., 2021).

1. **Global Power Imbalances:** The lack of robust AI governance frameworks in Africa contributes to existing global power imbalances. As powerful nations, primarily in the North, shape global guidelines for AI development, the exclusion of Africa from these discussions exacerbates the power disparity. Without inclusive global governance initiatives, there is a risk of AI misuse in the South. It emphasizes the urgent need for comprehensive and inclusive AI governance frameworks that reflect diverse voices globally to ensure a more equitable approach to AI system design.
2. **Cultural Sensitivity in AI Design:** The absence of robust governance frameworks raises concerns about culturally insensitive AI design and deployment in Africa. Current AI systems may prioritize Northern values, posing risks for the South. Epistemic approaches such as 'value-sensitive design' and 'human-centered design' are crucial for ensuring culturally sensitive and responsible AI development. Efforts must be made to incorporate diverse cultural perspectives into AI governance frameworks to mitigate these risks effectively.
3. **Dangers of Unfair Discrimination and Bias:** Inadequate data diversity and algorithmic shortcomings contribute to issues of unfair discrimination and bias in AI systems. Principles and values are essential to prevent AI from perpetuating existing biases harmful to Africans. With a lack of robust data infrastructure and AI skillsets, effective governance becomes paramount to mitigate risks of discrimination and bias.
4. **Impacts on SDGs Attainment:** The absence of robust AI governance structures poses challenges to Africa's efforts in achieving Sustainable Development Goals (SDGs). Responsible AI practices must balance positive and negative impacts, addressing issues such as biases, high energy demands, and potential impacts on human autonomy. For Africa to achieve UN SDG targets, robust governance structures grounded in clear epistemological understandings are essential to harness AI benefits effectively (Vinuesa et al., 2020; Gupta et al., 2021; Wakunuma et al., 2022).

5. **Ethical Issues:** Lack of AI governance exacerbates ethical dilemmas and risks associated with AI technologies. Without regulatory oversight, there's a heightened potential for the misuse of AI systems, leading to privacy violations, biases in decision-making algorithms, and exacerbation of societal inequalities. For instance, in the absence of comprehensive regulations, AI-powered systems might perpetuate existing biases and discrimination, particularly against marginalized communities
6. **Innovation and Competitiveness:** The absence of robust AI governance undermines efforts to foster innovation and competitiveness in African economies. Without clear guidelines on intellectual property rights, data protection, and fair competition, local entrepreneurs and businesses may face barriers to entry in the AI market. This could result in missed opportunities for economic growth and job creation within the continent .
7. **Technological Dependencies:** The lack of AI governance leaves African countries vulnerable to technological dependencies and risks associated with foreign AI providers. In the absence of domestic regulations, African governments and businesses may become reliant on foreign AI solutions, potentially compromising national sovereignty and security.

The absence of AI governance in Africa has far-reaching implications, ranging from exacerbating global power imbalances to potential cultural insensitivity, discrimination, and hindrances in achieving Sustainable Development Goals (SDGs). These challenges encompass ethical concerns, economic disparities, and technological dependencies, underscoring the urgent need for collaborative action from governments, policymakers, businesses, and civil society. Addressing these issues requires the development of comprehensive, inclusive, and culturally sensitive AI governance frameworks. These frameworks must prioritize ethical considerations, foster innovation, and safeguard national interests, thereby empowering Africa to actively participate in and benefit from the global AI landscape.

Key components of this endeavour include the establishment of robust policies and regulations to promote ethical AI development, protect individuals' rights and privacy, and stimulate innovation and competitiveness in the AI sector. Additionally, capacity-building initiatives are essential to enhance local expertise in AI governance and technology assessment. By proactively addressing these challenges and implementing effective AI governance frameworks, Africa can navigate the complexities of AI technology while leveraging its potential for positive societal impact

and economic development. It is imperative for African governments and stakeholders to prioritize these efforts to ensure a sustainable and inclusive AI future for the continent.

Key Findings:

1. The research highlights the disparity in the development of AI governance structures between African countries and the Global North, which has consequences for the attainment of Sustainable Development Goals (SDGs).
2. Lack of robust regulatory frameworks tailored to the African context contributes to the slower pace of AI governance development in the region.
3. Limited capacity-building initiatives hinder the effective management and regulation of AI technologies in African states.
4. Insufficient collaboration among governments, the private sector, and civil society impedes the responsible deployment of AI in African countries, affecting progress towards SDGs.

Recommendations:

1. Establish tailored regulatory frameworks: African countries should develop regulatory frameworks specific to their needs and contexts, taking into account local challenges and opportunities related to AI deployment. These frameworks should address issues such as data privacy, algorithmic transparency, and ethical AI principles.
2. Prioritize capacity-building: Investment in capacity-building initiatives is crucial to enhance the skills and expertise necessary for effective AI governance and regulation. Training programmes, workshops, and educational initiatives should be prioritized to empower policymakers, regulators, and other stakeholders in navigating the complexities of AI governance.
3. Foster collaboration: Governments, the private sector, and civil society should collaborate closely to develop and implement AI governance frameworks. Multi-stakeholder partnerships can facilitate knowledge-sharing, resource mobilization, and joint initiatives aimed at promoting responsible AI deployment and adherence to SDGs.
4. Promote transparency and public engagement: Transparency and public engagement are essential for building trust in AI technologies and ensuring accountability. African governments and stakeholders should prioritize transparency measures, such as open data initiatives and public consultations, to enhance public

understanding of AI technologies and involve citizens in decision-making processes related to AI governance and regulation.

5. Align AI technologies with SDGs: Efforts should be made to ensure that AI technologies contribute to the achievement of SDGs in African countries. This includes integrating SDG principles into AI development and deployment processes, leveraging AI for social good initiatives, and monitoring the impact of AI interventions on sustainable development outcomes.

CONCLUSION

This paper explores the intricate relationship between AI governance and the Sustainable Development Goals (SDGs) in Africa. It highlights the critical role of robust AI governance frameworks in unlocking AI's potential to advance SDGs on the continent. The analysis of the current AI policy landscape reveals significant hurdles, including the absence of regulatory and ethical frameworks and inadequate technological infrastructure, which hinder the effective implementation of AI solutions in Africa. The lack of established AI governance structures has broad implications, ranging from exacerbating global power imbalances to the development of culturally insensitive AI systems, increasing the risk of discrimination, and potentially impeding progress towards SDGs in Africa.

While acknowledging that AI governance alone cannot address all challenges, it underscores its foundational importance in promoting responsible AI development and deployment. The paper recommends collaborative efforts among industry, policymakers, academia, and civil society to drive AI research using African datasets and algorithms. This collaboration aims to incorporate African contextual concerns, interests, and values into AI frameworks. Other recommendations include the promotion of African ethical principles, the establishment of robust AI governance structures, and the strategic integration of AI into educational curricula across Africa.

Furthermore, the study emphasizes the need to address current challenges facing AI in Africa, such as limited data access, skill shortages, and the absence of comprehensive policy frameworks. By overcoming these obstacles and prioritizing responsible AI practices, investing in research and knowledge transfer, and fostering local innovation, Africa can leverage AI's transformative potential to significantly contribute to the achievement of SDGs. The paper argues that AI will not only enhance

efficiency and innovation but also play a pivotal role in promoting inclusivity, safeguarding privacy, and upholding African norms and ethics in sustainable development efforts.

Acknowledgement

We acknowledge the authors whose works contributed to the successful completion of this paper.

Funding

The manuscript did not receive any financial assistance from any source.

Conflict of interest

There are no conflicts of interest associated with this publication.

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