



GHANA ARTIFICIAL INTELLIGENCE PRACTITIONERS' GUIDE



Implemented by:



Published by:

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

Registered Office:

GIZ Office Accra, Ghana

Address:

P.O. Box KA 9698
7 Volta Street
Airport Residential Area
Accra – Ghana

T +233 302 760448

F +233 302 777375

E giz-ghana@giz.de

www.giz.de

Responsible:

Emmanuel Mumuni
Digital Transformation Center
GIZ, Ghana

Author:

Heritors Labs
20 Dr Tagoe Ave, Accra

Editor:

Elikplim Sabblah
FAIR Forward - Artificial Intelligence for all Initiative
GIZ, Ghana

Design:

Heritors Labs
20 Dr Tagoe Ave, Accra

Accra, September 2025



Licensing

This document is available in Open Access under [the Attribution-ShareAlike 4.0 International license CC BY-SA 4.0 DEED](#).

Attribution

You must give [appropriate credit](#), provide a link to the license, and [indicate if changes were made](#).

Please cite as follows: Heritors Labs & Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) FAIR Forward (2025). Ghana Artificial Intelligence Practitioners' Guide. Licensed under CC BY-SA 4.0.

ShareAlike

If you remix, transform, or build upon the material, you must distribute your contributions under [the same license as the original](#).

Re-use/Adaptation/Translation

Any derivative work should include the following visible disclaimer “The present work is not an official Heritors Labs or GIZ publication and shall not be considered as such.” Use of the logos of Heritors Labs, GIZ or FAIR Forward or the imprint of the publication is not permitted on derivative works.

Heritors Labs or GIZ are not liable for any alteration of the original content as used in the derivative work.

For any derivative work, we would also appreciate greatly if you can notify us briefly via fairforward@giz.de and derry@heritorslabs.com.

Disclaimer

The data in the publication has been collected, analysed and compiled with due care; and has been prepared in good faith based on information available at the date of publication without any independent verification. However, Heritors Labs and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH do not guarantee the accuracy, reliability, completeness or currency of the information in this publication. Heritors Labs and GIZ shall not be held liable for any loss, damage, cost or expense incurred or arising by reason of any person using or relying on information in this publication.

Accra, Ghana, September 2025

GHANA ARTIFICIAL INTELLIGENCE PRACTITIONERS' GUIDE

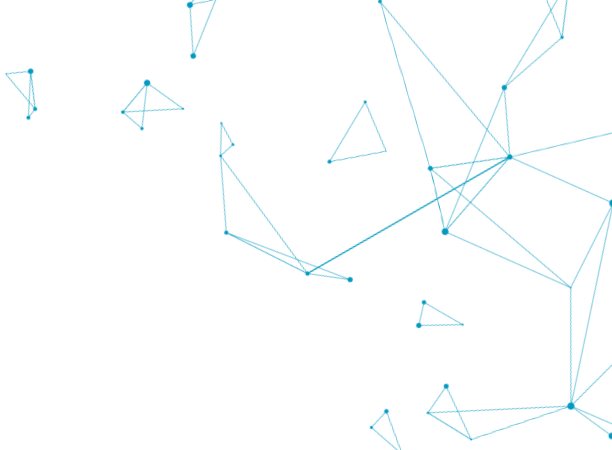


Table of Contents

FOREWORD BY HERITORS LABS	1
FOREWORD BY GIZ GHANA	2
EXECUTIVE SUMMARY – GHANA AI PRACTITIONERS’ GUIDE	3
SECTION 1: INTRODUCTION TO ARTIFICIAL INTELLIGENCE IN GHANA	5
1.1. Introduction	5
1.2. Key Stakeholders and Cross-Sector Collaborations	6
1.3. Definition of AI	7
1.4. AI Categorisation by Application	8
1.5. Classification of AI by Risk Levels	10
1.6. Artificial Intelligence in the Ghanaian Context	11
1.6.1 Early Building Blocks and Enablements	11
1.6.2 From Emergence to a maturing Ecosystem	12
1.6.3 Policy Development and Institutional Commitment	13
1.7. Current Landscape: A maturing Ecosystem	13
1.8 Strategic Gaps and Opportunities in Ghana’s AI Ecosystem	14
1.9 Key Drivers and Drivers and Enablers of AI Ecosystem in Ghana	16
1.10 Key Challenges of the AI Ecosystem in Ghana	18
1.11 Key Stakeholders and Cross-Sector Collaborations	19
1.12. Section One Summary	21
SECTION 2: RESPONSIBLE AI: GUIDELINES ON THE ETHICAL, LEGAL, AND INSTITUTIONAL GOVERNANCE OF ARTIFICIAL INTELLIGENCE IN GHANA	22
2.1. Purpose	22
2.2. Ethical Guidelines for Responsible AI	23
2.3. Legal and Regulatory Guidelines for Responsible AI	27
2.4. Institutional and Governance Guidelines for Responsible AI	34
2.5. Section Two Recap	37
SECTION 3: AI DEVELOPMENT AND DEPLOYMENT	39

3.1. Introduction	39
3.2. Best Practices for AI Model Development	40
3.2.1 The AI Model Development Lifecycle	43
3.2.2. Agile and Iterative Development for AI	44
3.2.3. Standards and Practices for AI Lifecycle	45
3.3. Data: The Fuel for Ghanaian AI	45
3.3.1. Sourcing and Curating Local Data Responsibly	45
3.4. Infrastructure and Computing: Powering AI in Ghana	47
3.4.1. Choosing the Right Environment	47
3.4.2. Affordable Computing Solutions in the Ghanaian Context	48
3.4.3. Understanding Processing Power: CPUs, GPUs, and TPUs	49
3.4.4. Streamlining Deployment: Containerization and Orchestration	49
3.4.5. Towards Green AI in Ghana	49
3.5. Procurement and Deployment Guidelines	50
3.5.1. Procurement	50
3.5.2. Open-Source and Interoperability	51
3.6. Section Three Recap_	52
 SECTION 4 GUIDELINES FOR SECTOR-SPECIFIC AI APPLICATIONS IN GHANA	 53
4.1. Introduction	53
4.2. Sector-Specific Snapshots and Guidelines	53
4.2.1. Health Sector	54
4.2.2. Agriculture Sector	55
4.2.3. Finance and Fintech	57
4.2.4. Education	58
4.2.5. Governance and Public Sctor	60
4.2.6. Environment and Climate change Sector	61
4.3. Cross-Cutting Principles Applicable to all Sectors	64
4.4. Section Four Recap_	65
 SECTION 5: CAPACITY BUILDING AND SKILLS DEVELOPMENT	 66
5.1. Introduction	66
5.2. AI Education and Training Programmes	67
5.2.1 University-Level AI and Data Science Education	67
5.2.2 AI and Data Science Programmes in Technical Universities	70
5.2.3 Emerging Models for AI Education	72

5.2.4 Inclusivity in AI Education	74
5.3 Workforce Development and Reskilling Strategies	74
5.3.1 Encouraging STEM Education to Build an AI Talent Pipeline	74
5.4 Role of Universities and Research Institutions	75
5.5 Opportunities and Challenges	75
5.5.1 Opportunities	75
5.5.2 Challenges	76
5.6 Section Five Recap	77
 SECTION 6 – BUILDING AN AI STARTUP IN GHANA: STRATEGIES, CAPITAL, AND ECOSYSTEM INSIGHTS	 78
6.1. Introduction	78
6.2. Ghana’s AI and Tech Startup Landscape	78
6.3. Key stakeholders and Institutional Anchors	79
6.4. The Support System	80
6.5. Understanding Ghana’s Startup Capital Landscape	82
6.6. Startup Guide to Commercialising AI Solutions in Ghana: From Prototype to Market	83
6.7. Section Six Recap	84
 SECTION 7: AI FOR SUSTAINABLE DEVELOPMENT	 85
7.1 Introduction	85
7.2 Understanding Sustainable Development and Ghana’s Priorities	86
7.3. Sectorial Applications of AI for Sustainable Development	87
7.4 Stakeholder Guidelines	88
7.5 Best Practices for Responsible AI	88
7.6 AI for Social Good Initiatives	90
7.7. Sustainable AI for Climate-Resilient Development in Ghana	91
7.8. Section Seven Recap	92
 Contributors	 96
References	97
Glossary	99

FOREWORD

BY HERITORS LABS



Technology is reshaping the world at a pace few could have imagined. Across industries and communities, it is opening new possibilities, altering the way we work, and influencing how societies progress. Ghana stands at the threshold of this transformation. Yet, the true test of our progress will not be whether we adopt new tools, but how we apply them in ways that uphold our values, strengthen institutions, ensure viable innovation economies, and improve lives.

The Ghana AI Practitioners' Guide marks an important milestone in this journey. It is the first comprehensive resource designed to support

the responsible and sustainable use of emerging technologies in our national context. More than a technical reference, it reflects a shared commitment to fairness, accountability, and socio-economic inclusion.

From the outset, the goal was never just to produce a document, but to enable dialogue, build consensus, and create space for diverse perspectives so that Ghana's innovation reflects a common vision for the future. Through consultations, workshops, and expert contributions, the Guide draws on the strength and creativity already present within our ecosystem. It captures that momentum and offers practitioners, policymakers, businesses, and educators a trusted resource to build on.

Practitioners will find guidance for applying AI responsibly. Policymakers will gain clarity for shaping frameworks that deliver value while upholding inclusivity. Businesses will discover pathways to adopt AI solutions that address societal challenges. Educators will have a foundation to prepare the next generation. Society at large will benefit through better living standards, secure livelihoods, and meaningful progress.

An AI Guide is only as valuable as the commitment of those who use it. We invite all stakeholders to engage, apply, and contribute to its growth. The future of AI in Ghana will be written not by machines, but by the values and choices of its people.

Derrydean Dadzie
Chief Executive Officer
Heritors Labs

FOREWORD

BY GIZ GHANA



Artificial Intelligence (AI) is no longer a distant frontier, it is a present reality with the power to transform economies, societies, and the daily lives of people. For Ghana, AI holds particular promise: it can boost agricultural productivity, strengthen health systems, enhance education, create more inclusive financial services, and open new avenues for entrepreneurship and innovation. With its dynamic youth population, vibrant tech ecosystem, and forward-looking policy agenda, Ghana is well-positioned to become a continental leader in responsible and inclusive AI adoption.

The Ghana AI Practitioners' Guide is therefore a timely and strategic resource. It brings together global principles, local experiences, and practical guidance to ensure that AI in Ghana is developed ethically, deployed responsibly, and leveraged for sustainable national development. More importantly, it underscores the principle that AI must be built for Ghanaians, by Ghanaians, and with Ghana's priorities at its heart.

Germany, through the Federal Ministry for Economic Cooperation and Development (BMZ) and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), is proud to partner with Ghana on this journey. Our support is anchored in the conviction that digital transformation, when guided by inclusivity, transparency, and human-centered values, can accelerate progress toward the Sustainable Development Goals (SDGs) and Africa's Agenda 2063. Through initiatives such as FAIR Forward – Artificial Intelligence for All, we continue to work with Ghanaian stakeholders to open access to data, build capacity, and support the development of policy frameworks.

This Guide reflects the shared vision of Ghana and Germany: that AI should be a force for equity, empowerment, and sustainable development. It is my hope that policymakers, innovators, businesses, researchers, and civil society actors will find in these pages both inspiration and practical tools to shape Ghana's AI future. Together, we can ensure that AI not only drives technological progress but also uplifts communities and creates opportunities for generations to come.

Dr. Dirk Aßmann,
Country Director,



EXECUTIVE SUMMARY – GHANA AI PRACTITIONERS' GUIDE

The Ghana Artificial Intelligence Practitioners' Guide is a strategic national resource designed to support the responsible, inclusive, and ethical development and deployment of Artificial Intelligence (AI) in Ghana. This guide aims to empower all stakeholders developers, researchers, businesses, policymakers, regulators, and technology enthusiasts with practical insights, local case studies, ethical frameworks, and implementation tools to ensure that AI is harnessed for public good and national transformation.

The overarching goal of the guide is to promote a human-centered AI ecosystem in Ghana, one that Prioritises safety, accountability, transparency, inclusivity, and sustainability. It seeks to bridge the gap between innovation and governance by providing a reference point for developing policies, products, services, and partnerships that are contextually relevant and socially beneficial.

Targeted at a broad and multidisciplinary audience, the guide serves as a blueprint for:

- Tech practitioners and developers looking to build AI solutions that adhere to ethical standards.
- Businesses and startups exploring AI to optimize operations and create value.
- Government and regulators formulating evidence-based policies and governance frameworks.
- Academics and researchers advancing local AI knowledge and skills.
- Civil society and communities are working to ensure inclusion and equity in AI access and outcomes.

Developed within the framework of Ghana's national digital innovation agenda¹, the guide aligns with the country's ambition to become a regional digital innovation hub. It complements key government efforts, including the Digital Economy Policy, Smart Ghana Initiative, and the ongoing development of a National AI Strategy, reinforcing Ghana's readiness for the Fourth Industrial Revolution.

Crucially, the guide aligns with Ghana's long-term development vision and international commitments, including:

The United Nations Sustainable Development Goals (SDGs), particularly SDGs 2 (Zero Hunger), 3 (Good Health), 4 (Quality Education), 6 (Clean Water), 7 (Affordable Energy), 9 (Industry, Innovation, and Infrastructure), 11 (Sustainable Cities), 13 (Climate Action), and 17 (Partnerships);

¹ <https://moc.gov.gh/2025/05/16/hon-samuel-nartey-george-highlights-ghanas-digital-innovation-agenda-at-mebsis-2025-in-kumasi/>

The African Union Agenda 2063, which envisions a technologically empowered and inclusive Africa; and Ghana's own Coordinated Programme of Economic and Social Development Policies (2021–2024) ² and Digital Economy Policy, which underscore the role of technology in sustainable socio-economic transformation. The guide is organized into seven core chapters, each addressing a critical dimension of AI in Ghana:

Section 1: Introduction to AI in Ghana – Provides an overview of the current state of AI adoption and innovation in Ghana, including key trends, stakeholders, and strategic priorities.

Section 2: Ethical AI, Policy, Legal and Regulatory Governance Landscape – Explores ethical frameworks and governance principles, current and proposed policies, and legal and regulatory approaches necessary to ensure safe and trustworthy AI.

Section 3: AI Development and Deployment – Offers practical insights into AI research, model development, infrastructure needs, and deployment pathways tailored to Ghana's context.

Section 4: Sector-Specific AI Applications – Highlights real and potential applications of AI across priority sectors such as agriculture, health, education, energy, finance, climate, and public services.

Section 5: Capacity Building and Skills Development – Focuses on strategies to strengthen AI education, training, and research, while building the talent pipeline necessary for Ghana's AI ecosystem.

Section 6: AI Innovation and Entrepreneurship – Examines the role of AI in driving startups, innovation hubs, and digital entrepreneurship, and outlines strategies to support local AI-driven enterprises.

Section 7: AI for Sustainable Development – Demonstrates how AI can accelerate Ghana's progress toward the SDGs and national development goals, with a focus on inclusive, climate-resilient, and human-centered solutions.

Ultimately, the Ghana AI Practitioners' Guide is a call to action: to build AI for Ghanaians, by Ghanaians, and with Ghana's development priorities at its core. It invites all sectors to collaborate in building an AI ecosystem that protects rights, fosters innovation, and delivers equitable development outcomes for present and future generations.

² https://ndpc.gov.gh/media/CPESDP_2021-2025_21-11-22-2_FINAL_CORRECTED.pdf

SECTION 01

INTRODUCTION TO ARTIFICIAL INTELLIGENCE IN GHANA

1.1. Introduction

The Ghana Artificial Intelligence AI Practitioners' Guide serves as a strategic national blueprint for the responsible development, deployment, and governance of Artificial Intelligence (AI) in Ghana. It is designed for practitioners, policymakers, developers, researchers, civil society, academia, and AI enthusiasts. Drawing from enduring global best practices, it provides a framework to help all stakeholders navigate AI's complexities in ways that are ethically sound, inclusive, and aligned with Ghana's long-term development goals.



AI is set to remain a defining force in shaping economic transformation, social progress, and national competitiveness. This guide positions Ghana to harness AI by strengthening the core enablers of innovation: robust digital infrastructure, skilled talent, inclusive and adaptable policy frameworks, and effective governance systems. Long-term success will depend not only on adopting emerging technologies but on ensuring that AI is developed and applied in ways that safeguard public trust, reflect cultural values, and deliver equitable benefits for all communities.

1.2. Key Stakeholders and Cross-Sector Collaborations

Ghana's AI ecosystem is built on a dynamic, multi-stakeholder network that brings together government entities, regulatory bodies, academic and research institutions, private sector innovators, startups, small and medium enterprises, civil society organisations, communities, and international development partners. This collaborative fabric ensures that AI adoption is anchored in Ghana's development priorities, aligned with robust governance principles, and responsive to the needs of all segments of society, including informal workers, persons with disabilities, and non-English speakers.

A defining strength of the ecosystem is the growing cross-sector synergy: universities collaborate with startups to co-develop real-world AI applications; government agencies work with civil society and private enterprises to pilot solutions in public service delivery, traffic management, agriculture, and healthcare; and industry engages with regulators to test innovations in safe and controlled environments. These partnerships are critical for ensuring that AI innovation remains inclusive, culturally relevant, and beneficial to both present and future generations.

Figure 1 Key AI stakeholder groups in Ghana

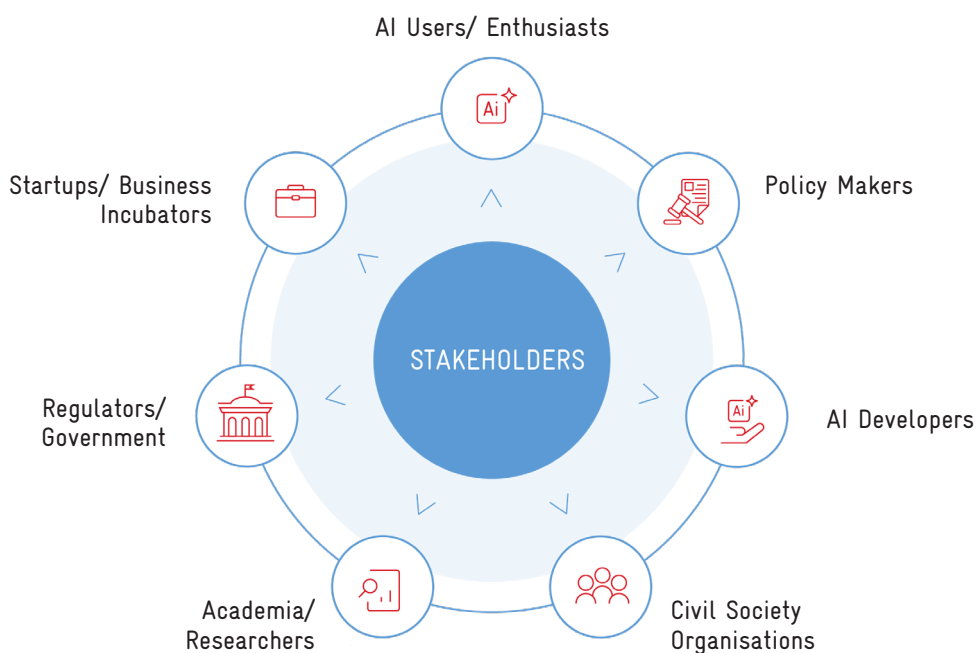


Table 1:Stakeholder roles and strategic Contribution

STAKEHOLDER	ROLE AND STRATEGIC CONTRIBUTION
AI Users and Enthusiasts	AI users and enthusiasts are individuals or organizations that use or benefit from AI innovations.
Policymakers	Create and adapt governance frameworks based on risk management principles and global good practice to balance innovation with safety and societal benefit.
AI Developers	Design and build AI systems through testing frameworks and secure data practices, ensuring solutions meet local needs and align with recognised standards.
Civil Society Organisations	Lead advocacy, influence AI policy, conduct community-led audits, and ensure underrepresented voices are included in decision-making.
Academia and Researchers	Advance AI research, education, and knowledge sharing through collaborative projects, specialised programmes, and shared infrastructure.
Regulators and Government	Ensure compliance with AI-related laws and ethical standards, promote transparency, and protect data sovereignty and intellectual property rights.
Startups and Business Incubators	Nurture and scale innovative AI products and services by providing technical support, investment readiness, and market access pathways.
Established Enterprises and SMEs	Integrate AI into operations to enhance productivity, market access, and security, leveraging both advanced and low-cost tools to reach diverse markets.
Communities	Participate in AI design processes, promoting culturally aligned applications such as language tools, heritage preservation, and localised service delivery.

1.3. Definition of AI

Artificial intelligence (AI) has been defined in various ways. In the context of this guide, artificial intelligence (AI) is defined as computer systems capable of simulating human intelligence. These systems use technologies that enable them to learn and adapt, sense and interact with their environment, reason and plan, make predictions and recommendations, operate autonomously, and extract insights from large volumes of data to support decision-making and achieve human-defined objectives (African Union Commission, 2023; OECD, 2019).

In Ghana, AI is a transformative tool for addressing systemic challenges across various sectors, including agriculture, health, the environment, and education, while preserving indigenous knowledge through localised solutions.

1.4. AI Categorisation by Application

This section explores the diverse applications of AI, showcasing its potential to transform Ghana’s socio-economic landscape. These typologies address local challenges, such as agricultural inefficiencies, healthcare access, and digital inclusion while leveraging Ghana’s youthful talent and cultural richness to drive innovation. By incorporating local languages and community needs, AI promotes equitable growth, supports the African Continental Free Trade Area’s (AfCFTA)’s digital trade objectives, and aligns with national priorities, such as the Sustainable Development Goals (SDGs).

Table 2: AI Typologies by Application

CATEGORIZATION	DESCRIPTION	USE CASE
Narrow AI (Weak AI)	Specialises in specific tasks without general cognitive abilities. Most AI applications currently in Ghana fall into this category.	Agri-advisory services that predict crop yields. Example: The Cashew Disease Identification AI (CADI AI) system, developed by Karaagro to detect diseases in cashew plantations in Ghana ³ .
General AI (Strong AI)	A conceptual AI capable of performing any intellectual task a human can do, adaptable across domains; remains largely theoretical.	There is no publicly known large-scale research projects in Ghana focused solely on General AI
Generative AI	Produces new content such as text, images, audio, or video.	Two content generation tools for cultural preservation. Example: ⁴ Khaya app developed by Ghana NLP for text-to-speech and text-to-text translations etc.

³ <https://huggingface.co/KaraAgroAI/CADI-AI>

⁴ <https://translate.ghananlp.org/>

CATEGORIZATION	DESCRIPTION	USE CASE
Machine Learning (ML)	Uses algorithms that learn from data and improve over time.	Credit scoring for Small and Medium-sized Enterprises (SMEs,) crop yield predictions, financial fraud detection.
Natural Language Processing (NLP)	Enables machines to interpret, generate, and interact in human languages.	Multilingual chatbots for rural communities. ⁵ Example: Khaya app developed by Ghana NLP for text-to-speech and text-to-text translations etc.
Computer Vision	Enables machines to process and interpret visual information.	Medical Imaging for diagnosing health conditions Example: MinoHealth's AI system for automated diagnostics of 14 chest conditions including pneumonia, fibrosis, hernia, and pleural effusion with chest X-rays, and breast cancer with mammograms. ⁶
Robotics	Combines AI with physical systems for automation.	Automated crop production tools. Example: The seed-planting robot developed by 3Farmate ⁷
Expert Systems	Emulates human expert decision-making in specialised domains.	Healthcare diagnostic tools Example: Moremi AI ⁸ developed by Mino Health AI Labs

⁵ <https://translate.ghananlp.org/>

⁶ <https://minohealth.ai/>

⁷ <https://www.3farmate.com/>

⁸ <https://www.biorxiv.org/content/10.1101/2025.02.12.637967v1>

1.5. Classification of AI by Risk Levels

As AI becomes more embedded in society, the economy, and daily life, it is essential to understand both its potential and the risks it poses. One approach to managing these risks is to classify AI systems based on their capabilities, intended use, and potential impact on safety, rights, and wellbeing. This includes categories such as reactive machines, limited-memory systems, theory-of-mind AI, self-aware AI, and the distinction between general AI and narrow AI.

Internationally, risk-based governance models have been adopted to guide the safe and responsible development of AI. One example is the European Union's AI Act, which categorises systems into levels of risk and applies specific requirements to each category. Such models provide valuable references for shaping Ghana's own AI governance framework in a way that reflects national priorities and values.

Table 2: AI Typologies by Application

RISK LEVEL	TYPOLOGY	SCENARIO
Minimal Risk	AI applications, such as spam filters, AI-enabled video games, and basic customer service chatbots, pose negligible risk to health, safety, or fundamental rights.	Agri-advisory services predicting crop yields.
Limited Risk	Systems such as content recommendation engines or non-sensitive data analytics tools that require transparency to help users understand how outputs are generated.	Emerging academic research into adaptive AI systems.
High Risk	AI systems are used in areas that affect safety and fundamental rights, such as biometric identification, credit scoring, healthcare diagnostics, and employment selection. Require strong governance, risk management, and human oversight.	Two content generation tools for cultural preservation and creative industries.
Unacceptable Risk	AI applications that threaten human rights include government social scoring, real-time biometric identification in public spaces without adequate safeguards, and manipulative AI targeting vulnerable populations. Such systems are generally prohibited.	Credit scoring for Small and Medium-sized Enterprises (SMEs,) crop yield predictions, financial fraud detection.

1.6. Artificial Intelligence in the Ghanaian Context

As AI becomes more embedded in society, the economy, and daily life, it is essential to understand both its potential and the risks it poses. One approach to managing these risks is to classify AI systems based on their capabilities, intended use, and potential impact on safety, rights, and wellbeing. This includes categories such as reactive machines, limited-memory systems, theory-of-mind AI, self-aware AI, and the distinction between general AI and narrow AI.

Internationally, risk-based governance models have been adopted to guide the safe and responsible development of AI. One example is the European Union's AI Act, which categorises systems into levels of risk and applies specific requirements to each category. Such models provide valuable references for shaping Ghana's own AI governance framework in a way that reflects national priorities and values.

1.6.1 Early Building Blocks and Enablements

In Ghana, Artificial Intelligence (AI) has emerged as a transformative tool with the potential to address systemic challenges and accelerate sustainable development across sectors such as agriculture, health, education, environmental management, and governance.

Ghana's AI journey began within academic institutions, where foundational research in computer science, data science, and engineering created pathways into AI-related disciplines. Universities such as the Kwame Nkrumah University of Science and Technology (KNUST), the University of Ghana, the Ghana Communication Technology University (GCTU), and Ashesi University integrated AI-focused modules in areas like machine learning, robotics, and intelligent systems. In 2005, Ashesi University pioneered one of the country's first formal AI courses, taught by a visiting professor from MIT, Krzysztof Gajos⁹. The course covered machine learning, knowledge representation, and graph algorithms, shaping early talent and laying the foundation for future leaders in Ghana's digital economy.

The early phase faced constraints, including limited access to high-performance computing, low internet penetration, high data costs, and minimal cross-sector coordination. Despite these challenges, the groundwork was laid for the growth of an AI ecosystem supported by policy, innovation, and international collaboration.

Government-led initiatives such as the Digital Ghana Agenda, supported by agencies like the Ministry of Communication, Digital Technology and Innovations and Digitalisation and the National Information Technology Agency (NITA), advanced digital infrastructure and skills development, indirectly boosting AI readiness. Ghana's collaboration with international partners such as UNESCO and GIZ strengthened

⁹ <https://hci.seas.harvard.edu/people/krzysztof-gajos#:~:text=Krzysztof%20Gajos%20%7C%20Human%2DComputer%20Interaction,Krzysztof%20Gajos>

its position within Africa's broader AI governance framework. These partnerships facilitated knowledge exchange, enhanced institutional and technical capacity, and promoted the alignment of Ghana's policies with global best practices in ethics, inclusivity, and the responsible deployment of AI.

Ghana's AI development has been characterised by practitioner-led innovation. Private institutions and startups have played a pivotal role in building AI readiness, developing early applications, and experimenting with solutions for local challenges.

1.6.2. From Emergence to a Maturing Ecosystem

Ghana's digital economy expansion created fertile ground for Artificial Intelligence (AI) to take root as both a driver of innovation and a tool for solving societal challenges. In its formative years, a vibrant technology ecosystem emerged, with hubs such as Kumasi Hive, iSpace, Impact Hub Accra, and Ghana Tech Lab offering training, incubation, and technical support to youth-led AI startups. These hubs served as launchpads for practitioner-driven innovation, linking talent, entrepreneurial ambition, and technical expertise.

The private sector quickly became a leading force in early AI adoption. DreamOval Limited (now Sevn) was among the first to introduce applied AI in Ghana, building chatbots for platforms such as Skype Lite and Facebook Messenger, and developing semantic and rule-based customer service automation. A defining milestone was their Kinect-powered gesture interface at Stanbic Bank's Stanbic Heights branch, Accra which allowed customers to navigate digital service walls with hand movements. This was one of Ghana's earliest commercial demonstrations of computer vision and human-computer interaction.

Other innovators expanded AI's footprint. Farmerline incorporated AI into its agri-advisory services to deliver data-driven weather and crop insights to smallholder farmers. Health technology startups experimented with AI-assisted diagnostics to improve medical decision-making, while fintech companies integrated machine learning into fraud detection and credit scoring systems.

International partnerships played a pivotal role in strengthening the ecosystem's capacity. Collaborations with GIZ and UNESCO brought knowledge exchange, training resources, and policy guidance, enabling Ghana to engage actively in regional and global AI governance dialogues.

Today, the foundations laid during this early period have matured into a more structured and diversified AI ecosystem. The country now combines emerging research capacity, growing regulatory awareness, and an expanding base of AI-powered solutions across key sectors, including agriculture, healthcare, financial services, and public service delivery. This transition from experimentation to broader adoption reflects both the resilience of Ghana's innovators and the increasing alignment of national policy, private sector investment, and academic research toward sustainable and inclusive AI development.

1.6.3 Policy Development and Institutional Commitment

From the early 2020s, Artificial Intelligence began to feature more prominently in Ghana's national digital transformation agenda. The Digital Ghana Agenda, led by the Ministry of Communication, Digital Technology and Innovation and supported by the National Information Technology Agency (NITA), placed emphasis on data infrastructure, e-governance, and digital skills development, indirectly strengthening AI readiness.

Ghana's Data Protection Act (2012), enforced by the Data Protection Commission, has provided a legal foundation for the ethical use of AI and the protection of personal data. The Act, which is aligned with international standards such as the General Data Protection Regulation (GDPR), remains central to responsible AI deployment. Its ongoing review aims to ensure it remains relevant in the face of technological advances, including the rapid growth of generative AI.

The government has also signalled its intention to establish a National AI Strategy to define long-term priorities, set ethical standards, and build governance structures that encourage innovation while safeguarding public trust. This work draws on enduring global reference points, including the OECD AI Principles, the African Union AI Strategy, and UNESCO's Recommendations on the Ethics of AI, while adapting them to Ghana's specific development context.

Through these policies and institutional commitments, Ghana is laying the groundwork for an AI ecosystem that is regulated, inclusive, and able to scale sustainably. By fostering collaboration among government, industry, academia, and civil society, the country is positioning itself to become a leader in the responsible adoption of AI within Africa.

1.7. Current Landscape: A Maturing Ecosystem

Ghana's AI ecosystem has evolved from early experimentation into a more structured and diversified environment that combines research capacity, entrepreneurial innovation, and growing regulatory awareness. The country ranks among the leading nations in West Africa in AI readiness, reflecting progress in infrastructure, talent development, and institutional commitment.

Academic institutions are playing a pivotal role in shaping the next generation of AI talent. The Kwame Nkrumah University of Science and Technology (KNUST) offers postgraduate programmes in computational intelligence, and the African Institute for Mathematical Sciences (AIMS) Ghana produces researchers engaged in socially impactful AI projects. Additionally, Ashesi University integrates AI throughout its undergraduate computing curriculum, while also offering a Master's in Intelligent Computing Systems. These universities not only develop skilled graduates but also collaborate with local and international partners to address Ghana-specific challenges through applied research.

Public-private partnerships have become a cornerstone of AI experimentation and adoption. Organisations such as the UNDP, the Mastercard Foundation, and GIZ have partnered with Ghanaian institutions and

companies to pilot AI applications in smart agriculture, intelligent transport systems, digital finance, and healthcare analytics.

The government’s commitment to developing a national AI strategy, informed by global frameworks and local priorities, underscores a shift toward more coordinated governance. This alignment between policy, innovation, and research indicates that Ghana is moving toward an AI ecosystem capable of delivering sustainable, inclusive benefits across sectors.

1.8. Strategic Gaps and Opportunities in Ghana’s AI Ecosystem

Ghana’s AI ecosystem has the potential to play a leading role in Africa’s digital transformation. To realise this potential, the country must address critical gaps while capitalising on opportunities that can strengthen competitiveness, promote inclusion, and drive innovation. These gaps span infrastructure, skills, governance, cultural integration, trade readiness, and investment, and each represents an opening for targeted interventions that align with national priorities such as the Digital Economy Policy, the African Continental Free Trade Area (AfCFTA), and the Sustainable Development Goals (SDGs).

Table 4: 1.10 Strategic Gaps and Opportunities in Ghana’s AI Ecosystem Ecosystem

THEME	GAP	CURRENT LIMITATION	OPPORTUNITY	STRATEGIC ACTION
Infrastructure & Access	Infrastructure Deficit	Limited access to high-performance computing reduces the scalability and sophistication of AI research and deployment.	Shared Computer Hubs	Establish a nationwide network of shared AI computing hubs to support training and research for startups, enterprises, and universities, enabling cost savings and fostering innovation.
	Digital Divide	Connectivity gaps in rural areas limit access to AI-enabled services for large segments of the population.	Rural Connectivity Initiatives	Deploy low-bandwidth AI tools, affordable internet access points, and public Wi-Fi zones to achieve widespread digital inclusion across urban and rural areas.

THEME	GAP	CURRENT LIMITATION	OPPORTUNITY	STRATEGIC ACTION
Skills & Inclusion	Skills Shortage	A shortage of AI-specialised talent in leadership roles limits informed decision-making and adoption capacity.	National AI Training Academy	Partner with innovation hubs, academia, and industry to deliver large-scale AI training programmes that boost literacy, leadership, and applied innovation.
	Inclusivity Barriers	Underrepresentation of women in AI roles reduces diversity of perspectives and solutions.	Gender-Equitable Programmes	Scale targeted initiatives to achieve gender parity in AI participation, strengthening inclusivity and innovation outcomes.
	Youth Engagement	Limited integration of youth voices in AI policy, design, and implementation processes.	Youth-Led Innovation Hubs	Expand youth-focused hackathons, incubators, and mentorship programmes to harness the creativity and digital fluency of young innovators.
Governance & Policy	Governance Voids	Lack of structured regulatory environments slows ethical AI testing and market readiness.	Ethical Testing Environments	Introduce AI sandboxes and controlled experimentation frameworks to enable responsible testing, policy learning, and faster deployment.
	Post-Deployment Monitoring	Weak auditing mechanisms risk bias, inefficiency, and non-compliance in AI systems.	Continuous Audit Frameworks	Establish periodic post-deployment audits using transparent evaluation tools to ensure fairness, accountability, and effectiveness.
	Trade Readiness	Insufficient data governance frameworks limit intellectual property protection and AI export capacity.	Cross-Border Data and IP Policies	Align national policies with continental and global trade frameworks to protect intellectual property and enable competitive AI exports.

THEME	GAP	CURRENT LIMITATION	OPPORTUNITY	STRATEGIC ACTION
Culture & Innovation	Cultural Integration	Limited use of AI in preserving indigenous languages, stories, and knowledge systems.	Localised AI Development	Build natural language processing and cultural heritage models to preserve local knowledge and expand inclusive digital access.
Finance & Investment	Funding Constraints	Limited funding for AI research and development constrains innovation capacity and competitiveness.	Public–Private Investment Models	Mobilise substantial AI R&D funding through blended finance, public–private partnerships, and international collaboration to drive sustained innovation and talent retention.

1.9. Key Drivers and Enablers of AI Ecosystem in Ghana.

Ghana’s AI landscape is shaped by a combination of demographic, technological, and institutional factors that create strong momentum for growth and adoption. These drivers, if strengthened and scaled, can position Ghana as a leader in AI adoption in Africa, fostering inclusive growth and building an innovation-driven economy. These drivers, when strengthened and scaled, can position Ghana as a leader in AI adoption within Africa, creating inclusive growth opportunities and fostering an innovation-driven economy.

DRIVER	DESCRIPTION
 Youthful Demographics:	With a median age below 22¹⁰, Ghana has a large population of digital natives who are quick to adopt and adapt new technologies. This demographic is driving demand for AI-powered tools in education, entertainment, agriculture, and entrepreneurship, creating a strong base for future innovation.

¹⁰ <https://www.worldometers.info/world-population/ghana-population/>



Expanding Internet Access:

Investments in broadband infrastructure and growing mobile data penetration are increasing digital connectivity across urban and rural areas, enabling AI literacy, online learning, and access to digital services.



Vibrant Tech Community.

Local initiatives such as AI Ghana, national data science hackathons, and university-based research labs are fostering collaboration between developers, startups, and policymakers, bridging the gap between research and commercial application.



Open Data and localised Research

Efforts by the Ghana Statistical Service to release public datasets, alongside local data annotation partnerships, are providing context-rich data for training AI models relevant to Ghana's needs.



Government Policy and Investment

National policy commitments, including the development of AI governance frameworks and strategic plans, are creating an enabling environment for responsible and ethical AI adoption, drawing on global best practices adapted to local priorities.



Public-Private Partnerships

Collaborations between government, the private sector, and development partners are driving AI pilots in areas such as smart agriculture, intelligent transport, digital finance, and healthcare analytics.



Talent Development and Education

Ghana's universities are expanding AI-related programmes to strengthen the talent pipeline. KNUST offers postgraduate courses in computational intelligence, AIMS Ghana trains researchers working on socially impactful projects, and Ashesi University integrates AI across its undergraduate curriculum while offering a Master's in Intelligent Computing Systems. Ashesi also supports AI research and collaborates with global institutions such as Carnegie Mellon University's Robotics Institute.

1.10. Key Challenges of the AI Ecosystem in Ghana

Despite strong drivers and enablers, Ghana's AI ecosystem faces significant challenges that, if unaddressed, could slow its growth and impact. These challenges underscore the need for coordinated, multi-stakeholder solutions that foster inclusive innovation, enhance governance, and ensure equitable access to the benefits of AI.

CHALLENGE	DESCRIPTION
 Infrastructure Limitations:	Access to high-performance computing (HPC) and cloud infrastructure remains limited, restricting advanced AI experimentation and deployment. This mirrors challenges faced across many African countries.
 Skills Gaps:	A shortage of specialised AI expertise among decision-makers in both the public and private sectors reduces the ability to design, procure, and manage AI systems effectively.
 Insufficient R&D Funding:	Public and private investment in AI research and development is still relatively low, limiting innovation pipelines and the scaling of homegrown AI solutions.
 Low Sectoral Adoption:	Traditional sectors such as agriculture, manufacturing, and healthcare have yet to fully adopt AI solutions due to limited awareness, affordability constraints, and perceptions of complexity. In rural areas, gaps in connectivity further limit adoption.
 Cultural and Contextual Relevance:	AI systems often lack integration with Ghanaian languages, cultural values, and social contexts, which risks excluding significant segments of the population.



Regulatory Gaps and Fragmentation

Public and private investment in AI research and development is still relatively low, limiting innovation pipelines and the scaling of homegrown AI solutions.



Cybersecurity Threats

The increasing reliance on AI introduces vulnerabilities that could compromise data security, privacy, and system integrity.



Brain Drain

The migration of skilled AI talent to global markets reduces local capacity, a challenge faced by many countries worldwide.

1.11. Key Stakeholders and Cross-Sector Collaborations

The AI ecosystem in Ghana comprises government entities, academic and research institutions, private sector actors, civil society, Customer Advocacy groups and international development partners and collaborators. The development, and governance of Artificial Intelligence (AI) in Ghana depend on a dynamic and multi-stakeholder ecosystem.

Government and Public Institutions

 **MINISTRY OF COMMUNICATION, DIGITAL TECHNOLOGY AND INNOVATIONS**
REPUBLIC OF GHANA
Leads the national digitalization agenda including the development of Ghana's AI Strategy.

 **Ministry of Education**
REPUBLIC OF GHANA
Integrates AI into educational reform and promotes digital literacy.

 **Ghana Statistical Service**
Provides open datasets critical for AI training and mode development.

 **DATA PROTECTION COMMISSION**
Responsible for regulating the processing of personal data to protect the privacy of individuals which is critical to ethical AI development.

 **NITA**
Develops IT infrastructure and cyber security frameworks.

 **GHANA INVESTMENT PROMOTION CENTRE**
Provides open datasets critical for AI training and mode development.

 **NATIONAL ENTREPRENEURSHIP PROGRAMME**
NEIP provides training, funding and mentorship to start-ups and small businesses in Ghana.

Private Sector and Tech Startups

 **Aishere**  **Heritors Labs**
Engaged in AI research, machine learning and engineering education.

 **Kwame AI**  **FARMERLINE**  **mPharma**  **Okra**
Start-ups leveraging AI in health, agriculture, fintech and logistics.

 **telecel**  **MTN**  **airteligo**
Enable digital platforms and mobile connectivity for AI services.

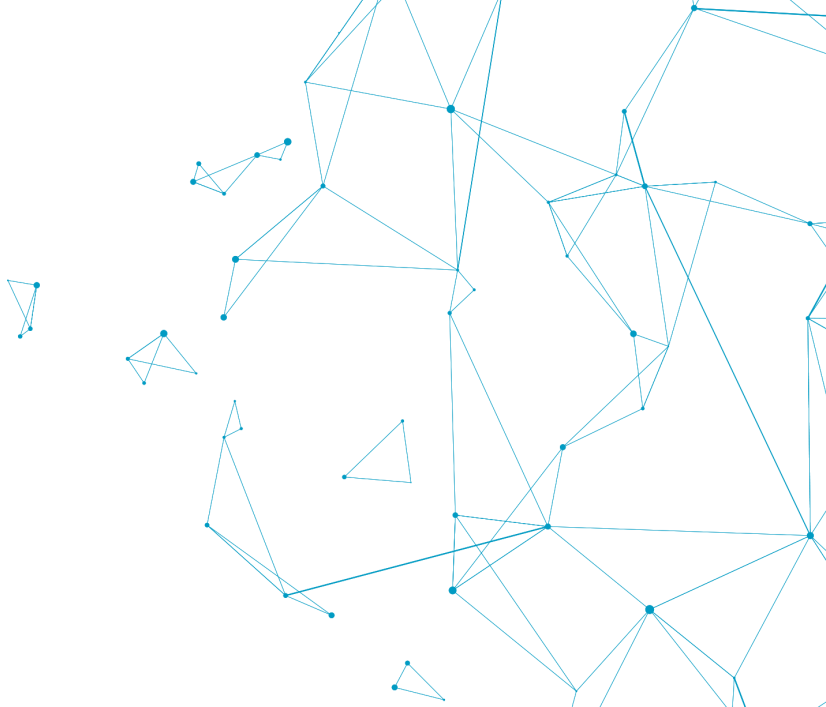
 **ISPACE**  **mest**  **HUB Accra**
Supports early-stage start-ups and AI entrepreneurs.



This is a snapshot of the Ghanaian AI Ecosystem and not an exhaustive list of actors.

This ecosystem includes government ministries and regulatory bodies, academic and research institutions, private sector innovators, civil society actors, and international development partners. Each plays a unique role in ensuring that AI technologies are not only adopted but also aligned with Ghana’s development priorities, regulatory frameworks, and ethical values.

An important feature of Ghana’s AI landscape is the growing collaboration between these sectors. Universities are partnering with tech startups to co-develop real-world AI solutions. Government agencies are teaming up with civil society and the private sector to pilot AI use cases in public service delivery, traffic management, and health diagnostics. These cross-sectoral efforts are essential for promoting AI innovation that is grounded in local needs and realities.



1.12. Section One Recap

This chapter outlined Ghana's journey in Artificial Intelligence (AI) within the national development context and global governance frameworks. It defined AI as the capability of computer systems to simulate human intelligence, including learning, reasoning, interaction, and decision-making to achieve human-defined goals. Key historical milestones include Ashesi University's 2005 launch of one of Ghana's first formal AI courses, DreamOval's gesture-controlled banking interface, and Farmerline's AI-driven agricultural advisory services. Technology hubs, such as Kumasi Hive, iSpace, Impact Hub Accra, and Ghana Tech Lab, have nurtured youth-led innovation and supported local startups.

Ghana's multi-stakeholder AI ecosystem includes practitioners, developers, policymakers, researchers, regulators, civil society, and communities, working alongside partners such as UNESCO, GIZ, and the FAIR Forward – AI for All initiative. These collaborations align with global reference points, including the OECD AI Principles, the African Union's Continental Artificial Intelligence Strategy, and the UNESCO Recommendation on the Ethics of Artificial Intelligence.

The chapter categorised AI applications, classified AI by risk levels using examples like the European Union's AI Act, and assessed the ecosystem's current state. It identified key drivers, such as youthful demographics, open data, and public-private partnerships, as well as key challenges, including infrastructure deficits, skills gaps, and regulatory fragmentation.

It concluded by highlighting strategic gaps and opportunities, demonstrating how improvements in infrastructure, skills, governance, cultural integration, trade readiness, and financing can position Ghana as a leader in responsible AI adoption under frameworks such as the AfCFTA's Digital Protocol, thereby contributing to inclusive growth, cultural preservation, and sustainable innovation.

SECTION 02

RESPONSIBLE AI: GUIDELINES ON THE ETHICAL, LEGAL, AND INSTITUTIONAL GOVERNANCE OF ARTIFICIAL INTELLIGENCE IN GHANA

2.1. Introduction

Responsible Artificial Intelligence (Responsible AI) refers to the design, development, deployment, and use of AI systems in a way that is ethical, transparent, accountable, inclusive, and aligned with human rights, democratic values, and societal well-being.

These guidelines aim to provide a nationally relevant framework to guide the ethical use, regulation, and institutional governance of Artificial Intelligence (AI) in Ghana. They reflect international best practices, Ghana's legal context, and African values on justice, human dignity, and inclusion



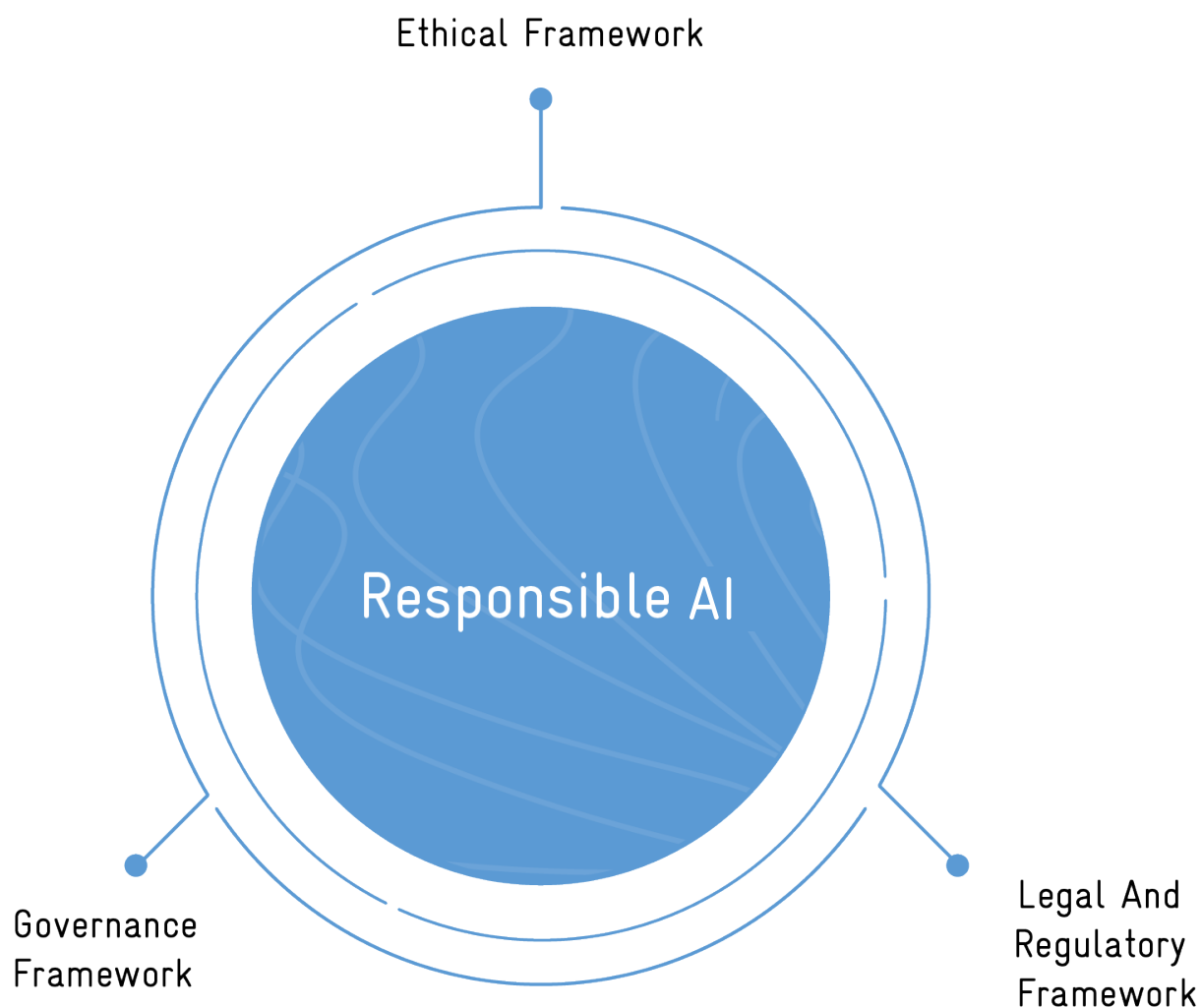


Fig 2.1 Responsible AI framework

2.2. Ethical Guidlines for Responsible AI

Grounded in the OECD AI Principles¹¹, the UNESCO AI Ethics Recommendation¹² (2021), and the African Charter on Human and Peoples' Rights (1981), Ghana's ethical AI governance should be based on the following principles.

¹¹ OECD. (2019). Recommendation of the Council on Artificial Intelligence. <https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449>

¹² UNESCO. (2021). Recommendation on the Ethics of Artificial Intelligence. <https://unesdoc.unesco.org/ark:/48223/pf0000381137>

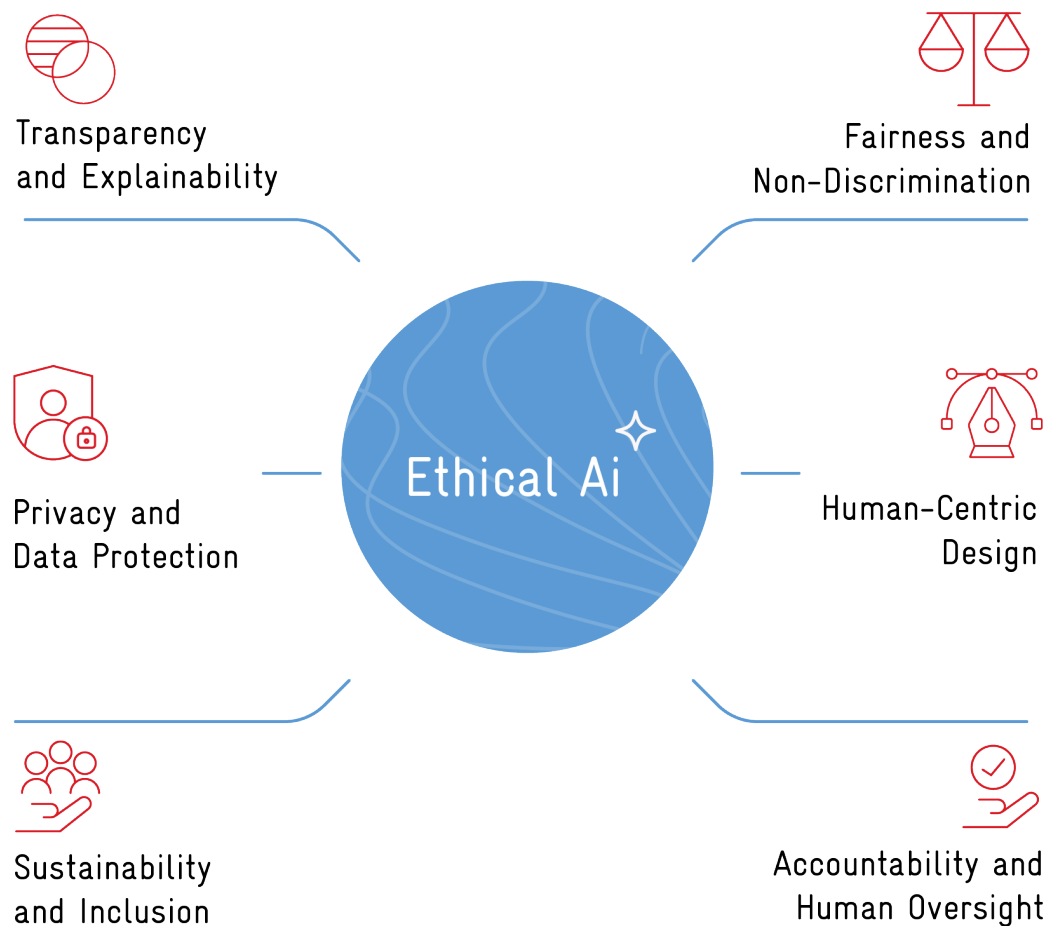


Fig 2.2 Ethical AI framework

1. Fairness and Non-Discrimination

AI systems can unintentionally discriminate if they are trained on biased data. Globally, this has led to unfair treatment in areas like hiring, policing, and healthcare¹³. In Ghana, where ethnic, gender, religious, political, and regional diversity is high, it's important that AI systems reflect and respect this diversity to prevent exclusion or harm.

Guidelines

- All AI systems must undergo bias and discrimination impact assessments before deployment.
- Algorithmic profiling based on ethnicity, gender, religion, political, or economic status must be banned.
- Developers must use diverse and representative datasets that capture Ghana's cultural, social, and geographic variety

¹³ Ibid

2. Transparency and Explainability

Globally, people are calling for AI systems to be more open about how they work, especially when used in decisions that affect lives, like loans, policing, or healthcare¹⁴. In Ghana, trust in AI will only grow if people can understand how these systems make decisions, mainly in government services or public Programmes.

Guidelines

- High-risk AI systems must clearly explain their decisions in plain language, especially to those affected.
- Developers must disclose what data was used, how the system works, and what it's meant to do.
- A central AI registry should be created for all AI systems used by public institutions, so citizens and regulators can track and review them.

3. Accountability and Human Oversight

AI systems are making decisions in areas where human lives and rights are at stake like criminal justice, medical diagnosis, or hiring. Without clear responsibility and oversight, errors can go unchallenged, and no one is held accountable¹⁵. In Ghana, where public trust in institutions is still growing, ensuring that real people, not just machines, remain in control is critical to ethical and lawful AI use.

Guidelines

- Every AI system must have clearly assigned responsibility to a person, company, or institution that is legally and ethically accountable for its decisions and outcomes.
- Human oversight must be built into all AI systems used in high-impact sectors like justice, law enforcement, healthcare, and employment. Humans should always have the final say.
- Require regular independent audits and reviews of AI systems to check for fairness, safety, and compliance with ethical and legal standards.

4. Privacy and Data Protection

People are increasingly concerned about how AI systems collect, store, and use their personal information, especially in surveillance, facial recognition, and biometric tracking¹⁶. In Ghana, the right to privacy is protected under the Data Protection Act, 2012 (Act 843). Intellectual property and proprietary information are protected on a statutory level by the Copyright Act, 2005 (Act 690), the Patents Act, 2003 (Act 657) and Trademarks Act, 2004 (Act 664), and on a contractual level through the use of licensing agreements. Despite this, current laws do not yet fully address the unique privacy risks posed by AI technologies.

¹⁴ Op. cit. (OECD, 2019); African Union (AU) (2024). Continental Artificial Intelligence Strategy: Harnessing AI for Africa's Development and Prosperity. https://au.int/sites/default/files/documents/44004-doc-EN-Continental_AI_Strategy_July_2024.pdf

¹⁵ Op. Cit. (UNESCO, 2021; OECD, 2019; AU, 2024).

¹⁶ Ibid

Guidelines

- All AI projects in Ghana must fully comply with the Data Protection Act, 2012 (Act 843)¹⁷, ensuring that data is collected lawfully, transparently, and with a clear purpose.
- AI-specific privacy rules should be introduced to govern the use of technologies like automated surveillance, facial recognition, and biometric identification.
- Individuals must be given clear consent options before their data is processed by AI systems, along with the ability to opt out where possible, especially in public service or commercial use.

5. Human-Centric Design

Internationally, there is growing agreement that AI should enhance not replace human judgment, well-being, and dignity¹⁸. In Ghana, where respect for human life and communal values is deeply rooted, AI systems must be built to serve people, not control or dehumanise them. It is especially important that affected communities are part of shaping how these technologies are designed and used.

Guidelines

- AI systems must be designed to protect and promote human dignity, safety, and autonomy, especially in areas like healthcare, education, and justice.
- AI tools that replace critical human judgment in sensitive decisions, such as legal rulings, child welfare, or medical treatment, must be prohibited or tightly regulated.
- Developers should adopt participatory design approaches that involve local communities, civil society, and end users throughout the development process, ensuring that AI responds to Ghanaian social, cultural, and ethical needs.

6. Sustainability and Inclusion

AI is being used to support the Sustainable Development Goals (SDGs), from improving education and agriculture to tackling climate change (OECD, 2019). But without inclusive design, many groups, especially in the Global South, are left out of the benefits. In Ghana, rural communities, women, youth, and persons with disabilities often face digital exclusion. For AI to truly serve national development, it must be both environmentally sustainable and socially inclusive.

Guidelines

- Ghana should Prioritise AI initiatives that directly support the SDGs, particularly in key sectors like agriculture, education, health, and environmental sustainability.
- All AI development processes must actively include underrepresented groups, such as youth, women, persons with disabilities, and rural populations, to ensure fairness and relevance.

¹⁷ Parliament of Ghana, (2012). Data Protection Act, 2012 (Act 843). <https://dataprotection.org.gh/data-protection-act>

¹⁸ Op. Cit. (UNESCO, 2021; OECD, 2019; AU, 2024).

- Developers must create multilingual and low-bandwidth versions of AI systems to make them accessible across all regions, including areas with limited internet infrastructure or low literacy levels.

2.3. Legal and Regulatory Guidelines for Responsible AI



As AI systems rapidly evolve, countries around the world are updating their laws to keep up with emerging risks around safety, accountability, and human rights.

Ghana does not yet have a dedicated “AI law”, However, Ghana has a strong framework of existing laws and regulations which govern the key areas that AI intersects with. These areas include data protection, electronic transactions, cybersecurity, and intellectual property. These instruments, all in force as of 2025, create legal conditions under which AI practitioners must operate. Below is an overview of the major laws and regulatory regimes relevant to AI in Ghana:

1. Data Protection Act, 2012 (Act 843)¹⁹

- The Data Protection Act, 2012 (Act 843) is the primary legal framework for data privacy in Ghana and is directly relevant to AI, which heavily relies on data processing.
- The Act established the independent Data Protection Commission (DPC) to oversee enforcement and uphold data privacy rights.
- It sets out principles governing personal data processing, including consent, legality, transparency, data minimisation, and security.
- All entities processing personal data in Ghana, including AI companies using user or training data, must register with the DPC and renew their registration every two years.
- Medium and large-scale organisations are required to appoint Data Protection Supervisors and implement internal compliance measures.

¹⁹ Data Protection Act 2012 (Act 843).

- The DPC actively enforces compliance; in 2023, it launched a nationwide campaign targeting non-compliant data controllers.
- Under Sections 56 and 95 of Act 843²⁰, non-compliance, such as failure to register or breach of data principles, is an offence punishable by fines or imprisonment upon summary conviction.
- AI developers in Ghana must integrate data privacy protections into system design to ensure lawful collection and processing of data.
- The Act empowers the DPC to audit organisations, issue enforcement notices, and sanction violators, providing robust legal safeguards for data use in AI systems.

2. Electronic Transactions Act, 2008 (Act 772)²¹

- The Electronic Transactions Act, 2008 (Act 772) provides the legal foundation for electronic communications, e-commerce, and digital services in Ghana.
- It grants legal recognition to electronic records and digital signatures, enabling AI systems to validly execute online contracts or consent forms.
- The Act establishes intermediary liability protections for service providers such as ISPs, network operators, and platforms, shielding them from liability for third-party content they do not originate, alter, or selectively transmit.
- This safe-harbor protection is crucial for AI platforms that host or transmit user-generated content, provided they comply with takedown requests.
- Though it does not explicitly reference AI, Act 772 applies to AI-enabled services that function through electronic transactions or contracts.
- Compliance obligations under Act 772 include secure handling of electronic records, valid use of digital signatures, and adherence to consumer protection standards in online service delivery.
- The National Information Technology Agency (NITA), under Act 771²², supports the implementation of Act 772 by regulating ICT standards, issuing guidelines, and coordinating e-government initiatives.
- AI service providers may be subject to NITA's licensing or certification requirements, especially when delivering network-based services.
- Overall, Act 772 provides a legal backbone for AI-driven services by legitimising their digital operations and defining the responsibilities of digital actors in Ghana's online economy.

3 Cybersecurity Act, 2020 (Act 1038)²³

- The Cybersecurity Act, 2020 (Act 1038) provides a comprehensive legal framework for cybersecurity in Ghana, which is essential for the safe operation of AI systems.
- The Act established the Cyber Security Authority (CSA) as the national regulator for cybersecurity

²⁰ Ibid

²¹ Electronic Transactions Act 2008 (Act 772).

²² National Information Technology Agency Act 2008 (Act 771)

²³ Cybersecurity Act 2020 (Act 1038).

- The CSA's mandate includes protecting critical information infrastructure, coordinating cyber incident responses, monitoring threats, issuing standards and guidelines, and promoting public awareness on cybersecurity.
- AI solutions related to cybersecurity (e.g., AI-based intrusion detection or encryption tools) may require licensing or accreditation from the CSA.
- Companies offering cybersecurity services such as digital forensic analysis must obtain appropriate Licences under Act 1038.
- The Act formalises Ghana's adherence to international cybersecurity norms, including the Budapest Convention²⁴ on Cybercrime and the AU Malabo Convention²⁵.
- Law enforcement may, with court approval, intercept data or seize computer systems for investigations, with safeguards to protect unrelated personal data and privacy.
- This framework balances effective investigation of cybercrimes (including AI-facilitated offences) with protections against arbitrary surveillance.
- AI systems deployed in Ghana must comply with cybersecurity standards to prevent cyberattacks, misuse, or breaches.
- AI technologies used in critical sectors such as finance, energy, or telecommunications may be subject to additional oversight by the CSA.
- Overall, the Act enhances trust and safety in Ghana's digital environment, supporting the secure and responsible deployment of AI technologies.

4. Intellectual Property (IP) Frameworks

- Ghana protects AI innovations under existing IP laws, though these laws do not yet explicitly address AI-generated content.
- The main IP statutes include the Copyright Act, 2005 (Act 690)²⁶, the Patents Act, 2003 (Act 657)²⁷, and the Trademarks Act, 2004 (Act 664)²⁸.
- Ghana's IP laws are aligned with international treaties such as WIPO conventions²⁹ and the TRIPS Agreement³⁰.

²⁴ Convention on Cybercrime (Budapest Convention) (opened for signature 23 November 2001, entered into force 1 July 2004) ETS No 185.

²⁵ African Union Convention on Cyber Security and Personal Data Protection (Malabo Convention) (adopted 27 June 2014, entered into force 8 June 2023).

²⁶ Copyright Act 2005 (Act 690)

²⁷ Patents Act 2003 (Act 657)

²⁸ Trademarks Act 2004 (Act 664)

²⁹ Convention Establishing the World Intellectual Property Organisation (adopted 14 July 1967, entered into force 26 April 1970) 828 UNTS 3

³⁰ Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement) (15 April 1994) Marrakesh Agreement Establishing the World Trade Organisation, Annex 1C, 1869 UNTS 299.

- Under Section 76 of Act 690³¹, computer software, including source and object code, is protected as a literary work, granting copyright to AI developers for their code and algorithms.
- The Patents Act (Act 657)³² allows patenting of novel, non-obvious technical solutions, including certain AI-related inventions such as diagnostic tools or AI hardware, though abstract algorithms alone are not patentable.
- Act 664³³ allows AI companies to register trademarks such as names and logos to protect brand identity.
- Ghana's IP laws currently require a human author or inventor, so purely AI-generated works have no clear entitlement to copyright or patent protection.
- Section 76 of the Copyright Act (Act 690)³⁴ defines an "author" as a natural person, meaning AI-generated works without human input may fall into the public domain.
- If AI is used as a tool with human creative input, the human may claim authorship, though this remains legally untested in Ghana.
- Patent law similarly lacks clarity on whether AI-designed inventions with minimal human involvement are patentable.
- These legal gaps have prompted calls for IP law reform to address issues such as ownership of AI-generated works and protection of training datasets or models.
- Despite the uncertainties, AI practitioners use the existing IP framework to protect code, software, and brand identity.
- Ghanaian courts and IP institutions have not yet issued authoritative rulings on AI-generated content, but legal interpretations may evolve to accommodate emerging challenges.
- For now, Ghana's IP laws offer solid protection for foundational AI components, while acknowledging the need for legal updates to cover new AI-specific scenarios patentable.
- These legal gaps have prompted calls for IP law reform to address issues such as ownership of AI-generated works and protection of training datasets or models.
- Despite the uncertainties, AI practitioners use the existing IP framework to protect code, software, and brand identity.
- Ghanaian courts and IP institutions have not yet issued authoritative rulings on AI-generated content, but legal interpretations may evolve to accommodate emerging challenges.
- For now, Ghana's IP laws offer solid protection for foundational AI components, while acknowledging the need for legal updates to cover new AI-specific scenarios.

5. Business Registration and Technology Sector Regulations

- AI companies in Ghana operate under general business law, with some sector-specific regulations affecting their operations.

³¹ Ibid, n. 8

³² Ibid, n. 9

³³ Ibid, n. 10

³⁴ Ibid, n. 8

- All businesses, including AI startups, must register with the Registrar General's Department under the Companies Act, 2019 (Act 992)³⁵ to gain legal personality.
- Foreign-owned tech businesses are subject to the Ghana Investment Promotion Centre (GIPC) Act, 2013 (Act 865),³⁶ which sets minimum capital requirements and offers tax incentives when registered with GIPC.
- The Bank of Ghana has established a regulatory sandbox for fintech innovation, allowing AI-driven financial products (e.g., credit scoring, fraud detection, digital banking) to be tested under supervised conditions before full regulatory compliance.
- Depending on the domain of application, AI technologies may be subject to sector-specific regulation:
 - Ghana Health Service and Food & Drugs Authority for medical AI.
 - Transport and Aviation authorities for autonomous vehicles or drones.
 - National Communications Authority (NCA) for AI in media, content moderation, or broadcasting.
- AI firms handling personal data must register with the Data Protection Commission (DPC) and comply with audits and privacy safeguards under Act 843.³⁷
- Companies offering cybersecurity-related AI solutions must be Licenced by the Cyber Security Authority (CSA) under Act 1038.³⁸
- These obligations ensure that AI businesses integrate data privacy and cybersecurity into their operations.
- The Ministry of Communication, Digital Technology and Innovation (MoCDTI) is actively updating regulatory frameworks to reflect technological changes.
- Subsidiary legislation, such as the Electronic Transactions Regulations (LI 2416)³⁹ under Act 772⁴⁰, sets cybersecurity and critical infrastructure standards.
- Ghana's regulatory landscape for AI businesses includes a patchwork of legal requirements like business registration, sectoral licensing, data and cybersecurity compliance, and consumer protection obligations.
- Enforcement is improving. The DPC began issuing penalties in 2023 for non-registration and data protection breaches, and the CSA commenced licensing audits.

Although there is no single AI regulator in Ghana, this array of existing laws ensures that AI development happens within a controlled legal environment that protects citizens' interests and fosters trust in technology. In conclusion, Ghana's current legal landscape, while not AI-specific yet, addresses the critical risk areas of AI. These include data privacy, digital transactions, cybersecurity, IP, and business accountability.

True to its reputation as a recognised continental leader, Ghana was one of the first African countries to draft a National AI strategy in 2022. The strategy outlined a comprehensive roadmap for the safe, inclusive, and beneficial adoption of AI while proposing measures to mitigate its associated risks.

³⁵ Companies Act 2019 (Act 992)

³⁶ Ghana Investment Promotion Centre Act 2013 (Act 865)

³⁷ Ibid, n. 1

³⁸ Ibid, n. 5

³⁹ Electronic Transactions Regulations, 2020 (LI 2416)

⁴⁰ Ibid, n. 3

The draft Ghana National AI Strategy underwent review in the first quarter of 2025, characterised by multiple stakeholder consultations and targeted feedback initiatives. The strategy is expected to be adopted by December 2025⁴¹.

To address the identified gaps in existing laws, the Ministry of Communication, Digital Technology and Innovation (MoCDTI) is leading an extensive legislative review process which aims to modernise Ghana's legal and regulatory framework and align it with the advancements in technology.

The initiative includes proposed amendments to key digital laws such as:

- The Data Protection Act;
- The Cybersecurity Act;
- The National Information Technology Agency Act; and
- The Electronic Transactions Act.

In addition to updating existing laws, MoCDTI is developing new legislation that directly addresses the promotion and governance of AI and related technologies in line with national interests. These include:

- The Emerging Technologies Bill⁴² – to establish a dedicated framework for the responsible deployment of frontier technologies, including AI, that promotes research and encourages innovation and development while setting safeguards around ethical use.
- The Data Harmonisation Bill⁴³ – to establish a legal framework which supports the secure, lawful, and standardised sharing of high-quality datasets across the public and private sector.
- The Digital Economy and Innovation Development Fund Bill⁴⁴ – to provide financial and technical support for digital infrastructure, innovation, skills development, entrepreneurship, and inclusive access to digital services

The bills are expected to be presented before Parliament by 2026 and will be informed by multiple rounds of rigorous stakeholder engagements. This process will allow contributions from industry professionals and practitioners to ensure proposed frameworks reflect the practical realities of AI development and deployment in Ghana.

⁴¹ <https://citinewsroom.com/2025/07/ghanas-10-year-ai-strategy-nears-completion-julius-debrah/>

⁴² <https://www.linkedin.com/feed/update/urn:li:activity:7356734312030842881/>

⁴³ <https://www.linkedin.com/feed/update/urn:li:activity:7361332981485006849/>

⁴⁴ <https://www.linkedin.com/feed/update/urn:li:activity:7358524858986573825/>

6 Update and Harmonise Existing Laws

As AI becomes more integrated into everyday systems, banking, healthcare, security, countries are updating their existing laws to address new forms of harm, risk, and rights violations⁴⁵. Ghana's digital laws, such as the Cybersecurity Act (Act 1038), Data Protection Act (Act 843), and Electronic Transactions Act (Act 772), were not written with AI in mind. Updating these laws will ensure they remain relevant in the face of rapidly evolving technologies.

Guidelines

- Amend existing laws to address AI-specific issues like algorithmic bias, automated decision-making, and AI-driven surveillance.
- Clarify Ghana's intellectual property laws to protect both developers and users of AI-generated content and software.
- Define legal thresholds to classify AI systems (e.g., low-risk, high-risk), so regulation is appropriate and not overly burdensome.

7 Develop a National AI Law

Many countries, including Brazil, the EU, and Canada, are drafting or enacting specific AI legislation to govern how these technologies are developed and used⁴⁶. Ghana currently lacks a dedicated legal framework for AI, making it harder to ensure consistency, accountability, and protection for citizens when things go wrong.

Guidelines

- Enact a comprehensive National AI Regulation Act that:
- Legally defines AI and its scope in Ghana.
- Establishes responsibilities for developers, users, and data controllers.
- Requires impact assessments and explanations for how AI systems make decisions.
- Sets clear penalties for misuse or harm caused by AI systems.

8 Align with International Standards

AI is a global technology, and no country can regulate it in isolation. International frameworks like the EU AI Act, National Institute of Standards and Technology (NIST) AI Risk Framework, and the African Union offer tested tools and shared values that Ghana can adapt to suit its local context. Aligning with these standards ensures Ghana stays competitive while protecting its people.

⁴⁵ European Commission. (2021). Artificial Intelligence Act Proposal. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021PC0206>

⁴⁶ NIST. (2023). AI Risk Management Framework (Version 1.0). <https://www.nist.gov/itl/ai-risk-management-framework>

Guidelines

- Integrate best practices from international frameworks, especially for risk classification, transparency, and human rights protections.
- Engage in African and global AI policy networks to influence and adopt emerging standards.
- Adopt global safeguards on sensitive technologies like facial recognition, biometric data, and autonomous systems to prevent abuse and misuse.

9 Establish Redress and Remedy Mechanisms

When AI makes a harmful or unfair decision, people need clear ways to challenge it. Globally, there's growing recognition that accountability means giving people access to appeal processes and compensation when AI causes harm (UNESCO, 2021). In Ghana, ensuring access to justice is essential for building trust in digital technologies, especially in the public sector.

Guidelines

- Create legal processes that allow individuals to challenge or appeal AI decisions, especially in health, employment, and policing.
- Require developers and institutions to maintain audit trails that show how AI systems operate and make decisions.
- Make it mandatory to document the sources of data, design logic, and ethical assessments for all high-risk AI systems.

2.4. Institutional and Governance Guidelines for Responsible AI

Nations worldwide are discovering that laws alone cannot adequately regulate Artificial Intelligence (AI). Effective AI governance also requires strong institutions, collaboration between sectors, and public understanding (OECD, 2019; UNESCO, 2021). For Ghana, building inclusive and well-resourced structures is critical to ensure AI technologies are not only innovative but also ethical, safe, and accountable to society. Here is a list of existing AI-related governance structures in Ghana:

Governance and Institutional Structures for AI in Ghana

Lead Ministry: Ministry of Communication, Digital Technology and Innovation (MOCDTI)

- Oversees National AI Strategy development and implementation.
- Supervises key agencies for digital governance

Key Institutions:



**DATA PROTECTION
COMMISSION**

1. Data Protection Commission (DPC)

- Enforces data laws
- Conducts training and audits
- Advisory role for AI projects with personal data
- Promotes privacy-by-design



2. Cyber Security Authority (CSA)

- Regulates national cybersecurity
- Oversees CERT-GH⁴⁷
- Audits AI systems in critical sectors
- International collaboration and cyber norms enforcement



3. National Information Technology Agency (NITA)

- Implements IT policy and is responsible for the regulation, development, and expansion of Ghana's national IT infrastructure
- Sets standards for digital services
- Drives e-government and AI pilots in public service
- Developed Digital Economy Policy including AI elements



4. National Communications Authority (NCA)

- Regulates telecoms and spectrum use
- May Licence AI-enabled communications services



BANK OF GHANA

5. Bank of Ghana (BoG)

- Fintech regulatory sandbox
- Oversees AI in digital finance

6. Other Sector Regulators:

- National Health Insurance Authority (NHIA)
- Health Insurance related AI
- SEC (Finance/Investment AI)
- Transport and aviation regulators (Autonomous systems)

7. Governance model:

- Multi-agency approach, with AI oversight integrated into existing mandates
- Coordinated through MoCDTT's national digital and AI strategies

Considering the gaps in Ghana's current AI Governance structure, here are some proposals for improvement

⁴⁷ <https://www.csa.gov.gh/cert-gh>

Establish a National AI Commission

Several countries have created dedicated agencies or commissions to guide national AI development, for example, Canada's AI Advisory Council or Singapore's AI Governance Office. Ghana currently lacks a central institution to coordinate AI efforts, resulting in fragmented oversight.

Guidelines

- Ghana should create an independent and well-resourced National AI Commission through an Act of Parliament.
- This Commission should:
 - i. Coordinate national AI policy and strategy, ensuring alignment across ministries.
 - ii. Accredite and monitor high-risk AI systems, particularly in public services.
 - iii. Act as Ghana's official representative in global AI governance forums.
 - iv. Promote ethical innovation through public guidance, funding, and partnerships with academia and industry.

Clarify Multi-Stakeholder Roles

AI affects all sectors of society, and no single actor can govern it alone. International guidance encourages countries to adopt multi-stakeholder models that involve government, industry, academia, and civil society (UNESCO, 2021). In Ghana, clear role-sharing can improve coordination, innovation, and public trust.

Guidelines

- **Government:** Lead in drafting and enforcing laws, setting national policy, and applying standards in public procurement.
- **Private Sector:** Follow ethical AI codes of conduct, submit systems for regulatory review, and ensure transparency in AI development.
- **Academia:** Research into AI safety and its societal impact; provide training and evidence for policy development.
- **Civil Society:** Monitor inclusion, fairness, and human rights in AI use; serve as a voice for affected and marginalized groups.

Invest in Capacity and Public Awareness

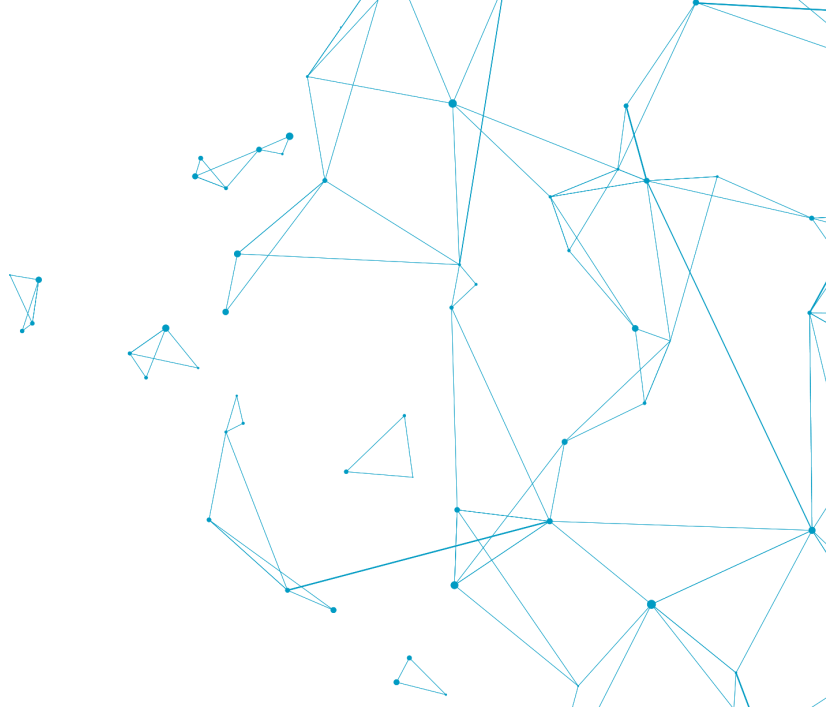
Globally, lack of AI literacy and technical capacity is one of the biggest barriers to responsible innovation, especially in low- and middle-income countries (UNESCO, 2021). In Ghana, investments in public education, legal expertise, and community engagement will be essential to ensure that people not only use AI but understand and shape its impact.

Guidelines

- Launch national campaigns to improve AI literacy, especially for youth, civil servants, lawyers, educators, and journalists.
- Support Ghanaian universities, law schools, and tech hubs to develop Programmes in AI ethics, policy, and

regulation.

- Fund community-driven forums and dialogues to raise public awareness and collect diverse views on AI's social, economic, and cultural impact.



2.5. Section Two Recap

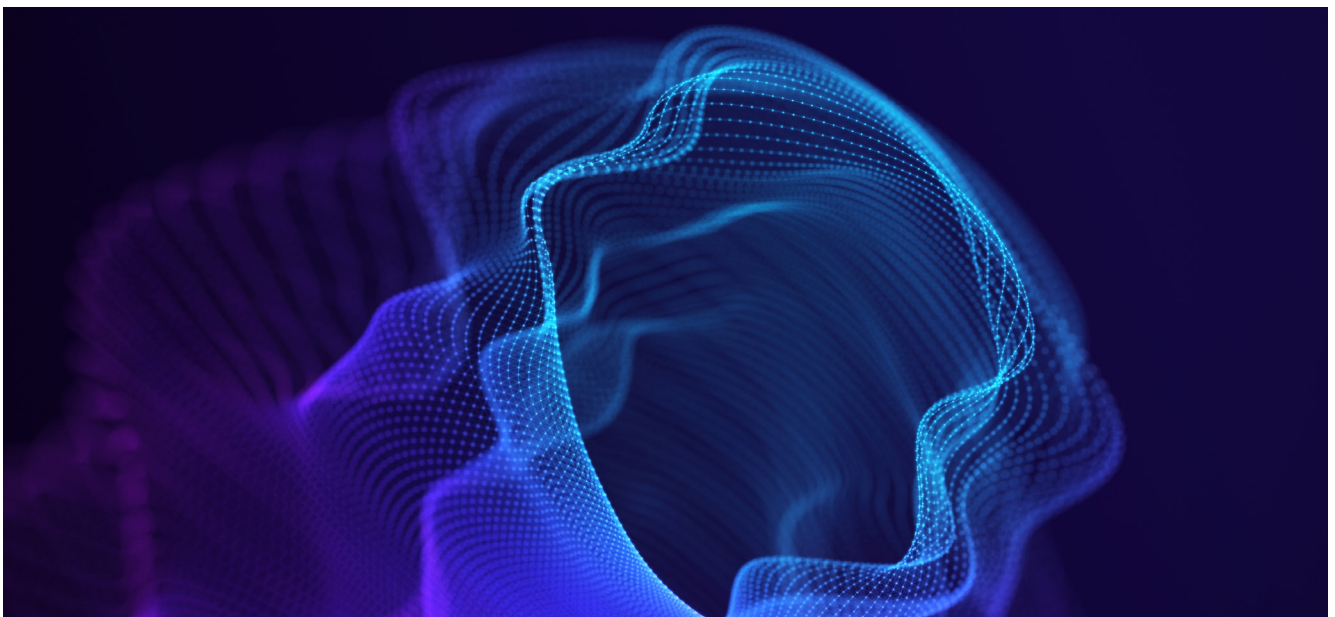
This section presented Artificial Intelligence as a powerful opportunity for Ghana's development, but emphasised that this potential could only be realised through responsible and inclusive action. It provided a clear roadmap for building ethical AI systems, strengthening legal safeguards, and creating accountable institutions. With strong leadership, cross-sector collaboration, and a shared national vision, Ghana was positioned to set the standard for trustworthy and transformative AI across Africa.

SECTION 03

AI DEVELOPMENT AND DEPLOYMENT

3.1. Introduction

Artificial Intelligence (AI) development and deployment encompass the entire process of translating ideas into functioning systems that can operate reliably and responsibly in real-world settings. It involves far more than coding algorithms; it is the integration of **problem definition, data stewardship, model design, validation, infrastructure planning, governance, and sustainable operation.**



Globally, leading frameworks such as the European Union Artificial Intelligence Act (EU AI Act), the National Institute of Standards and Technology Artificial Intelligence Risk Management Framework (NIST AI RMF) in the United States, and the United Nations Educational, Scientific and Cultural Organisation (UNESCO) Recommendation on the Ethics of Artificial Intelligence highlight that effective AI requires not only technical precision but also ethical safeguards, transparency, and accountability. The Organisation for Economic Co-operation and Development Artificial Intelligence Principles (OECD AI Principles) and the emerging African Union Artificial Intelligence Continental Strategy reinforce this by emphasising inclusivity, fairness, and socio-economic alignment.

Within this context, AI development begins with defining a problem clearly and determining whether it can be addressed using AI methods. This requires alignment between technical feasibility, availability of high-quality data, and relevance to societal needs. Deployment extends this process by embedding models into usable applications, monitoring their performance over time, and adapting them as data and contexts evolve. It is an iterative journey that demands technical expertise, domain knowledge, ethical awareness, and institutional support.

For Ghana, development and deployment must reflect both global best practice and the specific realities of the national ecosystem. This means accounting for challenges such as high computing costs, uneven internet access, and data sovereignty, while also leveraging opportunities such as open datasets, multilingual communities, and growing digital infrastructure. It also involves ensuring that solutions are sustainable within local resource constraints, and that they deliver value to farmers, teachers, healthcare workers, businesses, and public services.

In essence, AI development and deployment are about moving from concept to impact. They involve designing systems that are not only technically sound but also contextually relevant, socially beneficial, and capable of evolving with future technological and societal shifts.

3.2. Best Practices for AI Model Development

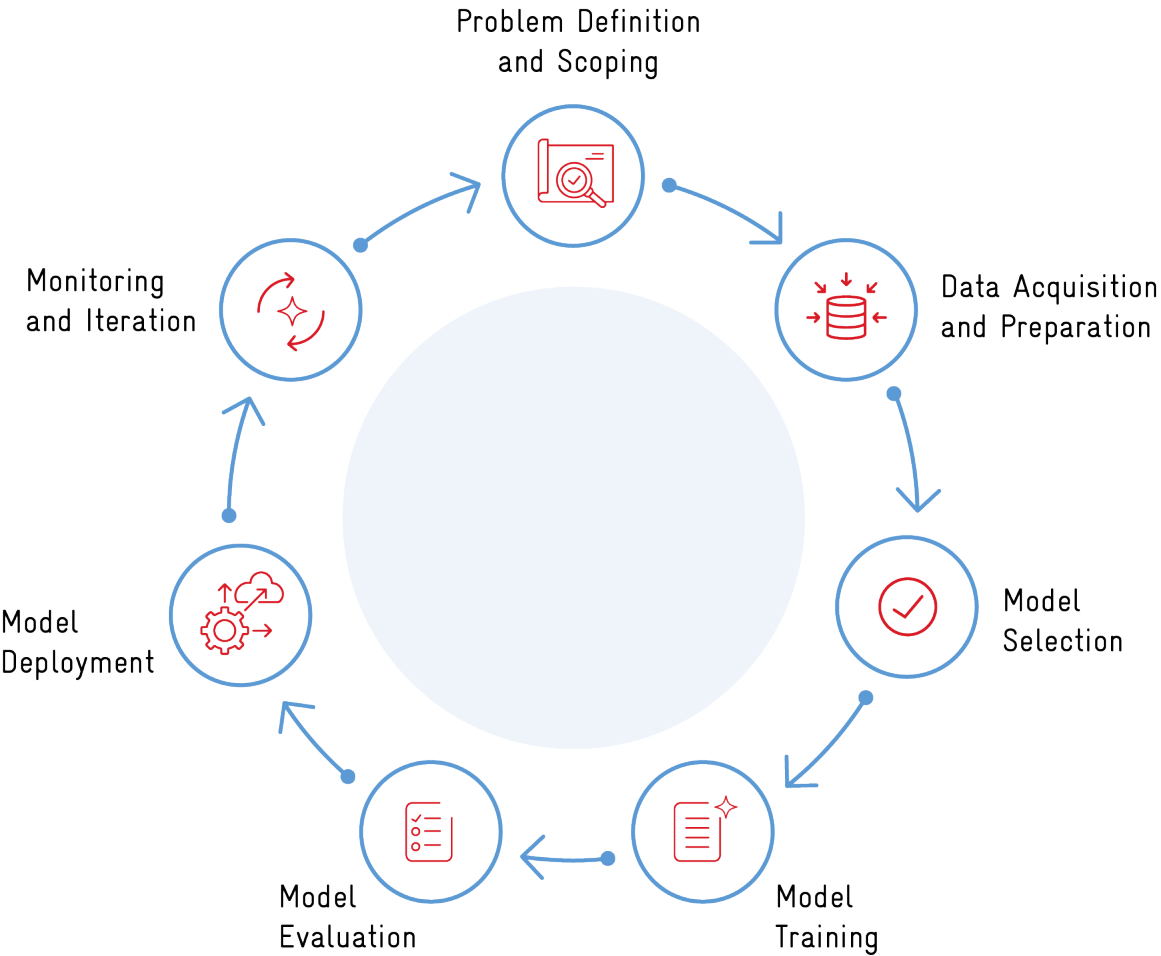
Developing AI models requires balancing scientific precision with practical usability. It is not enough to design a sophisticated algorithm; the process must ensure that models are reliable, interpretable, ethical, and resilient across diverse real-world environments. Globally, leading frameworks such as the NIST AI RMF, the EU AI Act, and the OECD AI Principles highlight that model development should integrate risk management, fairness, transparency, and accountability from the outset.

In Ghana, the stakes are particularly high. AI models must perform well in contexts where datasets are sparse or unevenly distributed, where electricity and internet access may be inconsistent, and where the end users include not only highly skilled professionals but also farmers, traders, health workers, and local administrators. The Ghana Cocoa Board (COCOBOD), for instance, collates agricultural data that could power predictive crop models, but unless these models are built responsibly with attention to data quality, interpretability, and user accessibility, they may fail to serve those who need them most.

AI model development is therefore best understood as a lifecycle, where each stage is both technical and ethical. The stages are iterative, and weaknesses at one point can undermine the system as a whole.

The table below presents the AI Model Development Lifecycle adapted to Ghana’s context. It draws from global frameworks such as the Cross Industry Standard Process for Data Mining (CRISP-DM) for structured workflows, Machine Learning Operations (MLOps) for operationalisation, and the NIST AI RMF for risk management. Each stage is described in terms of its global principle, a Ghanaian example, and practical guidance for practitioners.

3.2.1 The AI Model Development Lifecycle



3.1.1 The AI Model Development Lifecycle

Table 3.1 AI Model Development Lifecycle in the Ghanaian Context

STAGE	CORE GLOBAL PRINCIPLE	GHANAIAN CONTEXT EXAMPLE	FUTURE-LEANING GUIDANCE FOR PRACTITIONER
Problem Definition and Scoping	Define the “why” and “what” clearly; ensure feasibility, ethical considerations, and measurable outcomes (NIST AI RMF, OECD AI Principles).	A national agricultural oversight body such as the Ghana Cocoa Board (COCOBOD) exploring AI to reduce crop losses in key agricultural regions such as the Ashanti Region.	Reframe challenges as AI problems, e.g., multimodal AI for predicting crop yields using weather, satellite images, and text reports. Define SMART (Specific, Measurable, Achievable, Relevant, Time-bound) metrics. Consider ethical risk classification (per EU AI Act high-risk categories).
Data Acquisition and Preparation	Collect, explore, clean, and prepare high-quality, ethically sourced data (UNESCO Ethics of AI).	Health survey data from district-level administrative bodies such as Metropolitan, Municipal and District Assemblies (MMDAs); agricultural sensor data.	Conduct Exploratory Data Analysis (EDA) to detect gaps and bias. Apply federated learning for privacy-preserving use of multilingual local datasets (e.g., in Fante, Ewe, Dagbani). Balance between national data sovereignty and innovation.
Model Selection	Select models balancing interpretability and performance; start simple before scaling (EU AI Act transparency rules).	Logistic regression for predicting micro-loan defaults; decision trees for early-stage health diagnostics.	Begin with interpretable “glass-box” models. Adopt advanced models only where justified. For 2025 tasks, explore multimodal vision-language models or parameter-efficient large language models (LLMs). Ensure transparency in sensitive domains.
Model Training	Apply rigorous, reproducible training methods (MLOps practices, CRISP-DM).	Training a diagnostic AI using annotated medical images curated by academic institutions with AI research capacity such as Ashesi University and KNUST.	Optimise with hyperparameter search (grid, random, Bayesian). Integrate bias mitigation libraries (e.g., AI Fairness 360). Use transfer learning and efficient architectures (DistilBERT, MobileNet) to save resources.

STAGE	CORE GLOBAL PRINCIPLE	GHANAIAAN CONTEXT EXAMPLE	FUTURE-LEARNING GUIDANCE FOR PRACTITIONER
Model Evaluation	Validate with fairness, accuracy, robustness, and inclusivity (OECD AI robustness principles; NIST AI RMF).	A voice assistant tested in multiple local languages, including Twi, Fante, and Ewe.	Evaluate against diverse user groups. Apply fairness metrics like equal error rates. Conduct resilience tests under real-world conditions (e.g., low bandwidth). Perform error analysis to expose structural bias.
Model Deployment	Operationalise models using Application Programming Interfaces (APIs), edge devices, or managed platforms (ONNX standards ensure interoperability).	Deploying a mobile-based diagnostic tool for rural clinics with limited connectivity.	Consider serverless computing (AWS Lambda, Google Functions) for lightweight inference, or hybrid deployments combining cloud training and edge deployment. Containerise models with Docker or Kubernetes for portability.
Monitoring and Iteration	Continuously monitor, audit, and retrain (ISO/IEC 42001 AI Management System).	A microfinance institution updating its credit risk AI as customer behaviour evolves.	Monitor for model, data, and concept drift. Establish feedback loops with users. Use explainable AI dashboards. Retrain periodically with new datasets. Document lifecycle changes for auditability. Plan for long-term resource costs.

3.2.2 Agile and Iterative Development for AI

Agile development in Artificial Intelligence (AI) is the disciplined practice of delivering value in short, evidence-driven cycles while managing risk across data, models, and deployment environments. It recognises that datasets evolve, user needs shift, and model behaviour can drift over time. Effective teams therefore combine product agility with technical safeguards from global frameworks such as the National Institute of Standards and Technology Artificial Intelligence Risk Management Framework (NIST AI RMF), the European Union Artificial Intelligence Act (EU AI Act), the Organisation for Economic Co-operation and Development Artificial Intelligence Principles (OECD AI Principles), and Singapore’s Model AI Governance Framework for Generative AI.

Equally important are African anchors. The African Union Artificial Intelligence Continental Strategy (2024) highlights inclusivity and equity in AI development. Kenya’s National AI Strategy (2025) provides examples of agile sectoral application, especially in agriculture and finance. Rwanda’s healthcare pilots demonstrate iterative deployments in resource-constrained settings, and the South Africa AI Institute showcases agile collaboration

models across academia, government, and private sector. These African examples remind us that agility is not only about speed but also about contextual fit and development impact.

In Ghana, Agile development must account for constraints such as intermittent connectivity, energy costs, and multilingual local languages such as Twi, Fante, Ewe, and Dagbani, while keeping solutions practical for small teams.

Agile Methodology

Concept: Emphasizes flexibility, collaboration, and rapid prototyping through short sprints.

Benefits: Adapts to data insights, tests models quickly, and incorporates feedback early.

Practice: Hold daily stand-ups, Prioritise tasks by value/risk, and deliver increments frequently.

Iterative Development

Concept: Build in cycles, refining the system iteratively.

Benefits: Allows multiple rounds of preprocessing, training, and evaluation to achieve desired outcomes.

Continuous Integration and Continuous Deployment (CI/CD) for AI (MLOps)

Concept: Automate building, testing, and deploying AI models.

Benefits: Speeds up development, ensures reproducibility, and simplifies updates.

Practice: Use version control (Git), automate data quality tests, and set up deployment pipelines.

Relevance for Ghana: Basic MLOps principles (version control, automated testing) enhance efficiency for smaller teams (Osei & Amankwah, 2023).

3.2.3 Standards and Practices for AI Lifecycle

To ensure consistency and reliability:

Data Sourcing and Labeling

- **Resources:** Use local data centers (e.g., Africa Data Centres like PAIX) or university infrastructure (e.g., University of Ghana). Collaborate with researchers from the Google AI Research Centre for example.
- **Labeling Standards:** Follow Standardised protocols for tools like CVAT or Doccano, ensuring label accuracy.

Model Development, Validation, and Testing

- **Development:** Use structured workflows (CRISP-DM, MLOps) and version control.
- **Validation:** Apply cross-validation and validation sets for hyperparameter tuning.
- **Testing:** Test on unseen data, focusing on edge cases and diverse groups.

Human-in-the-Loop Systems

- **Practice:** Integrate human oversight for critical applications (e.g., fraud detection in banks), allowing

feedback to refine predictions.

Audits and Benchmarking

- **Audits:** Use tools like AI Fairness 360 to audit for performance and bias.
- **Benchmarking:** Compare against industry benchmarks or baseline models.

International Standards

- **ISO/IEC:** Adhere to ISO/IEC 42001 (AI Management System) and ISO/IEC 38507 (Governance of AI).
- **IEEE:** Follow IEEE 7010 for assessing AI's societal impact (ISO/IEC, 2023; IEEE, 2020).

3.3. Data: The Fuel for Ghanaian AI



AI systems utilize various types of data, broadly categorised into structured, unstructured, and semi-structured data. Structured data, like spreadsheets, has a defined format, while unstructured data, such as images and text, lacks a predefined structure. Semi-structured data falls in between, with some Organisational elements but not a strict tabular format. Common data types include numerical, categorical, text, image, audio, and time series data. High-quality, contextually relevant data is essential for impactful solutions in Ghana.

3.3.1 Sourcing and Curating Local Data Responsibly

Local data reflects Ghana's unique linguistic, cultural, and environmental contexts.

Importance of Local Data

- **Relevance:** Captures Ghanaian dialects, crops, or healthcare challenges, etc. Generally, the data should be collected in Ghana about uniquely Ghanaian experiences.
- **Reduced Bias:** Avoids inequities from Western-centric data.

- **Innovation:** Spurs solutions for Ghana-specific needs.

Strategies for Sourcing

- **Public Sector:** Access datasets from Metropolitan, Municipal, and District Assemblies (MMDAs) (e.g., health, agricultural surveys).
- **Academia:** Collaborate with universities for research datasets. For example, the Responsible AI Lab in KNUST (RAIL) puts out open AI data on their Kaggle account.
- **Private Sector:** Partner with businesses, ensuring privacy and consent.
- **Community-Driven:** Ethically collect data from underserved areas with informed consent.
- **NGOs/CSOs:** Leverage data from Organisations for social good projects.

Ethical Sourcing

- **Informed Consent:** Ensure clear, freely given consent.
- **Benefit Sharing:** Return benefits to data-providing communities.
- **Data Ownership:** Clarify ownership and stewardship.
- **Quality Focus:** Prioritise high-quality, curated datasets over large, noisy ones.

Localization and Sovereignty

- **Local Ownership:** Use local data centers to retain control and prevent exploitation.
- **Protection:** Implement encryption and access controls to safeguard data.
- **Open Data:** Promote open data initiatives for innovation, complying with privacy laws.

Regional and International Open-Source AI initiatives:

1. **FAIR Forward:** GIZ's FAIR Forward - Artificial Intelligence for All initiative⁴⁸ is dedicated to the open and sustainable development and application of artificial intelligence, particularly supporting seven partnering countries in Africa and Asia on behalf of the Federal Ministry for Economic Cooperation and Development. The initiative has three focus areas: access to data, capacity building, and policy frameworks. Over the past 6 years, FAIR Forward has open-sourced over 48 datasets⁴⁹ in all its partner countries, including Ghana.
1. **Lacuna Fund:** It was a collaborative initiative founded in 2020 to address the lack of unbiased, labeled data for artificial intelligence (AI) in low- and middle-income countries, by providing resources to create, augment, and update datasets for machine learning. The Lacuna fund database⁵⁰ includes data from Ghana and other African countries in the following fields: agriculture, health, and natural language processing etc.
1. **Mozilla Common Voice:** Mozilla Common Voice is a crowdsourced initiative that builds a large, open,

⁴⁸ <https://www.giz.de/expertise/html/61982.html>

⁴⁹ <https://fair-forward.github.io/datasets/>

⁵⁰ <https://lacunafund.org/datasets/agriculture/>

and publicly available dataset of transcribed voice data to train speech recognition technology for various languages. This initiative's database⁵¹ includes NLP data from Ghana and other African countries.

Open Data Licensing for Equitable Data Access and Benefits in Ghana:

Open data licensing in Africa is central to ensuring that the continent's data serves its people first, protecting data sovereignty, encouraging the inclusion of local communities in data governance, and guaranteeing that these communities receive fair benefits from innovations at no or low cost. Too often, African data has been extracted and commercialised without returning value to the people it represents. By adopting African-grown licensing frameworks, we ensure that data collected in Africa directly fuels African innovation, strengthens local research, and drives sustainable development. For Ghana, this is especially important: institutions that plan to release open AI datasets must consider African open data Licences to safeguard equity and fairness in how data is accessed and used. Notable examples include the NOODL – Nwulite Obodo Open Data Licence⁵² and the Esethu Open Data Licence⁵³, both of which reflect Africa's vision of data as a shared resource that empowers communities, drives innovation, and ensures benefits remain on the continent.

3.4. Infrastructure and Computing: Powering AI in Ghana



Computational resources are critical for AI development and deployment, balancing performance, cost, and accessibility.

3.4.1 Choosing the Right Environment

In the Ghanaian context, computational resources are critical for AI development and deployment, as institutions and startups must carefully balance performance, cost, and accessibility amid limited infrastructure and high hardware and cloud service costs. Expanding affordable access to Graphics Processing Units (GPUs), cloud platforms, and local data centers is essential to unlock the country's full AI innovation potential.

⁵¹ <https://commonvoice.mozilla.org/en/datasets>

⁵² <https://cipit.strathmore.edu/the-nwulite-obodo-open-data-Licence-a-new-licence-for-sharing-african-datasets/>

⁵³ <https://arxiv.org/abs/2502.15916>

- **On-Premises Infrastructure**

Pros: Data control, no-internet dependency.

Cons: High upfront costs, maintenance, scalability challenges.

Suitability: Viable for large institutions with sensitive data.

- **Cloud Computing**

Pros: Scalable, low upfront costs, access to GPUs/TPUs (Tensor Processing Unit).

Cons: Internet dependency, data transfer costs, sovereignty concerns.

Suitability: Ideal for startups and researchers.

- **Edge Computing**

Pros: Low latency, reduced bandwidth, enhanced privacy.

Cons: Limited power, optimisation challenges.

Suitability: Promising for agriculture, healthcare, and smart cities.

- **Hybrid Approach**

Combines elements from different environments

3.4.2 Affordable Computing Solutions in the Ghanaian Context

Given the high cost of computational infrastructure in Ghana, it is essential to leverage affordable and accessible solutions to support AI research, innovation, and deployment:

- **Free Tiers and Startup Credits:** Major cloud providers like AWS, Microsoft Azure, and Google Cloud Platform (GCP) offer free-tier access and startup grants. Ghanaian AI startups and research labs can apply for Programmes like AWS Activate, Microsoft for Startups, or Google Cloud for Startups to gain access to cloud credits that subsidise training and deployment costs. MEST Africa and Academic City University have started facilitating access to such credits.
- **Google Colab and Kaggle:** These platforms provide free access to Graphics Processing Unit (GPU) and Tensor Processing Unit (TPU) resources, making them highly valuable for students, researchers, and independent developers in Ghana. While they may have usage limits, they're ideal for prototyping and model experimentation in low-resource environments.
- **Open-Source Frameworks:** The adoption of open-source AI frameworks like TensorFlow, PyTorch, Scikit-learn, and Hugging Face Transformers has reduced licensing barriers. In Ghana, university computer science departments and AI clubs increasingly rely on these tools for curriculum delivery and project work.
- **Local Data Centers:** Africa Data Centres and PAIX Data Centres have begun expanding infrastructure in Accra, offering opportunities for data sovereignty, reduced latency, and localised hosting of AI applications. As connectivity and pricing improve, these data centers can play a vital role in mitigating reliance on expensive offshore cloud infrastructure.

- **Efficient Model Design:** To reduce the computational burden, Ghanaian AI developers are increasingly adopting transfer learning, pre-trained models, and parameter-efficient architectures such as DistilBERT or MobileNets. These methods allow resource-constrained environments to benefit from state-of-the-art performance without incurring the full training costs (Osei & Amankwah, 2023).

3.4.3 Understanding Processing Power: CPUs, GPUs, and TPUs

AI developers in Ghana must make informed decisions about the type of processing hardware needed for their workloads, especially when resources are limited:

- **CPUs (Central Processing Units):** Widely available in personal computers and most local servers, CPUs are suitable for data preprocessing, rule-based models, and traditional machine learning algorithms. They remain the default option in many institutions due to their ubiquity.
- **GPUs (Graphics Processing Units):** Essential for accelerating training and inference of deep learning models. Though expensive, some Ghanaian startups and labs access GPUs through cloud platforms or academic collaborations with institutions abroad.
- **TPUs (Tensor Processing Units):** Specialised for TensorFlow-based deep learning models at scale. Access in Ghana is mostly limited to Google Colab or GCP cloud services, but they offer substantial acceleration for training large models like image classifiers or NLP models.
- **Efficiency Strategies:** Developers are encouraged to use methods such as model quantisation, pruning, and transfer learning to optimize performance on limited hardware—crucial in areas with constrained budgets or limited power supply.

3.4.4 Streamlining Deployment: Containerization and Orchestration

Efficient deployment is key to scaling AI applications, especially in sectors like health, agriculture, and fintech in Ghana:

- **Docker:** Enables packaging applications into portable containers that run consistently across environments. It's increasingly taught in Ghanaian tertiary institutions and used in startups to simplify deployment and improve reproducibility.
- **Kubernetes:** Facilitates orchestration of multiple containers, handling load balancing, auto-scaling, and fault tolerance. While not yet widespread in Ghana due to infrastructure requirements, cloud-based Kubernetes services (e.g., GKE, AKS, EKS) are accessible to teams with cloud credits or external funding.

3.4.5 Towards Green AI in Ghana

Energy efficiency is especially relevant in Ghana, where electricity costs are high, and power supply can be inconsistent. Green AI practices align with the nation's sustainability and energy efficiency goals:

- **Why It Matters:** Reducing compute-intensive AI workloads helps lower energy costs and ensures models

can be deployed in rural or off-grid environments (e.g., on solar-powered edge devices for agriculture or health).

- **Sustainable Strategies:**

- o Model efficiency: Using compact models such as MobileNets, SqueezeNet, or TinyML frameworks enables edge deployments in areas with minimal hardware.
- o Pruning and Quantisation: Techniques to reduce model size and computation without sacrificing performance, useful for mobile and embedded applications.
- o Hardware choices: Encouraging use of energy-efficient processors like Raspberry Pi or NVIDIA Jetson Nano for localised inference.

3.5. Procurement and Deployment Guidelines

3.5.1. Procurement

- **Ethical Compliance:**

All AI systems and related technologies procured for use in Ghana must comply with national laws, particularly *Ghana's Data Protection Act (Act 843)*, which governs the lawful collection, use, and safeguarding of personal data. In addition, alignment with international frameworks such as *UNESCO's Recommendation on the Ethics of Artificial Intelligence* is required to ensure respect for human rights, fairness, inclusiveness, and accountability in all AI-related projects.

- **Auditability:**

Procured systems must include built-in mechanisms for regular auditing and traceability. This includes model explainability features, logging of data usage, and version tracking of AI models. Regular independent audits should be mandated to assess for algorithmic bias, performance consistency, data provenance, and unintended harms, particularly in sensitive domains such as healthcare, law enforcement, or public services.

- **Performance Guarantees:**

All procurement contracts should include clear, measurable **SMART** (Specific, Measurable, Achievable, Relevant, Time-bound) performance indicators. These indicators should be tailored to Ghana's context, such as local language processing accuracy, rural connectivity optimisation, or low-power computing benchmarks. Contracts must also define penalties or remedial actions for underperformance or non-compliance.

- **Vendor Evaluation:**

Evaluation of AI vendors must Prioritise those who demonstrate adherence to ethical standards, transparency in model design and data usage, and commitment to interoperability. Preference should be given to vendors that offer:

- o Local support or partnerships with Ghanaian institutions.
- o Documented ethical impact assessments
- o Models and systems that are customisable to local contexts (e.g., support for Ghanaian languages or socio-economic data).

3.5.2. Open-Source and Interoperability

- **Open-Source Frameworks:**

To foster innovation, reduce costs, and ensure transparency, AI systems should, where possible, be built on or incorporate widely adopted open-source frameworks such as TensorFlow, PyTorch, Scikit-learn, or Keras. These tools not only provide global community support but also allow for local customisation, which is essential for developing contextually relevant AI applications in Ghana.

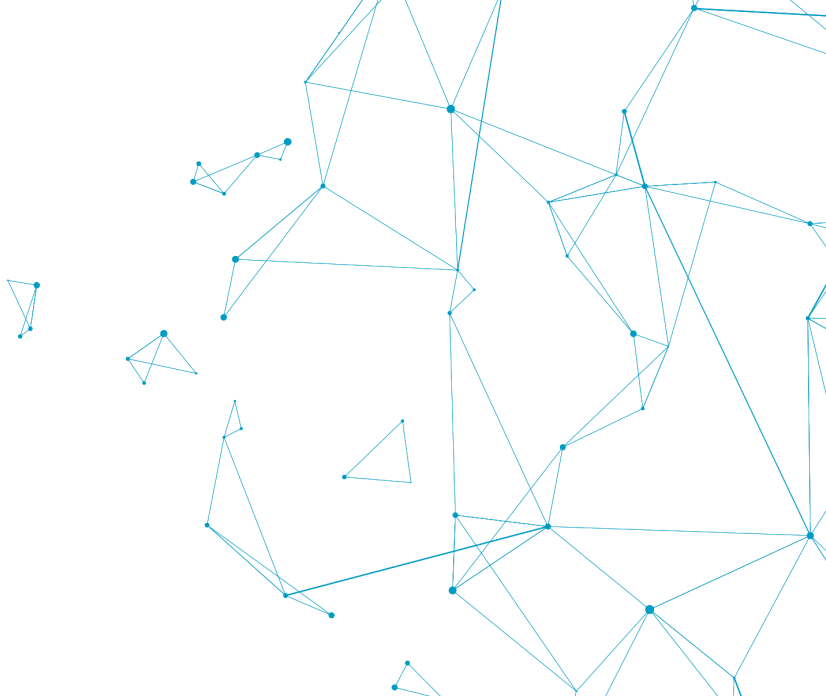
- **Standardised Formats and APIs:**

Procurement should mandate the use of Standardised model formats (e.g., ONNX for model portability across platforms), data formats (e.g., JSON, CSV), and open APIs that allow seamless integration between systems. This ensures interoperability across different government platforms, minimises vendor lock-in, and promotes data sharing between sectors.

Reference: (*Sarpong & Boateng, 2023*) – their study emphasises the importance of technical interoperability and open-source adaptability in AI deployments in West Africa.

- **Localization and Accessibility:**

Open-source tools should be adapted to support Ghana's multilingual environment, including the integration of **local languages (e.g., Twi, Ewe, Dagbani)** into natural language processing systems. Additionally, systems must be designed to function in low-connectivity or offline environments common in rural areas, using lightweight models or edge-AI approaches.



3.6. Section Three Recap

This section provided a practical roadmap for developing and deploying AI systems in Ghana, emphasising ethical, transparent, and context-sensitive approaches. It began by outlining best practices for AI model development, including problem scoping, data acquisition, model selection, training, evaluation, deployment, and continuous monitoring. Agile and iterative methods, along with MLOps practices, were recommended to enhance flexibility, collaboration, and reproducibility.

The section highlighted the centrality of high-quality, locally sourced data, stressing ethical collection, ownership, and the need for datasets that reflected Ghana's cultural, linguistic, and environmental contexts. It further examined infrastructure requirements, balancing on-premises, cloud, and edge computing while suggesting affordable solutions such as free cloud credits, open-source frameworks, and efficient model design.

Additionally, procurement and deployment guidelines were presented, mandating compliance with Ghana's Data Protection Act and international ethical frameworks, auditability, performance guarantees, and preference for open-source, interoperable, and locally adaptable solutions.

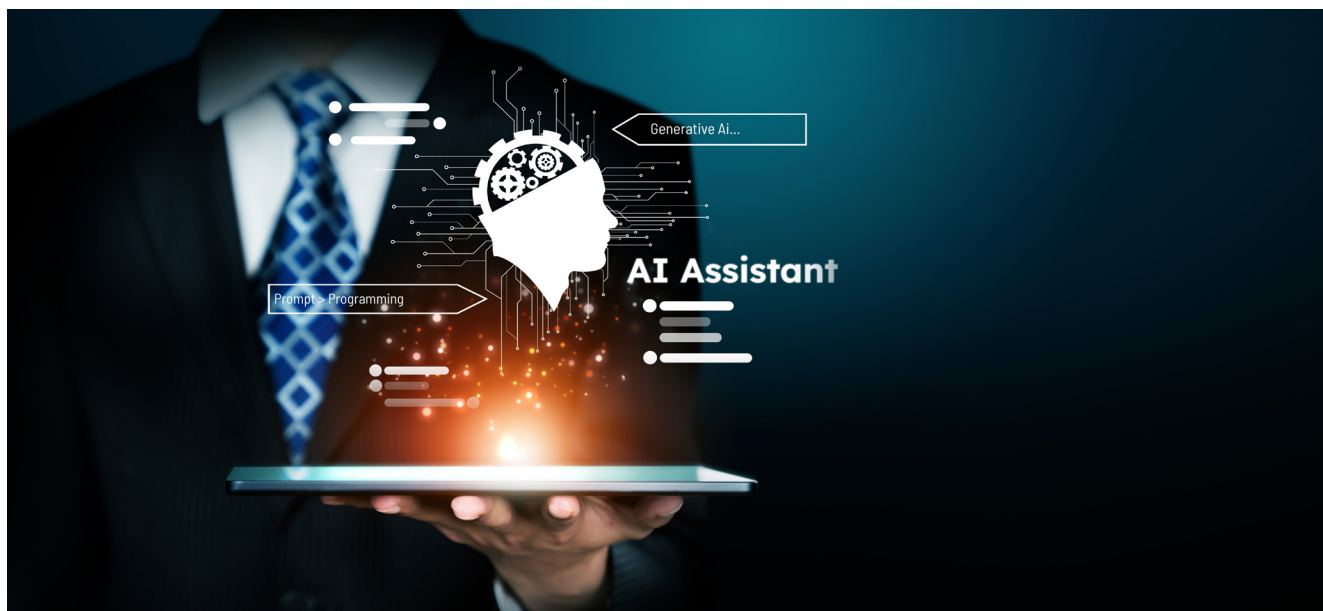
Overall, the section provided stakeholders with structured guidance to build AI systems that were technologically robust, ethically sound, cost-effective, and beneficial for Ghana's development.

SECTION 04

GUIDELINES FOR SECTOR-SPECIFIC AI APPLICATIONS IN GHANA

4.1. Introduction

This section provides tailored guidance for applying AI in key sectors of the Ghanaian economy—finance, healthcare, agriculture, education, governance, and more—ensuring alignment with national development goals, ethical standards, and local realities and provides a snapshot of the current landscapes of AI application and developments.



4.2. Sector-Specific Snapshots and Guidelines

4.2.1. Health Sector

AI is transforming the healthcare industry in Ghana by offering innovative solutions. Some challenges in the health sector include human resource shortage, access to health facilities and unequal resource allocation to health facilities.

Examples of AI in the health sector

1. DeafCanTalk App

DeafCanTalk App is an algorithm-based AI application that converts spoken speech into text and vice versa. DeafCanTalk incorporates a range of features, including note-taking capabilities, sign language courses, assistive communication technology, a dedicated customer support service called “Deaf-Care,” telemedicine solutions, and inclusive employment Programmes.

2. Chestify AI Labs

Chestify has built an AI platform capable of analyzing chest X-rays to detect and classify various conditions. These include Pneumonia, Tuberculosis (TB), Lung cancer, Cardiomegaly (enlarged heart) and other thoracic abnormalities. The AI is trained using deep learning algorithms on large datasets, with the goal of providing rapid, accurate interpretations, especially in areas with limited access to radiologists.

3. MinoHealth AI labs.

MinoHealth AI Labs is a Ghanaian artificial intelligence company focused on using AI in medical imaging and health diagnostics, with a mission to improve access to quality healthcare across Africa. MinoHealth develops AI models to analyse:

- Chest X-rays (for TB, pneumonia, COVID-19, cardiomegaly)
- CT scans
- Ultrasound and other imaging modalities

These AI tools help detect diseases quickly and accurately, reducing reliance on radiologists, especially in under-resourced or rural areas.

MinoHealth AI Labs has also built platforms that integrate electronic health records (EHRs) with AI analytics that is supporting decision-making for clinicians using data-driven insights. MinoHealth’s flagship product is Moremi AI: an LLM for health diagnosis

Guidelines for Health sector AI applications

- **Key objectives**
 - o Improve diagnostic accuracy, triage, patient monitoring, and health system efficiency.
- **Must-dos before deployment**
 - o Clinical validation: multi-center trials and local validation vs gold standard.
 - o Regulatory clearance: seek approval from Ghana FDA / Ministry of Health where applicable.

- o Data anonymisation: remove PHI, follow consent and secondary use rules.
- o Integration: integrate with existing electronic medical records / referral workflows.
- o Liability plan: define clinician vs AI responsibilities and malpractice coverage.
- **Metrics to track**
 - o Sensitivity / specificity, false positive/negative rates, clinical impact (e.g., time-to-diagnosis), clinician acceptance, adverse events.
- **Risks & mitigations**
 - o Risk: Over-reliance by clinicians.
 - o Mitigation: Require clinician sign-off; show confidence intervals.
 - o Risk: Dataset not representative of Ghanaian population.
 - o Mitigation: Collect local data for retraining and external validation.
- **Operational checklist**
 - o Obtain institutional review board (IRB) / ethics approval.
 - o Produce a model clinical protocol, escalation SOP, and user training materials.
 - o Implement logging and incident response for misdiagnoses.
 - o Respect Data privacy: Ensure all health-related AI tools comply with the Ghana Data Protection Act, 2012 (Act 843).
 - o Promote Trust: Build public confidence in AI through transparent use in diagnostics and patient data handling.
 - o Rural Inclusion: Prioritise AI-based mobile solutions for remote and underserved communities.

4.2.2. Agriculture Sector

Agriculture remains a backbone of Ghana's economy, employing over 30% of the workforce and contributing significantly to GDP. However, the sector faces persistent challenges, including low productivity, post-harvest losses, climate variability, pest and disease outbreaks, and limited access to timely market and agronomic information.

Artificial Intelligence (AI) is emerging as a transformative tool to address these challenges. In Ghana, AI-powered solutions are being deployed for precision farming, crop disease detection, yield prediction, weather forecasting, and supply chain optimisation. Startups like Sesi Technologies, Karaa Agro, and initiatives by Esoko and Farmerline leverage AI-driven analytics, satellite imagery, and mobile platforms to provide farmers with real-time, localized advice and early warnings. These tools help improve decision-making, reduce risks, and enhance productivity.

Examples of AI applications in the agriculture sector:

- I. Google AI Research Center works with InstaDeep and FAO to predict locust swarms and prevent crop loss; also flood forecasting. is the actual name. They just set up an AI Community center with a 37-million-dollar funding available to support various AI initiatives.

2. KaraAgro AI is a precision agriculture start-up harnessing AI and drone imagery to enhance crop health management. Their solutions include:
 - o Cashew Disease Identification AI project (CADI AI): With support from GIZ's FAIR Forward initiative Karaagro developed an open-source desktop app for identifying cashew tree issues based on drone images including pests, diseases, and abiotic stress.
3. RAIL has done some work in the Agric space: these initiatives include the creation of the Crop Disease Detection Dataset (tomatoes, pepper, and maize). With support from GIZ's FAIR Forward initiative, RAIL organised a continent-wide competition based on this dataset for participants to develop models that can detect diseases in the three staple crops and deployed on edge devices. The Ghana Crop Disease Detection Challenge⁵⁴ was successful with 344 participants and 3 winners from different countries on the African continent.
4. Darli AI⁵⁵: An AI-powered conversational IVR chatbot accessible via phone or WhatsApp developed by Farmerline. It delivers agronomic advice, weather updates, disease diagnosis (via images), and regenerative farming guidance in up to 27 languages.
5. Aya Grow⁵⁶: AyaGrow is an agricultural intelligence platform that transforms aerial imagery and field data into detailed tree- and block-level insights. Through its geospatial dashboard, it empowers farm managers, agribusinesses, and financiers to make data-driven decisions, optimize yields, and streamline operations with timely analytics.

Guidelines for Agriculture sector AI applications

- **Key objectives**
 - o Early disease detection, yield forecasting, input optimisation, market linkages.
- **Must-dos before deployment**
 - o Localisation: Develop AI models using Ghana-specific agronomic data (e.g., from SARI, Ministry of Food and Agriculture (MOFA)).
 - o Edge/low-bandwidth design - allow offline use and smartphone + USSD/SMS fallback.
 - o Participatory data collection - involve extension officers and farmers in labeling.
 - o Explainable recommendations provide simple actions (e.g., “apply X, on leaf Y”).

⁵⁴ <https://zindi.africa/competitions/ghana-crop-disease-detection-challenge>

⁵⁵ <https://farmerline.co/farmerlines-darli-ai-Recognised-on-times-list-of-the-best-inventions-of-2024/>

⁵⁶ <https://www.ayadata.ai/service/ayagrow/>

- **Risks & mitigations**

- o Risk: Wrong pesticide recommendations.
- o Mitigation: Connect recommendations to approved MOFA guidelines; require agronomist confirmation for chemical use.
- o Risk: Digital divide excludes smallholders. Mitigation: Provide IVR/voice and local language support; partner with farmer groups.

- **Operational checklist**

- o Validate drone/satellite models on local farms.
- o Build simple SMS/IVR flows for low-literacy farmers.
- o Ensure data sovereignty store sensitive farm data per agreements with farmers.
- o Affordability: Ensure AI tools are cost-effective and designed for use on basic mobile phones (USSD/SMS).
- o Farmer Participation: Engage farmer cooperatives in AI system design and feedback.
- o Data Ethics: Secure consent when collecting farm and geolocation data from smallholders.

4.2.3. Finance and Fintech

Artificial Intelligence (AI) is increasingly shaping Ghana's finance and fintech ecosystem by enhancing fraud prevention, improving customer experience, and enabling inclusive credit services. Local companies are leveraging AI for tasks ranging from transaction monitoring and identity verification to credit scoring and personal financial management.

Examples of AI applications the Finance and Fintech sector:

- Mazzuma is a Ghana-based fintech company that provides digital payments solutions using emerging technologies like cryptocurrency, blockchain, and artificial intelligence. Uses AI to enhance fraud detection, customer profiling, and transaction risk analysis.
- Nsano is a Ghana-based financial technology (fintech) company that builds digital payment solutions for Africa, focusing on mobile money, banking, and cross-border transactions. Uses AI for fraud detection, KYC verification, and transaction monitoring.
- Hubtel launched Ghana's first indigenous AI lab⁵⁷ focused on fintech. Its use cases include fraud detection, revenue leakage prevention, and creditworthiness assessment, especially for merchants dealing with utility systems like ECG.
- Oze offers digital lending tools for SMEs. Its AI capabilities help assess credit risk, streamline bookkeeping, and facilitate unsecured loans. Recently secured funding from Visa and DEG
- Ladder – AI Wealth & Budget Management-This award-winning platform embeds its AI assistant LADY, which delivers personalized budgeting and investment advice. Ladder was crowned Fintech Startup of the Year (2024) in Ghana.

⁵⁷ <https://news.hubtel.com/hubtel-opens-ghanas-first-indigenous-ai-lab/>

Guidelines for Finance and Fintech sector AI applications

- **Key objectives**
 - o Credit inclusion, efficient underwriting, fraud prevention, customer support.
- **Must-dos before deployment**
 - o Explainable credit decisions: produce rationale for acceptance/rejection; allow appeal.
 - o Regulatory adherence: check Bank of Ghana rules, AML/CFT, KYC standards.
 - o Privacy-preserving models: prefer aggregated/transactional signals and differential privacy when possible.
 - o Real-time monitoring: fraud patterns and model degradation.
- **Metrics to track**
 - o Default rate, precision/recall for fraud detection, conversion rate, false positive blocking percentage, customer complaints.
- **Risks & mitigations**
 - o Risk: Discriminatory scoring.
 - o Mitigation: Proactively exclude protected attributes and test for proxies.
 - o Risk: Financial exclusion due to conservative thresholds.
 - o Mitigation: Introduce human review and tiered credit products.
- **Operational checklist**
 - o Maintain audit trails for decisions.
 - o Build a customer dispute resolution and manual override process.
 - o Secure APIs, used in mobile money integrations.
 - o Bias Prevention: Avoid marginalisation of women and unbanked populations in algorithmic lending.
 - o Consumer Protection: Ensure explainability in credit decisions and recourse mechanisms.
 - o Cybersecurity: Integrate AI with robust security layers to protect financial data and transactions.

4.2.4. Education

As Ghana continues to embrace digital innovation, AI technologies are being integrated into classrooms, learning platforms, and policy frameworks to enhance educational access, quality, and equity. From intelligent tutoring systems and personalised learning apps to automated assessments and language translation tools, AI helps address long-standing challenges such as overcrowded classrooms, uneven teacher distribution, and language barriers. AI-powered learning platforms: AI-based math apps are being used to track students' problem-solving patterns, identify misconceptions, and provide tailored exercises and hints. Some applications of AI in education in Ghana are listed below.

Examples of AI applications the Educational sector:

1. Rori AI tutor (WhatsApp): MLdriven math tutoring boosted Grade 3–9 performance by +0.37 effect size

in 11 schools (2022 pilot)

2. Brilla AI: Built to compete in National Science & Maths Quiz; answered 1/4 riddles ahead of contestants in 2023 finals
3. 21st Century Teacher Educator GPT: A customised GenAI tool supporting pre-service teachers in English + Twi, Dagbani, Mampruli, Dagaare
4. TTEL: Nonprofit partner using EdTech Hub for tech enabled teacher training, adaptive learning, and COVID era remote instruction
5. SuaCode.ai developed a bilingual Artificial Intelligence (AI) teaching assistant, Kwame AI that provides answers to students' coding questions from the SuaCode courses in English and French.
6. Kwame AI enables students to ask questions related to the Science subjects of the West African Secondary School Examination (WASSCE) and get instant answers along with relevant diagrams.
7. Naa AI personalises learning for West African students with AI-powered, multilingual educational resources accessible offline, via WhatsApp, Telegram, and SMS. We offer customised learning paths, interactive lessons, and progress tracking, empowering both students and educators.
8. The Khaya AI app is a mobile and web application that provides African language translation, speech recognition, and text-to-speech capabilities, focusing on African languages such as Twi, Ewe, Yoruba, Hausa etc.
9. Meta School: It is an AI-powered educational platform that delivers personalised learning modules to students via basic feature phones. It uses USSD and SMS to provide interactive, text-based lessons and quizzes, enabling students in remote and underserved areas to access quality education without needing a smartphone or an internet connection.

Guidelines for Education sector AI applications

- **Key objectives**
 - o Personalised learning, automated grading, teacher support, resource allocation.
- **Must-dos before deployment**
 - o Curriculum alignment: map AI content to Ghana Education Service curricula.
 - o Protect minors: follow child protection policies; obtain parental consent where needed.
 - o Bias testing: ensure recommendations don't disadvantage students from certain regions or languages.
 - o Teacher augmentation: provide teacher dashboards and avoid replacing teachers with automation.
- **Metrics to track**
 - o Learning gains (pre/post), teacher satisfaction, retention, equity of outcomes across regions.
- **Risks & mitigations**
 - o Risk: Cheating via automated grading.
 - o Mitigation: Randomised task forms, teacher review queues.
 - o Risk: Widening inequity.
 - o Mitigation: Provide offline resources and device lending Programmes.

- **Operational checklist**

- o Pilot in representative schools; co-design with teachers.
- o Train educators on interpreting AI outputs and on remedial instruction.
- o Curriculum Integration: Promote AI education in secondary and tertiary institutions (e.g., AI clubs, coding bootcamps).
- o Digital Equity: Ensure that AI-based tools work offline or with low-bandwidth to benefit rural schools.
- o Teacher Empowerment: Provide training for educators to effectively use AI tools, rather than replace them.
- o Student Privacy: Ensure compliance with data protection standards when collecting academic and Behavioural data.
- o Ensure AI tools in education can be accessed by persons with disabilities

4.2.5. Governance and Public Sector

Ghana's public sector is increasingly exploring Artificial Intelligence (AI) to enhance service delivery, improve transparency, and optimise decision-making. While adoption is still in its early stages, AI has the potential to transform governance by automating administrative processes, enabling predictive policy planning, and facilitating citizen engagement.

In governance, AI applications can support e-governance platforms, public service chatbots, fraud detection in public finance, smart identity verification, and data-driven policy analysis. For instance, AI-powered analytics can help ministries analyse large datasets from health, education, or economic Programmes to identify trends, measure impact, and adjust strategies in real time.

Examples of AI applications in the governance and public sector:

- Mass Digitisation of Public Records⁵⁸-The government is embarking on a major initiative to use AI to digitise over 100 billion physical records from institutions like hospitals and universities within four years.
- The AI-GDC platform offers intelligent agents specialised in interpreting government documents like the Constitution, national budgets, and policy speeches via conversational interfaces.
- Drone-Powered Healthcare Delivery-While operating in the health sector, this AI application also supports governance by strengthening logistics: Zipline's AI-enabled drone system automatically plans the fastest delivery routes to deliver medical supplies to rural clinics vital for emergency response and decentralised service delivery.

Guidelines for governance and public sector AI applications

- **Key objectives**
 - o Policy analytics, service targeting, citizen engagement, fraud detection.
- **Must-dos before deployment**
 - o Transparency & public consultation: publishing model purposes, inputs, and appeals process.

⁵⁸ <https://gna.org.gh/2025/03/ghana-to-harnesses-ai-to-digitise-100-billion-public-records/>

- o Compliance with procurement rules: transparent vendor selection and open procurement.
- o Civil liberties safeguards: conduct privacy impact assessments and human rights checks.
- **Metrics to track**
 - o Improvement in service delivery KPIs, citizen trust scores, error rates in targeting, audit outcomes.
- **Risks & mitigations**
 - o **Risk:** Algorithmic discrimination in social Programmes.
 - o **Mitigation:** independent audits and human oversight committees.
 - o **Risk:** Misuse for surveillance.
 - o **Mitigation:** legal safeguards, access controls, and accountability chains.
- **Operational checklist**
 - o Run public sector pilots with multi-stakeholder oversight.
 - o Provide open access to non-sensitive model documentation for civic tech scrutiny.
 - o **Transparency:** All AI-driven government services should have clear disclosure, purpose, and appeal mechanisms.
 - o **Citizen Participation:** Involve citizens and civil society in co-creating AI policies and applications.
 - o **Accountability:** Establish clear lines of responsibility for automated decisions (e.g., through NITA and Data Protection Commission).
 - o **Inclusion:** Ensure AI services are accessible in local languages and inclusive of persons with disabilities.

4.2.6. Environment and Climate Change Sector

Artificial Intelligence (AI) is increasingly being applied in Ghana to address environmental and climate-related challenges. These solutions aim to improve early warning systems, enhance climate risk modeling, and support sustainable resource management.

Examples of AI applications in the Environment and Climate sector:

- RAGA Rapid Assessment of Groundwater Availability Developed by KNUST, RAGA⁵⁹ is an AI-powered web-based open-source tool that predicts groundwater levels across Ghana using spatiotemporal hydrological, geological, climatic, and groundwater data. It AI-Driven Rainfall Forecasting.
- Researchers have built data-driven rainfall prediction models using convolutional neural networks (U-Net architecture), trained on international reanalysis datasets (e.g., ERA5 and GPM-IMERG)⁶⁰. These models outperform some traditional forecasts especially at 12-hour lead times and help improve weather predictability and planning.
- Satellite-Based Air Quality Estimation-Deep transfer learning models trained on satellite imagery and

⁵⁹ <https://rain-ca.org/projects/raga-an-artificial-intelligence-based-system-for-predicting-groundwater-availability/>

⁶⁰ <https://arxiv.org/html/2410.14062v2#:~:text=In%20this%20work%20we%20tackle,available%20in%20the%20TIGGE%20dataset>

external city data (e.g., from the U.S.) have been adapted to estimate air quality in Accra. This helps fill gaps in ground-level monitoring infrastructure.

- Image-Based Timber Identification (XyloTron)⁶¹-An AI-based vision system was trained to identify 15 commercial Ghanaian timber species using wood imagery the “XyloTron” with successful lab and field tests. This helps combat illegal logging by enabling rapid species identification.

Guidelines for Environment and Climate Change AI applications

- **Key objectives**
 - o Early warning systems, climate risk modeling, natural resource monitoring.
- **Must-dos before deployment**
 - o Data provenance: clearly document sources (satellite, sensors, historical).
 - o Uncertainty communication: present probabilistic forecasts and actionable guidance.
 - o Local stakeholder engagement: include meteorological agencies and local communities.
- **Metrics to track**
 - o Lead time of warnings, forecasting accuracy, reduction in climate-related losses, community response rates.
- **Risks & mitigations**
 - o Risk: False alarms causing resource waste.
 - o Mitigation: calibrate thresholds and include human verification.
 - o Risk: Model failure in rare events.
 - o Mitigation: set fallback plans and manual response protocols.
- **Operational checklist**
 - o Integrate with Ghana Meteorological Agency and disaster management bodies.
 - o Provide multiple dissemination channels: SMS, radio, community leaders.
 - o Collaboration: Partner with universities (e.g., CSIR, UG, KNUST, GCTU) and development partners on environmental AI solutions.
 - o Open Data: Encourage open access to climate and environmental data for AI model development.
 - o Sustainability Metrics: Ensure AI tools support climate goals under Ghana’s Nationally Determined Contributions (NDCs) and Green Ghana Initiative.
 - o Community-Based Design: Engage local communities in AI design and deployment for ecological monitoring.

⁵¹ <https://arxiv.org/abs/1912.00296>

4.3. Cross-Cutting Principles Applicable to all Sectors

1. **People first — human-in-the-loop.**

Always design AI to augment, not replace, expert judgment. Keep a clear escalation path to human decision-makers.

2. **Data protection & consent.**

Collect only what you need, inform users, and get consent. In Ghana follow data protection law (e.g., Data Protection Act / Act 843) and institutional privacy policies.

3. **Localisation & cultural fit.**

Use local languages, units, agricultural calendars, clinical guidelines, curricula, and socio-cultural norms. Validate outputs with local experts and communities.

4. **Bias detection & fairness.**

Test models for demographic bias (gender, ethnicity, region, age). Report limitations and avoid deploying models that systematically harm subgroups.

5. **Explainability & transparency.**

Provide plain-language explanations of decisions (why a loan was scored, why a diagnosis was flagged). Log model inputs/outputs for audits.

6. **Security & resilience.**

Secure data at rest and in transit, protect APIs, use role-based access control, maintain backups, and plan for adversarial attacks and model drift.

7. **Regulatory & ethical compliance.**

Check sector regulators (e.g., Ghana FDA / Health Service for medical devices; Bank of Ghana/Banking regulator for fintech; Ministry of Food & Agriculture for agri interventions) before pilots and procurement.

8. **Interoperability & standards.**

Use open standards, APIs, and data schemas so solutions can integrate with health records, mobile money, extension services, and government systems.

9. **Performance monitoring & lifecycle management.**

Continuously monitor accuracy, fairness metrics, latency, and business KPIs; maintain a retraining and decommissioning policy.

10. **Capacity building & handover.**

Train local staff to manage, interpret, and maintain AI systems. Document code, datasets, model cards, and SOPs.

11. **Cost-effectiveness & sustainability.**

Design for low compute / low-bandwidth settings; include total cost of ownership and local hosting options.

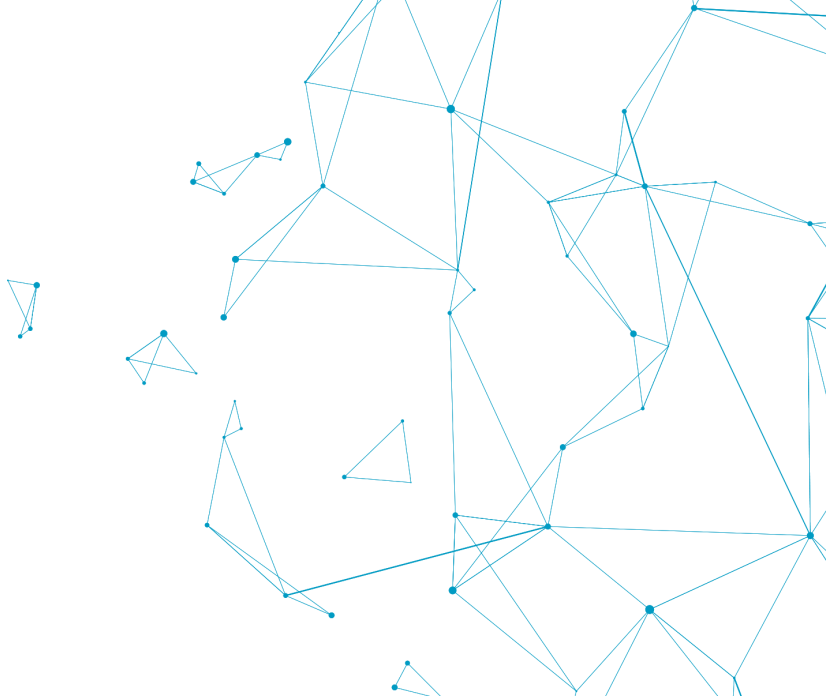
12. **Open documentation & auditability.**

Publish model cards, data provenance, evaluation datasets (where possible), and independent audit results.

13. **AI developers must adhere to the guidelines stipulated in the Web Content Accessibility Guidelines 2.2 (WCAG 2.2) to make their innovations more accessible to people with visual impairments.**

This means adding text descriptions for images, making sure everything works with a keyboard and screen

reader, highlighting where the user's focus is on the screen, using buttons and links that are big enough to click, and avoiding security checks (like picture CAPTCHAs) that blind users can't complete



4.4. Section Four Recap

This section outlined strategic guidelines for deploying Artificial Intelligence (AI) solutions across key sectors in Ghana, ensuring they align with national development priorities, ethical frameworks, and local socio-economic realities. It provides sector-specific examples, operational checklists, and risk mitigation strategies to guide stakeholders in adopting AI responsibly and effectively. The chapter emphasises the importance of tailoring AI applications to Ghana's unique challenges and opportunities, covering sectors such as health, agriculture, finance and fintech, education, governance, and environmental management. It advocates ethical, transparent, and culturally relevant AI adoption



SECTION 05

CAPACITY BUILDING AND SKILLS DEVELOPMENT

5.1. Introduction

This section examines how Ghana has been building a robust AI talent ecosystem through education, professional development, and targeted sectoral upskilling. It also serves as a comprehensive resource for AI practitioners seeking relevant skills and expertise.

Artificial Intelligence (AI) presents transformative potential for Ghana, promising innovation across critical sectors such as agriculture, healthcare, education, and finance. However, realising this potential requires a strong foundation of local talent and institutional capacity.

The State of AI in Africa Report 2023 identifies a significant skills gap in AI and data science, a challenge echoed across much of the continent. In response, the African Union's Continental AI Strategy outlines initiatives such as specialised AI training Programmes, collaborative research networks, and the establishment of AI hubs to address this deficit.

A key pillar of Ghana's AI capacity-building agenda is expanding access to quality education, reskilling the workforce, and fostering inclusive participation in the AI economy.



5.2. AI Education and Training Programmes

AI education in Ghana is gradually gaining momentum. At the primary and secondary school levels, the Ministry of Education has made initial strides by integrating digital literacy and computational thinking into the basic school curriculum. However, AI-specific content remains limited.

At the tertiary level, universities have introduced courses or modules in machine learning, data science, and robotics, combining technical training with ethical and social considerations.

5.2.1. University-Level AI and Data Science Education

Ghanaian universities are increasingly integrating AI, Machine Learning (ML), and Data Science into their curricula at both undergraduate and postgraduate levels. While institutions like the University of Ghana and Kwame Nkrumah University of Science and Technology offer AI-focused electives within broader computer science Programmes, universities such as Ghana Communication Technology University (GCTU), Academic City, and Ashesi University provide dedicated AI and Data Science degrees tailored to industry needs.

Many also collaborate with global technology companies such as Google AI, IBM, and Facebook AI Research to enhance Programme content and provide industry-Recognised certifications.

Table 5.1: AI and Data Science Related Programmes in Public and Private Universities in Ghana (2025)

UNIVERSITY	PROGRAMMES RELATED TO AI/DATA SCIENCE	PROGRAMME LEVELS	ENTRY REQUIREMENTS
University of Ghana (UG)	BSc. Information Technology (AI and Data Mining courses),	Undergraduate	WASSCE with Maths, English, Science
	MSc. Computer Science (AI, Machine Learning electives)	Postgraduate	Bachelor's degree
Kwame Nkrumah University of Science and Technology (KNUST)	BSc. Computer Science	Undergraduate	WASSCE with Maths, English, Science
	MSc. Data Science	Postgraduate	Bachelor's degree
	PhD in Computer Science (AI specialisation) Through the Responsible AI Lab, KNUST is working towards 6 post-graduate courses in AI and Data science.	PhD	Master's degree
Academic City University College	BSc. Artificial Intelligence	Undergraduate	WASSCE with Maths, Physics, English
	MSc. Data Science	Postgraduate	Bachelor's degree
Ashesi University	BSc. Computer Science (with AI/ML electives, Data Structures, Algorithms)	Undergraduate	WASSCE with emphasis on Maths; holistic review process.
	MSc. Intelligent Computing Systems	Postgraduate	Bachelor's in relevant field
University of Professional Studies, Accra (UPSA)	BSc. Data Science and Analytics	Undergraduate	WASSCE with elective Maths
University of Cape Coast (UCC)	BSc. Computer Science, (with AI courses)	Undergraduate	WASSCE with Maths, Science

UNIVERSITY	PROGRAMMES RELATED TO AI/DATA SCIENCE	PROGRAMME LEVELS	ENTRY REQUIREMENTS
University for Development Studies (UDS)	BSc. Computer Science, (with AI courses)	Undergraduate	WASSCE with Maths, Science
	MSc./MPhil. Computer Science, (with AI courses)	Postgraduate	BSc. Degree
	PhD Computer Science, (with AI courses)	PhD	MSc./MPhil Degree
Ghana Communication Technology University (GCTU)	Dip./BSc. Computer science	Undergraduate,	WASSCE or equivalent
	MSc/MPhil Computer science	Postgraduate	Bachelor's Degree
	PhD Computer science	PhD	MSc./MPhil Degree
	BSc Internet of Things and Big data	Undergraduate	WASSCE or equivalent
	Msc./Mphil Internet of Things and Big data	Postgraduate	Bachelor's degree, (with interview)
	Dip./BSc. Data science and Analytics	Undergraduate	WASSCE or equivalent;
	Dip/BSc. Information Technology(AI courses)	Undergraduate,	WASSCE or equivalent
	MSc./MPhil Information Technology (AI, courses)	Postgraduate	Bachelor's degree.
	PhD Information Technology (AI, courses)	PhD	MSc./MPhil Degree
Lancaster University Ghana	BSc. Computer Science (with AI, Machine Learning, Data Science modules)	Undergraduate	High WASSCE or equivalent; IELTS for international students.
Regent University College of Science and Technology	BSc. Computer Science (AI- related courses)	Undergraduate	Passes in core Maths, English, and Science subjects.
	BSc. Information Systems Sciences (AI-related courses)	Undergraduate	Passes in core Maths, English, and Science subjects.

UNIVERSITY	PROGRAMMES RELATED TO AI/DATA SCIENCE	PROGRAMME LEVELS	ENTRY REQUIREMENTS
BlueCrest College (Accredited)	BSc. Information Technology (AI modules, Data Analytics specialisation)	Undergraduate	WASSCE; some Programmes require aptitude assessment.
	MSc. Information Technology (AI modules, Data Analytics specialisation)	Postgraduate	Bachelor's Degree
SIIMT University College	BSc Data Science	Undergraduate	High WASSCE or equivalent

5.2.2. AI and Data Science Programmes in Technical Universities

Ghana's Technical Universities, originally established to provide vocational and industry-oriented education, are adapting to the demands of the digital economy by incorporating AI and Data Science into their Programmes. These institutions are realigning curricula to prepare students for automation, data-driven decision-making, and intelligent systems in emerging tech-driven industries.

Table 5.2: AI and Data Science Related Programmes in Technical Universities in Ghana

TECHNICAL UNIVERSITY	RELEVANT PROGRAMMES	PROGRAMME LEVELS	ENTRY REQUIREMENTS
Accra Technical University (ATU)	BTech Computer Science (AI/Data Analytics courses included)	Undergraduate	HND holders or WASSCE/SSSCE with credits in Maths, English, and Science.
	BTech Information Technology (AI/Data Analytics courses included)	Undergraduate	HND holders or WASSCE/SSSCE with credits in Maths, English, and Science.
	MTech Data Science and Industrial Analytics	Postgraduate	Bachelor's degree: ICT or maths & stats background preferred

TECHNICAL UNIVERSITY	RELEVANT PROGRAMMES	PROGRAMME LEVELS	ENTRY REQUIREMENTS
Koforidua Technical University (KTU)	BTech Computer Science	Undergraduate	WASSCE/SSSCE with passes in relevant subjects; HND for top-up Programmes.
	BTech Artificial Intelligence and Robotics	Postgraduate	Bachelor's degree in relevant field
Kumasi Technical University (KsTU)	HND Computer Science (with some AI/Big Data modules)	HND	WASSCE/SSSCE with passes in relevant subjects;
	BTech Computer Technology (with some AI/Big Data modules)	Undergraduate	WASSCE/SSSCE with passes in relevant subjects; HND for top-up Programmes.
	BTech Computer Technology (with some AI/Big Data modules)	Undergraduate	WASSCE/SSSCE with passes in relevant subjects; HND for top-up Programmes.
	MTech Computer Technology (with some AI/Big Data modules)	Postgraduate	Bachelor's degree in relevant field
Sunyani Technical University (STU)	BTech Computer Science (with AI/Big Data modules)	Undergraduate	WASSCE/SSSCE with passes in relevant subjects; HND for top-up Programmes.
	BTech ICT (emerging AI/Data Science modules)	Undergraduate	WASSCE/SSSCE passes; diploma holders or HND for direct BTech entry.
Tamale Technical University (TaTU)	BTech Information and Communication Technology	Undergraduate	WASSCE/SSSCE or HND holders; Maths and ICT emphasis.
	MTech Artificial Intelligence	Postgraduate	Bachelor's Degree in relevant field
	MTech Data Science	Postgraduate	Bachelor's Degree in relevant field
Dr Hilla Limann Technical University	BTech Information and Communication Technology	Undergraduate	WASSCE/SSSCE or HND holders; Maths and ICT emphasis.
Ho Technical University (HTU)	BTech Computer Science (with AI/Big Data modules)	Undergraduate	WASSCE/SSSCE with passes in relevant subjects; HND for top-up Programmes.
	BTech ICT (emerging AI/Data Science modules)	Undergraduate	WASSCE/SSSCE passes; diploma holders or HND for direct BTech entry.

5.2.3. Emerging Models for AI Education

Innovative AI education models such as bootcamps, workshops, online courses, and hands-on training are helping to bridge Ghana's AI skills gap.

Programmes offered by Ghana Tech Lab, MEST Africa, Blossom Academy, and Soronko Academy, often supported by partners like Google, GIZ, and the Mastercard Foundation, provide flexible, industry-aligned training. These initiatives offer mentorship, internships, and startup support, particularly for youth, women, and underserved communities, helping to democratize AI education and align training with market needs.

Table 5.3: AI and Data Science Related Training by Non-University Institutions in Ghana (2025)

ORGANISATION	PROGRAMMES OFFERED	FOCUS AREAS	NOTES
Kumasi Hive	Training in AI, hackathons, incubation and accelerator Programmes	Formal and informal AI skills training.	Supports tech entrepreneurs integrating AI.
Blossom Academy	Data Science Fellowship, AI Engineering Bootcamps	Data Science, AI, Software Development, Career Coaching	Strong industry partnerships; focuses on employability.
Ghana Tech Lab (GTL)	AI and Data Science Training Programmes	Data Science, AI, Cloud Computing	National footprint; collaborations with MasterCard Foundation, MEST Africa.
MEST Africa (Accra Campus)	Technology Entrepreneurship Programme (with Data/ AI focus)	Software development, AI, Business and entrepreneurship	Full-year training for tech entrepreneurs, AI startups encouraged.
Kwame AI (private initiative)	AI Programming Bootcamps	Python for AI, TensorFlow, NLP, Deep Learning	Focuses on building AI developers for local solutions.
AI Ghana	Seminars, workshops, conferences, and short courses	AI research promotion, ethics, responsible AI, technical training	Advocacy plus technical upskilling events.
Soronko Academy	Women-focused Tech Skills Training	AI and data science Basics, Data Literacy, Digital Skills	Gender-inclusive, focus on empowering women in tech.
Institute of ICT Professionals Ghana (IIPGH)	AI, Cybersecurity, Data Science Certificate Programmes	ICT skills development for youth and professionals	Professional certifications with ICT career pathways.

ORGANISATION	PROGRAMMES OFFERED	FOCUS AREAS	NOTES
Ghana Innovation Hub	Startup incubation with AI and Data components	Innovation, Entrepreneurship, Data-driven startup mentoring	Supports tech entrepreneurs integrating AI.
Google Developer Groups (GDG) Accra/Kumasi	AI/ML Study Jams, TensorFlow Workshops	AI development, TensorFlow applications	Community-led, free or low-cost training supported by Google.
Yison Tech Hub (YTH)	Youth and Women-focused Tech Skills Training	ICT and AI skills development for youth and professionals	Advocacy plus technical upskilling events.
IPMC	AI, Data Science diploma and Certificate Programmes	ICT skills development for youth and professionals	Professional certifications with ICT career pathways.
Open Labs Ghana	Data Science, Software development training	Data Science, AI, Software Development, Career Coaching	Strong industry partnerships; focuses on employability.
Ghana-India Kofi Annan Centre of Excellence in ICT (GI-KACE)	Data analytics, Software development training	ICT skills development for youth and professionals	Professional certifications with ICT career pathways.
Responsible AI Lab - KNUST	Capacity building for researchers and practitioners in responsible AI utilis	Cutting-edge research and development. Capacity building for researchers and practitioners in responsible AI utilis Stakeholder and community engagement	Advancing the responsible use of AI to address the Sustainable Development Goals
ALX	Data engineering, AI career essentials, data science and data analytics	Capacity building for practitioners	ALX empowers young people with in-demand digital skills and offers access to international degrees, entrepreneurial support, and a lifelong community.

5.2.4. Inclusivity in AI Education

Inclusivity is a central concern in Ghana's AI education strategy. Gender-focused initiatives such as Blossom Academy's AI Fellowship for Women⁶² with support from FAIR Forward, Soronko Academy, Pyladies Ghana and STEMbees have trained thousands of girls and women in coding and robotics, helping bridge the gender gap in tech education.

Government-backed Programmes like the Girls-in-ICT initiative coordinated by the Ministry of Communications and Digitalisation have trained over 12,000 girls in basic computing and coding since 2017, laying the groundwork for future AI-related learning.

Civil society Organisations continue to play a vital role, running grassroots initiatives that reach marginalised communities and ensure no group is left behind in the AI revolution.

5.3. Workforce Development and Reskilling Strategies

As AI reshapes labour markets, workforce reskilling and upskilling have become urgent priorities. Ghana's Digital Economy Policy and the forthcoming National AI Strategy highlight the government's commitment to workforce transformation.

Programmes such as the One-Teacher-One-Laptop initiative and digital skills training through the Ghana-India Kofi Annan Centre of Excellence in ICT (GI-KACE) aim to prepare workers for AI-enabled environments

5.3.1. Encouraging STEM Education to Build an AI Talent Pipeline

Ghana has made notable progress in promoting Science, Technology, Engineering, and Mathematics (STEM) education as a foundation for future AI talent. Government reforms have integrated digital literacy and basic Programming into the basic school curriculum to build early computing competencies. National initiatives like the National Science and Maths Quiz (NSMQ) continue to spark enthusiasm for STEM subjects at the high school level.

Private sector and civil society Programmes complement these efforts. The Ghana Robotics Academy Foundation (GRAAF) hosts competitions and camps that expose students to engineering and automation. The Mastercard Foundation's Young Africa Works initiative delivers digital and STEM skills training to youth, particularly girls and underserved communities.

Together, these initiatives are fostering early interest in technology, building practical skills, and ensuring equitable access to AI career pathways.

⁶² <https://www.bmz-digital.global/en/new-skill-unlocked-ai-bootcamp-turns-barriers-into-careers/>

5.4. Role of Universities and Research Institutions

Ghanaian universities and research institutions are playing a pivotal role in AI innovation and talent development.

They have integrated AI into curricula and are conducting research in areas such as computer vision, natural language processing (NLP), and AI ethics. Global partnerships further strengthen this ecosystem:

- **Ashesi University** collaborates with ETH Zurich through the ETH4D Programme to support development-focused AI research and has established AI labs for applied research and ethics.
- **KNUST** participates in the AI4D Africa initiative, and with support from IDRC and GIZ's FAIR Forward initiative, KNUST established the Responsible Artificial Intelligence Lab (RAIL) to promote ethical AI research and development.
- **Google's AI Research Center in Accra:** the first of its kind in Africa and it advances NLP for African languages, mentors local researchers, and collaborates with Ghanaian universities. The Center recently launched the Google AI Community Center⁶³ in Accra to support artificial intelligence innovation across the continent.

To sustain momentum, Ghana must invest in AI research capacity, promote interdisciplinary collaboration, and strengthen academic–industry linkages.

5.5. Opportunities and Challenges

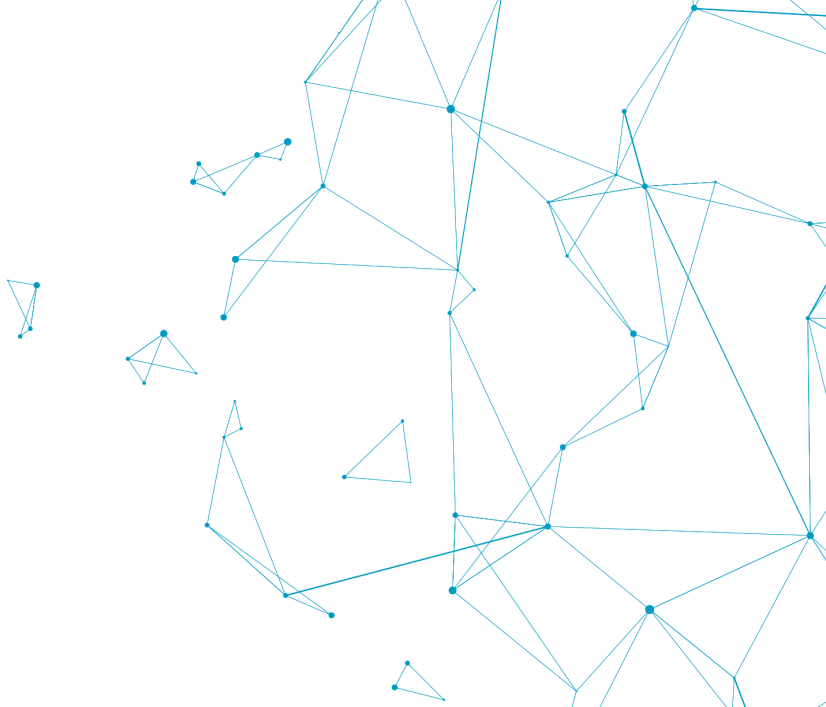
5.5.1 Opportunities

- **Youth Demographics:** Ghana's youthful population offers a large pool of potential AI talent. With proper training in coding, robotics, and data science, young people can become key drivers of AI innovation, entrepreneurship, and adoption.
- **Policy Momentum:** National strategies like the Digital Economy Policy and the forthcoming National AI Strategy create a supportive policy environment for AI education, infrastructure, and ethical governance.
- **Public-Private Partnerships:** Collaboration between government, academia, industry, and international partners can bridge skills gaps and create market-ready talent pipelines.
- **Societal Impact:** AI has strong potential to address Ghana's development challenges such as AI-driven diagnostics in health, precision farming in agriculture, and adaptive learning in education ensuring socially impactful outcomes.

⁶³ <https://amchamghana.org/2025/07/31/google-launches-ai-community-center-in-ghana-with-37m-investment-deepening-u-s-africa-tech-collaboration/>

5.5.2 Challenges

- **Fragmented Efforts:** Lack of coordination among government, academia, and industry leads to inefficiencies and missed opportunities.
- **Limited Faculty and Research Capacity:** Shortages of qualified AI faculty, outdated curricula, and limited research funding hinder high-quality AI education.
- **Access to Infrastructure:** Limited access to GPUs, cloud computing, and large datasets restrict practical, hands-on AI training.
- **Brain Drain:** Skilled AI professionals often seek opportunities abroad, weakening the local innovation ecosystem.



5.6. Section Five Recap

This section explored Ghana's progress in building AI capacity through education, workforce development, and targeted training initiatives. It highlighted how AI education is expanding from basic digital literacy in schools to specialised AI and data science Programmes in universities, technical institutions, and non-university training centers. Efforts by global technology companies, local innovation hubs, and civil society Organisations are complementing formal education, making AI skills more accessible and inclusive particularly for women and underserved communities.

The section also examined workforce reskilling strategies and the role of STEM education in creating a pipeline of AI talent. Universities and research institutions are increasingly engaged in applied AI research, ethics, and industry collaboration, supported by both national and international partnerships.

Opportunities such as Ghana's youthful population, supportive policy environment, and potential for impactful public private partnerships position the country well to lead AI innovation in Africa. However, challenges including fragmented initiatives, limited faculty and research capacity, inadequate infrastructure, and brain drain must be addressed.

Overall, the section underscores that sustained investment, coordinated strategies, and strong academic–industry linkages are critical to transforming Ghana's growing AI talent ecosystem into a globally competitive, inclusive, and innovation-driven sector.

SECTION 06

BUILDING AN AI STARTUP IN GHANA: STRATEGIES, CAPITAL, AND ECOSYSTEM INSIGHTS

6.1. Introduction

Ghana is rapidly positioning itself as a leading hub for digital innovation and entrepreneurship in West Africa. With stable governance, expanding mobile and internet penetration, and growing investor interest, the country presents fertile ground for Artificial Intelligence (AI) startups. However, founders still face challenges including access to capital, limited technical expertise, fragmented infrastructure, and constrained market readiness.

This section provides practical guidelines for AI entrepreneurs and ecosystem stakeholders in Ghana. It outlines the structure of the startup ecosystem, identifies key institutional actors, highlights funding opportunities, and offers step-by-step guidance for commercialisation. It also emphasises the importance of inclusive, ethical, and sustainable practices to ensure that AI startups not only thrive commercially but also deliver social impact aligned with Ghana's national development priorities



6.2. Snapshot of Ghana's AI Startup Landscape

Ghana's AI and tech ecosystem has grown significantly, with more than 100 innovation hubs established nationwide by 2023.

Notable examples of AI startup activity include:

- **MinoHealth AI Labs** – developing medical imaging solutions for TB, pneumonia, and cardiomegaly.
- **RiviaCo** – advancing healthtech solutions with AI-driven diagnostics.
- **Farmerline and Warc Africa** – using AI for agronomic advice, climate-smart agriculture, and supply chain optimization.
- **Copianto AI** – providing generative AI tools for corporate use, with international visibility through Shark Tank Malta.
- **mNotify** – deploying AI-enabled chatbots for customer communications.
- **Npontu Technologies** – Big Data and Artificial Intelligence, Software and Mobile App development, Value-Added Services and IT Consulting & Managed Services.

Funding for Ghanaian startups reached US\$121 million in 2024 (a 95% increase from 2023), with strong growth in healthtech, agritech, and fintech. However, early-stage equity declined, reflecting greater investor selectivity and a maturing ecosystem where traction and quality matter more than quantity. The country's momentum is supported by its high ranking on the International Monetary Fund's (IMF) AI Preparedness Index, citing strong digital infrastructure, supportive policy, and human capital.

6.3. Key Ecosystem Stakeholders

Ghana's startup ecosystem is powered by a Triple Helix model of collaboration among government, academia, and industry: This model facilitates the co-creation of AI solutions aligned with national priorities in sectors such as education, health, agriculture, fintech, and governance, enabling each stakeholder to contribute their unique strengths. The government provides strategic direction, enabling policies, infrastructure, and funding mechanisms (e.g., innovation funds, data governance frameworks, and regulatory sandboxes). Academia drives curriculum reforms, applied research, talent development, and commercialisation through partnerships and tech transfer offices. Meanwhile, industry leads in innovation, product development, open-source sharing, and shaping a digitally skilled workforce. The key stakeholders include:

- **Innovation Hubs & Accelerators:** MEST Africa, Kosmos Innovation Center, iSpace, Kumasi Hive, Node 8, HOPin Academy. These Organisations provide early-stage capital, mentorship, and networks.
- **Research & Academia:** Ashesi University, GCTU, KNUST, GI-KACE, and CSIR are producing AI research in health, agriculture, and natural language processing while training the next generation of AI talent.
- **Government & Policy:** The Draft Ghana National AI Strategy emphasises ethical adoption, capacity-building, and regulatory sandboxes for innovation testing. Agencies such as the Development Bank of Ghana (DBG) are launching capital vehicles for startups

- **Development Partners:** GIZ, IDRC, USAID, and UNDP offer grants, capacity building, and technical assistance for AI-for-development applications.

6.4. Capital Landscape for AI Startups

AI startups in Ghana can access a growing mix of funding instruments designed to support ventures at different stages. Each option carries its own expectations, suitability, and trade-offs:

Grants offer early-stage, non-dilutive capital, particularly valuable during ideation and piloting phases. These are often awarded through competitions or development partners but typically come with detailed reporting requirements and modest amounts.

Key Funding Instruments

- **Grants:** Early-stage, non-dilutive capital from partners like GIZ, GSMA, and UNDP; often tied to SDG-linked pilots.
- **Equity Investment:** Offered by VCs, angel investors, and platforms like MEST Africa and 10k2Startup; dominant for scale-up stages.
- **Debt Financing:** Available to revenue-generating startups but requires collateral.
- **Convertible Notes/SAFEs:** Flexible instruments often used in accelerators and angel rounds.
- **Revenue-Based Financing:** Linked to monthly revenues, reducing risk for startups with predictable income streams.

Table 6.1. Below is a table of key AI solution categories and associated funding opportunities.

AI SOLUTION CATEGORY	NOTABLE STARTUPS / PROJECTS	FUNDING SOURCES	TYPICAL FUNDING AMOUNTS / NOTES
Healthtech	MinoHealth, RiviaCo, BACE Group	MEST Africa, DFIs, Private Equity, Enterprise Partnerships	Pre-seed to Series A; \$200K–\$2M; Some infrastructure grants
Agritech	Warc Africa, KaraAgro AI & Drones	Kosmos Innovation Center, VCs, Development Bank of Ghana	\$7.5M (Warc Africa); Early-stage equity & grant support
Fintech	Fido, Copianto AI, BACE Group	VCs, 10k2Startup, Private Equity	\$30M (Fido); \$100K+ (Copianto); Seed to Series B rounds
E-commerce & Logistics	Hubtel	Bootstrapped, Private Investors, Potential VC/ Angel Funding	Early-stage; Scaling across West Africa
Edtech & Talent Development	T-TEL + Google + Milgo (AI assessment), Academic City, Ashesi	Public-private partnerships, Donor Agencies, Institutional Investors	Grants, In-kind support, Infrastructure funding

AI SOLUTION CATEGORY	NOTABLE STARTUPS / PROJECTS	FUNDING SOURCES	TYPICAL FUNDING AMOUNTS / NOTES
Cross-sector AI Enablers	General AI Startups, R&D, Infrastructure support	Development Bank of Ghana, Pension Funds (Potential), DFIs	Call for blended finance, venture debt, and results-based grants

Table 6.2. Additional Recommended Funding Sources for AI Startups

FUNDING SOURCE / PROGRAMME	TYPE OF SUPPORT	RELEVANCE TO GHANAIAN AI STARTUPS
Google for Startups (Africa)	Equity-free funding, mentorship, cloud credits	Ideal for early-stage AI and tech startups looking for global exposure and resources
GSMA Innovation Fund	Grants and technical assistance	Supports digital inclusion, including AI for health, agriculture, and mobile tech
Africa AI Accelerator (Ghana Tech Lab & GIZ)	Accelerator Programme, mentorship, seed funding	Locally based, supports Ghanaian AI startups through training and seed-stage support
AI4D Africa (IDRC & Sida)	Research grants, capacity building	Targets AI research with social impact in Africa; suitable for academic and R&D-linked startups
Tony Elumelu Foundation	Seed capital (\$5,000), mentorship, training	Open to all African startups; highly competitive; promotes scalable entrepreneurship
MIT Solve Initiative	Challenge-based funding (\$10,000–\$100,000)	International platform for AI solutions addressing education, climate, and health challenges
African Development Bank Youth Entrepreneurship Investment Bank	Debt and equity financing, technical support	Targets high-impact youth-led ventures in tech and innovation
UNDP Ghana – Youth Innovation Grants	Small grants and training	Ideal for grassroots or youth-led AI ideas addressing SDGs in Ghana
Pension Funds (Domestic – Potential Source)	Long-term investment capital	Policy reforms can unlock pension fund allocation for local innovation financing
Africa’s Business Heroes (Jack Ma Foundation)	Grants (\$100K to \$300K), training	Pan-African funding for entrepreneurs building tech-enabled solutions

Mapping of Funding to Sectors

A clear understanding of capital needs and corresponding investor expectations is essential at each stage of the startup journey. The stages mapped in the table below are not rigid. Many Ghanaian startups often adopt a blended financing approach combining equity, grants, and concessional funding to navigate growth phases.

- Healthtech: MinoHealth, RiviaCo → backed by MEST Africa, DFIs.
- Agritech: Warc Africa, KaraAgro AI → supported by Kosmos Innovation Center and DBG.
- Fintech: Copianto AI, Fido → raised seed-to-growth equity from local and global VCs.
- Edtech & Talent Development: SuaCode, Academic City → rely on grants and public-private partnerships.

6.5. Guidelines for Building an AI Startup in Ghana

Attracting capital in Ghana's maturing AI space requires more than a promising idea. Investors increasingly seek:

- **Problem-Solution Fit:** A validated use case addressing a significant challenge, supported by real-world evidence.
- **Traction:** Demonstrable pilot success, user adoption, early revenue, or proof of concept.
- **Team Strength:** A well-balanced founding team with domain expertise, technical capabilities, and business acumen.
- **Execution Capacity:** Lean operations, realistic projections, and a roadmap for scale.
- **Business Model Soundness:** Clear pathways to revenue and competitive differentiation.
- **Impact and Inclusion:** For impact investors, a compelling social mission, especially if targeting underserved populations or advancing gender equality.

Guidelines for AI startups

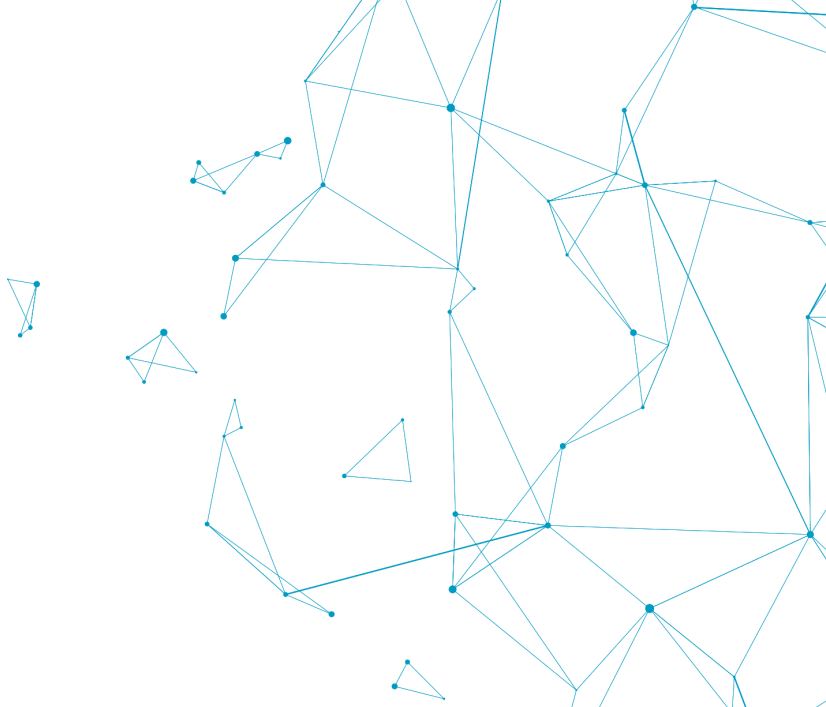
Securing funding is a structured journey requiring both preparation and strategy. Early-stage founders are advised to:

- **Register and Structure the Business:** Formal incorporation and compliance with tax and data regulations signal professionalism and readiness.
- **Develop a Minimum Viable Product (MVP):** Build and test an early version of the product, incorporating feedback loops.
- **Validate with Users:** Conduct surveys, interviews, or pilot deployments to confirm market demand.
- **Prepare Investor Documents:**
- **One-Pager:** Concise overview of the business, team, value proposition, and capital needs.
- **Pitch Deck:** A 10–12 slide presentation covering the problem, solution, business model, traction, financials, and team.
- **Engage with Ecosystem Platforms:** Leverage hubs like GI-KACE, Kumasi Hive, and Impact Hub to access mentorship and investor connections.
- **Approach the Right Investors:** Research alignment in sector, stage, and ticket size. Tailor communication and establish trust early.
- **Navigate Due Diligence:** Be transparent and organised. Legal, financial, and operational scrutiny is standard.

6.6. Commercialisation Pathway: From Prototype to Market

Ghana's AI and tech startup ecosystem is growing fast with more funding, global interest, and strong institutional backing than ever before. But for early-stage AI innovators, building a great prototype is only half the journey. Moving your solution from the lab to the market requires the right partnerships, funding, and strategy. This section of the guide outlines five practical steps young startups can take to successfully commercialise AI innovations in the Ghanaian.

- **Pilot with Real Users:** Use regulatory and innovation sandboxes for early testing.
- **Partner with Academia:** Leverage university labs for co-development and validation.
- **Blend Local & Global Funding:** Combine Ghanaian Programmes (DBG, MEST, 10k2Startup) with international accelerators (Google for Startups, AI4D Africa).
- **Engage Large Customers:** Pursue government ministries, banks, telcos, and logistics firms as first anchor clients.
- **Build Trust & Inclusion:** Ensure solutions are ethical, explainable, and adapted to local cultural and linguistic contexts.



6.7. Section Six Recap

This section has outlined strategies for building AI startups in Ghana, situating the country as a rising innovation hub in West Africa. It highlights the growth of the AI and tech ecosystem, identifies key institutional anchors, and maps available sources of startup capital.

Practical guidelines emphasize validation, inclusive product design, diversified funding, and strong governance structures. The section also underscores the importance of commercialisation pathways piloting, partnerships, blended finance, and scaling beyond Accra to achieve sustainable impact.

By following these guidelines, AI entrepreneurs in Ghana can navigate challenges, secure capital, and build scalable ventures that contribute to national development while positioning Ghana as a continental leader in ethical and inclusive AI innovation.

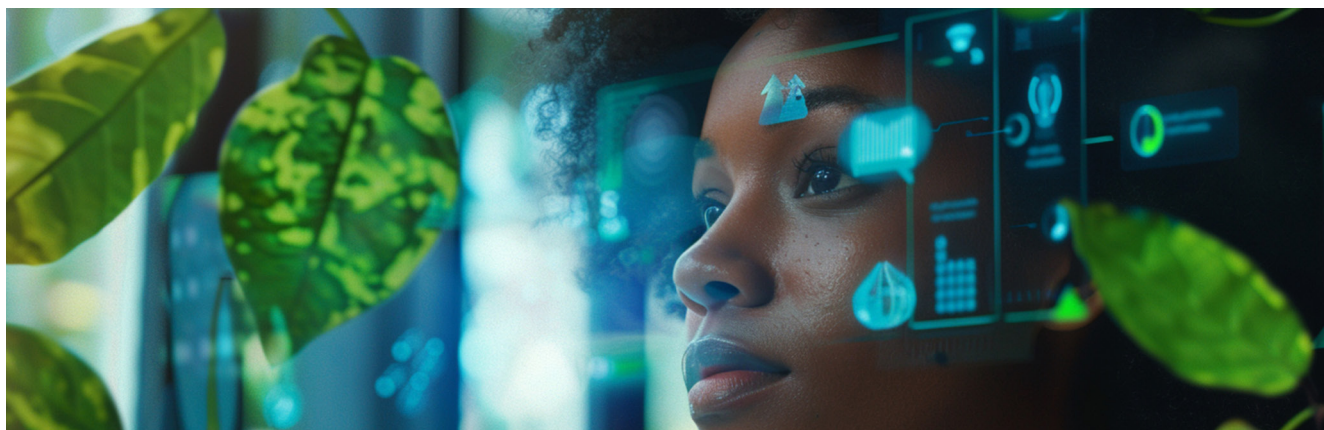
SECTION 07

AI FOR SUSTAINABLE DEVELOPMENT

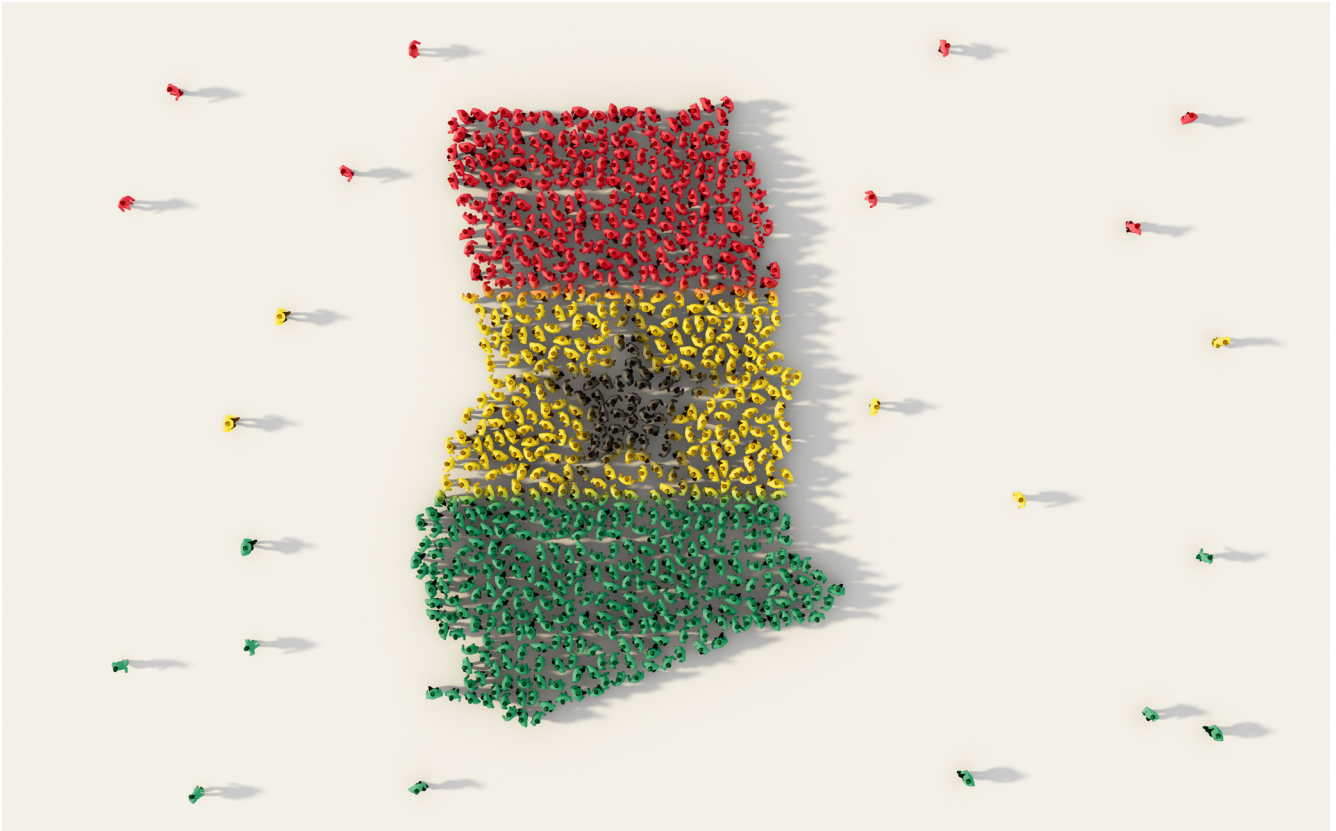
7.1. Introduction

This section examines the practical applications of AI in supporting Ghana's sustainable development goals, enhance local and regional initiatives, and provides recommendations for policymakers, developers, researchers, and civil society actors to harness AI responsibly for sustainable development.

As Ghana works toward achieving the United Nations Sustainable Development Goals (SDGs) by 2030, the strategic deployment of AI presents an opportunity to accelerate progress. For Ghana, a targeted approach that focuses on priority SDGs such as Zero Hunger, Good Health, Quality Education, Clean Water and Sanitation, Clean Energy, Industry and Innovation, Sustainable Cities, Climate Action, and Partnerships (SDGs 2, 3, 4, 6, 7, 9, 11, 13, and 17) is essential.



7.2. Understanding Sustainable Development and Ghana's Priorities



Sustainable development is a development paradigm that meets the needs of the present without compromising the ability of future generations to meet their own needs. Ghana's own development plans, including the Coordinated Programme of Economic and Social Development Policies and the Ghana Beyond Aid agenda, align closely with the SDGs. However, challenges such as Poverty still affects many families, access to quality education and healthcare is uneven, and environmental issues like deforestation and pollution are growing concerns. In many of these areas, AI offers new ways to understand problems, make better decisions, and deliver services more effectively. Ghana has identified priority SDGs that reflect the country's most urgent needs and long-term goals. AI can accelerate the achievement of these goals by improving how Ghana collects data, monitors progress, and reports results. For example, AI-powered data analytics can help track school enrolment or disease outbreaks in real time.

7.3. Sectoral Applications of AI for Sustainable Development

7.3.1 Ghana's SDG Priorities and Strategic Focus



SDG 2: Zero Hunger

Agriculture is a major part of Ghana's economy employing over 40% of the population⁶⁴. Many Citizens rely on farming for their livelihood, but this area faces challenges like changing weather patterns, pests, and lack of access to market information. Startups like Farmerline, a Ghanaian agritech company, uses AI and mobile technology to send weather updates, farming tips, and pricing information to farmers in their local languages.



SDG 3: Good Health and Well-being

Access to healthcare remains a major challenge in Ghana, particularly in rural and underserved communities. Artificial Intelligence (AI) is emerging as a powerful tool to strengthen health systems by analyzing patient data, predicting disease outbreaks, and supporting doctors with faster and more accurate diagnoses. A notable example is Moremi AI, which is pioneering the use of large language models to generate medical insights and design therapeutic agents, showcasing the potential of AI-driven innovation in healthcare. As Ghana continues to expand local health centers and enhance maternal and child health services, the integration of AI solutions offers an opportunity to improve both accessibility and quality of care across the country.



SDG 4: Education

Access to quality education remains a pressing challenge in Ghana, particularly in rural and underserved communities. Artificial Intelligence (AI) is opening new opportunities to bridge these gaps by personalizing learning, supporting teachers with intelligent tools, and improving access to educational resources. A notable example is Kwame AI (refer to Section 4 for details on Kwame AI and other educational AI innovations). As Ghana scales up efforts to strengthen its education system, such AI innovations offer a pathway to accelerate both learning outcomes and sustainable development.



SDG 6 & 7: Sustainable Water and Clean Energy

When it comes to environmental sustainability, AI is increasingly central to Ghana's efforts to tackle clean water and energy challenges. In water resource management, AI supports the prediction of leakages in urban water systems and the monitoring of river pollution through sensor data and anomaly detection models. In the

⁶⁴ Unlocking the lifeline of Ghana's economic growth: The indispensable role of agribusiness

<https://thebftonline.com/2025/01/30/unlocking-the-lifeline-of-ghanas-economic-growth-the-indispensable-role-of-agribusiness/>

energy sector, researchers and engineers are piloting AI tools that forecast electricity demand, detect faults in transmission lines, and improve the integration of renewable energy into the national grid. A practical example is the RAGA (Rapid Assessment of Groundwater Availability) project, which uses artificial intelligence to predict and manage the country's groundwater resources. (Refer to Section 4 for more AI innovations focused on environmental sustainability).



SDG 9: Industry, Innovation and Infrastructure

Ghana is advancing progress toward SDG 9: Industry, Innovation, and Infrastructure through homegrown AI innovations such as Aya Data and its subsidiaries. Aya Data is building critical data infrastructure by providing high-quality data annotation and collection services while creating jobs and skills development opportunities for young people in the digital economy. Its product AyaGrow supports precision agriculture by transforming aerial imagery and field data into actionable insights for farmers and agribusinesses, enhancing productivity and resilience in the agricultural sector.



SDG 11: Sustainable Cities and Communities

Ghana is exploring the role of Artificial Intelligence in building sustainable cities and communities in line with SDG 11, and a strong example is the recent Accra Mobility Hackathon jointly organized by the University of Ghana, Yango Group, and the data science platform Zindi. The hackathon brought together students, young innovators, and data scientists to develop AI models that predict taxi ride times in Accra using trip and weather data. By addressing urban mobility challenges, such solutions can reduce traffic congestion, improve transport efficiency, and contribute to safer, more reliable city transport systems. Beyond the technical innovations, the event showcased the value of collaboration between academia, the private sector, and civic tech communities in co-creating solutions tailored to Ghana's urban realities.



SDG 13: Climate Action

The West African Science Service Centre on Climate Change and Adapted Land Use⁶⁵ (WASCAL, 2023) is collaborating with local researchers to use AI in climate modelling, drought forecasting, and carbon emission tracking. Ghana has also piloted AI-enabled drones for tracking illegal mining and deforestation in protected forest zones, a critical intervention given the scale of environmental degradation from illegal mining (galamsey) operations. AI has an important role to play in climate change mitigation. Machine learning models can be used to simulate climate risks, predict extreme weather events, and analyse the impact of rising temperatures on food and water systems. Ghana can use these tools to develop early warning systems and protect vulnerable communities.

⁶⁵ WASCAL – Combating Climate Change. Improving Livelihoods

7.4. Stakeholder Guidelines

- **Policymakers**

- o Adopt and implement a national AI strategy aligned with the SDGs prioritizing sectors like healthcare, education and climate.
- o Invest in public infrastructure, such as AI research centers, data labs, and green computing hubs across the country.
- o Facilitate multi-stakeholder dialogue between government, tech companies, academia, and civil society to guide AI governance.

- **Developers & Tech Startups**

- o Adopt open innovation practices, partnering with NGOs, schools, and researchers to test AI in real-world settings.
- o Build energy-efficient, low-bandwidth AI tools that work in offline or low-connectivity environments.
- o Incorporate ethics-by-design principles, including explainability, non-discrimination, and community consultation.

- **Researchers and Academia**

- o Focus on applied AI research relevant to Ghanaian contexts and SDGs (e.g., crop disease detection, maternal health AI tools).
- o Create interdisciplinary AI Programmes combining computer science, development studies, and ethics.
- o Produce open datasets and research outputs that can support AI startups, further research and government planning.

- **Civil Society**

- o Advocate for inclusive and rights-based AI policies, especially concerning vulnerable populations.
- o Raise public awareness on AI's benefits and risks through community forums, media, and digital campaigns.
- o Support community participation in AI projects, especially in education, health, and environmental monitoring.

- **International Partners**

- o Provide funding and technical support for AI initiatives that align with Ghana's SDG priorities.
- o Facilitate knowledge transfer by supporting South-South and North-South collaborations in AI for development.
- o Help build regional data infrastructure (e.g., AI-ready public datasets, interoperable platforms) that benefit Ghana and West Africa.
- o Encourage inclusive research partnerships that Prioritise Ghanaian leadership and local capacity building.

For All Stakeholders

- Foster interdisciplinary and cross-sector partnerships to maximize the impact of AI for sustainable development¹.
- Engage in regional and international collaborations to share best practices and Harmonise standards.

7.5. Best Practices for Responsible AI

To use AI safely and fairly, Ghana should follow some key principles:

- **Green AI:** Use energy-efficient systems and renewable energy sources to reduce environmental harm.
- **Inclusive Design:** Involve people from all walks of life women, youth, persons with disabilities, and rural communities in designing AI systems.
- **Open and Ethical Data:** Share non-sensitive public data to support innovation while protecting people's privacy.
- **Local Capacity Building:** Train more Ghanaians in AI so that we can develop solutions that reflect our own values, languages, and needs.

7.6. AI for Social Good Initiatives

AI is helping to solve real-life problems in health, education, governance, and public welfare. In Ghana, several AI-powered initiatives have already demonstrated that when designed with purpose and inclusion in mind, AI can significantly improve the lives of ordinary people.

- **AI for Persons with Disabilities and Inclusion**

AI-powered speech recognition and voice assistants are helping people with motor impairments use smartphones and access digital services. In Ghana, efforts are underway to build local language support into such systems so that more people can use them in Twi, Ewe, or Dagbani.

Globally tested solutions like Seeing AI by Microsoft or Be My Eyes are being explored by Ghanaian disability Organisations. These apps use computer vision to describe objects and scenes to visually impaired users through a smartphone camera.

- **AI in Disaster Relief and Humanitarian Aid**

Ghana is increasingly vulnerable to natural disasters such as floods and droughts. AI tools like Google's flood forecasting system have been deployed to predict floods several days in advance. These systems analyse satellite data and rainfall trends to alert communities and agencies about flood risks, allowing for early evacuation and resource deployment. Through initiatives like OpenStreetMap Ghana, volunteers train AI models to detect flood prone areas.

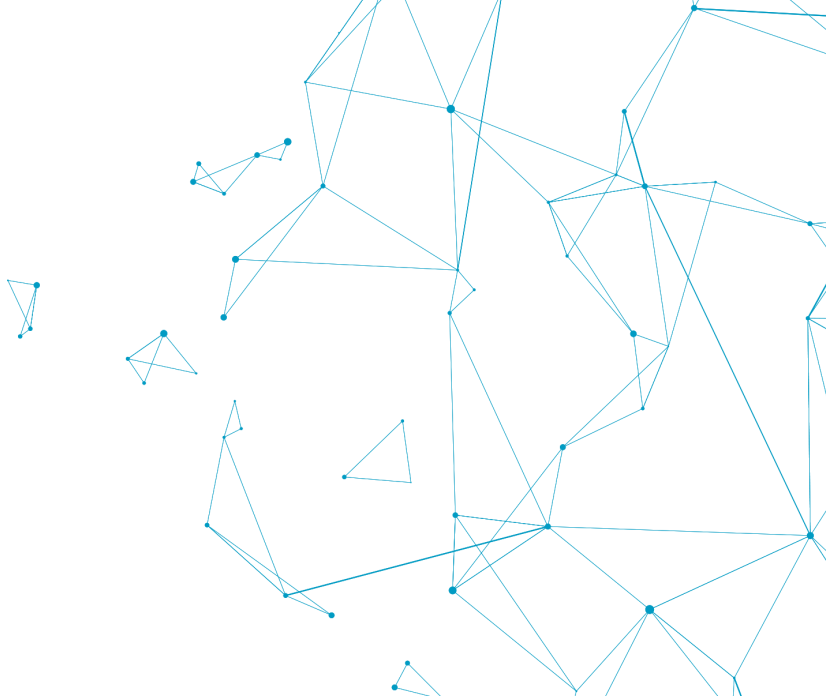
7.7. Sustainable AI for Climate-Resilient Development in Ghana

Climate change is a major challenge for Ghana, and while Artificial Intelligence (AI) can support climate action through better data, energy efficiency, and early warning systems, it also risks harming the environment if deployed without safeguards. Large-scale AI requires significant energy, water, and hardware, which can increase emissions and waste. To align with Ghana's National Climate Change Policy, and global commitments under the Paris Agreement, AI must be developed sustainably.

Guidelines for Green AI in Ghana:

1. **Use renewable energy** – Host AI infrastructure on clean power.
2. **Boost efficiency** – Promote smaller, low-energy AI models and efficient data centres.
3. **Manage e-waste** – Enforce recycling and circular economy practices.
4. **Carbon reporting** – Track and disclose AI-related emissions.
5. **Policy alignment** – Integrate AI expansion into national climate and energy plans.

By embedding these principles, Ghana can scale AI responsibly, driving innovation while safeguarding the environment and advancing the SDGs.



7.8. Section Seven Recap

This section focused on the intersection of AI and sustainable development within Ghana. The key sectors explored were agriculture, health, education, climate, energy, environment, and governance. These areas were crucial to Ghana's national development and were directly linked to the SDGs. The section had four main objectives:

- Showed how AI technologies could support Ghana's development goals and SDG commitments
- Provided real-life examples of AI being used in Ghana or in similar contexts across Africa.
- Explained the ethical, environmental, and social risks associated with AI.
- Offered practical recommendations for key stakeholders on how to develop and use AI responsibly and inclusively.

Contributors

GIZ

ELIKPLIM SABBLAH	Technical Advisor, Fair Forward, GIZ Ghana
MARY SEIWAH AFRAM	Technical Advisor, Fair Forward, GIZ Ghana

Project consultants

DERRYDEAN DADZIE	Project Team Lead, Heritors Labs
DR. WILLIAM LESLIE BROWN-ACQUAYE	AI Policy/Research Consultant, Heritors Labs
DONALD GWIRA	Communication Consultant, Heritors Labs

Project Team

KOFI OCLOO	Senior Project Operations Manager, Heritors Labs
JOEL OFORI-TEIKO	Project Manager, Heritors Labs
BERNARD KWABENA BOADI MENSAH	Project Coordinator, Heritors Labs
PERCY BROWN	Research Assistant, Heritors Labs
JULIUS SEMAVOR	Events Coordinator, Heritors Labs
BEVERLEY ANDOH	Business Communications Manager, Heritors Labs
RUTH AMOAKO OBENG	Creative Lead, Heritors Labs
EVELYN TWENTOH	Heritors Labs
BARBARA AIDOO	Heritors Labs
EMMANUEL PRINCE AMARTEY	Heritors Labs
HILLARY ACQUAH	Asar Ramofh

Expert Pool

DEBORAH ARTHUR	AI Ghana
DODZI KOKU HATTOH	Bonn Sustainable AI Lab, Germany Kimathi & Partners, Ghana University of Ghana
DR CHARLES NII AYIKU AYIKU	Institute of Public Relations, Ghana

Expert Pool

DR. FORGOR LEMPOGO	Ghana Communication Technology University
DR. MICHAEL WILSON	CSIR-Institute for Scientific and Technological Information
DR. NII LONGDON SOWAH	University of Ghana
EMMANUEL ASAMOAH	Tecotran Global Limited
ISAAC NEWTON ACQUAH	The Innovation Spark
MAXWELL ABABIO	Data Protection Commission
MS. VANESA AKUETTEH	Eight Geeks at Law
NANA DEFIE ASAMOA-BONSU BADU	Private Consultant - Communications, Leadership & Organisational Development
PROF. EBENEZER OWUSU	University of Ghana
SIRAN MAHAMA	Institute of Advanced Legal Studies, University of London
TIMOTHY OWUSU	iKolilu
WORLALI SENYO	Farmerline Limited

Key Stakeholders

ABIGAIL YEBOAH
ADWOA ASANTEWAA BREMANG
AMA LARBI SIAW
AMMISHADDAI OFORI
BLAISE BAYUO
DANIEL CHARWAY
DANIEL KWAMMY
DANIELLA ESI DARLINGTON
DEBORAH ASMAH
DOCIA AGYEMANG BOAKYE
DR AYORKORH KORSAH

DR. NII LANTE
EMMANUEL AKWAH KYEI
EMMANUEL APETSI
EMMANUEL EKOW ARTHUR
ENOCK WILSON ESSUMAN
ERNEST GAVOR
EVELYN MAWUKO OHENE
EWURADWOA ASSABA PAINTSIL
FELIX DONKOR
GEORGE BEST AKUFFO
GEORGE DIANTEY

Key Stakeholders

GETRUDE ASEYE ASIENI
HENRY MINTAH JNR
IPHY ANTHONY
ISAFUN SENAM AMEMATEKPOR
ISOBEL ACQUAH
JEPH B. ACHEAMPONG
JOHN OFORI
JOSEPH BEREKOH
JOSHUA OPOKU AGYEMANG
JUDITH AWO SEMABIA
JUSTICE WILLIAMS ASARE (PH.D)
KUWORNU KAFUI LAWRENCE
KWAME NYANTUAME
KWAMU AHIABENU
LUCAS AKPALU
MALIK OWUSU ANTWI

NAA LAMLE BOYE
PAUL CRAFER
PROF. ISAAC WIAFE
PROSPERA KUUSANE
RACHAEL TACHIE-MENSON
RASHIDA MUSA
RONALD TAGOE
RUBEN MAWUJI
SAMUEL DOWUONA
SELASY E ZORMELO
STEPHEN BOADI
STEPHEN MOORE
STEPHEN NYARKO DJABA
VENUS TAWIAH
VICTORIA AMEYAW
YOLANDE YAYRA P GAKE

Institutions

AFRICAN CENTER OF ECONOMIC TRANSFORMATION
ALLEINA.CO
ASHESI UNIVERSITY
ASSESSED INTELLIGENCE LLC FOR HUMANITY EUROPE
ASSOCIATION OF GHANA INDUSTRIES
AYA DATA
BLOSSOM ACADEMY
BODOMASE WOMEN'S FELLOWSHIP NETWORK

CENTER FOR SOCIAL INNOVATION
CERTA FOUNDATION
CRATE DIGITAL
CYBERSECURITY AUTHORITY
DATA PROTECTION COMMISSION
DIGITAL FOUNDATION AFRICA
ENABLE GROWTH CONSULT
ENGINE BUSINESS NETWORK
ENNOVATE BLCK

Institutions

FIXXIES TECHNOLOGIES
GHANA ARMED FORCES
GHANA BAR ASSOCIATION
GHANA BLIND UNION
GHANA COMMUNICATION TECHNOLOGY UNIVERSITY
GHANA HUBS NETWORK
GHANA NLP
GHANA TELECOMMUNICATIONS CHAMBER
GRASSROOTS HUB
HOPIN ACADEMY
HUBTEL
INNOVATION SPARK
INSTANTRAD INC
IOT NETWORK HUB
MEST AFRICA
MIEWOGE
MINISTRY OF COMMUNICATION, DIGITAL TECHNOLOGY AND INNOVATIONS

MINISTRY OF ENVIRONMENT, SCIENCE AND TECHNOLOGY
MINISTRY OF GENDER, CHILDREN AND SOCIAL PROTECTION
MINOHEALTH AI LABS
MNOTIFY
NATIONAL COUNCIL ON PERSONS WITH DISABILITIES
NATIONAL INFORMATION TECHNOLOGY AGENCY
NPONTU TECHNOLOGIES
RAIMA
RETHINK AFRICA
SCS DELIVERIES
SE HUB
SISU AI
SOMPA AND PARTNERS
TECHFOCUS 24
UNIVERSITY OF GHANA
VIAMO
WAN-HIVE GHANA
ZONGO VATION HUB



References

1. Agyepong, L. & Owusu, K., 2023. AI adoption in Ghana: Opportunities and challenges. *Journal of African Technology Studies*, 12(3), pp.45–60.
2. Anzolin, G., Haraguchi, N., De Sousa, A.P.N., Savrasov, A. & Reis, J., 2024. Bridging the AI Divide: Empowering Developing Countries through Manufacturing. *Policy Brief*, (12).
3. Artificial Intelligence Practitioners' Guide – Kenya, 2023. Artificial Intelligence Practitioners' Guide: Kenya. Global Partnership for Sustainable Development Data & GIZ. Available at: <<https://www.data4sdgs.org>>.
4. Asiedu, N. & Mensah, P., 2024. Data-driven agriculture: Leveraging AI for Ghana's farming future. *Ghana Journal of Agricultural Innovation*, 8(2), pp.22–35.
5. Data Protection Commission Ghana, 2012. Data Protection Act (Act 843). Accra: Government of Ghana.
6. Farmerline, 2023. Farmerline. [online] Available at: <<https://www.farmerline.co>> [Accessed 30 May 2025].
7. Ghana Data Protection Commission, 2012. Data Protection Act, 2012 (Act 843). Accra: Government of Ghana.
8. Ghana Statistical Service, 2022. Ghana Sustainable Development Goals Report. Accra: GSS.
9. GSMA, 2024. Understanding AI for Sustainable Development in Africa. London: GSMA.
10. Guide, K.A., 2021. AI for Development. Nairobi: AI4Dev Africa.
11. IEEE Standards Association, 2020. IEEE 7010: Recommended practice for assessing the impact of AI on human well-being. Piscataway, NJ: IEEE.
12. International Telecommunication Union, 2021. Bridging the Digital Divide. Geneva: ITU.
13. Israel, D., 2025. Ghana's National Artificial Intelligence Strategy: A Critical Policy Analysis on Building a Sustainable AI Ecosystem. [online] SSRN. Available at: <<https://ssrn.com/abstract=5123653>> [Accessed 30 May 2025].
14. ISO/IEC, 2023. ISO/IEC 42001: Artificial intelligence management system. Geneva: International Organisation for Standardization.
15. ITU, 2022. AI for Good Global Summit Proceedings. Geneva: ITU.
16. Kwamboka, L. & Mwagiru, A., 2023. Artificial Intelligence Practitioners' Guide: Kenya. Global Partnership for Sustainable Development Data. Available at: <<https://www.data4sdgs.org>>.
17. Mensah, P. & Kofi, A., 2024. Monitoring AI systems: A case study of Ghanaian financial institutions. *African AI Review*, 5(1), pp.88–102.
18. Ministry of Communications and Digitalisation (MoCD), 2021. Digital Ghana Agenda. Accra: Government of Ghana.
19. Ministry of Communications and Digitalisation (MoCD), 2023. Government trains about 12,000 Girls-in-ICT since 2017. [online] Available at: <<https://moc.gov.gh/2023/11/03/government-trains-about>>.

12000-girls-in-ict-since-2017/> [Accessed 30 May 2025].

20. Ministry of Communications and Digitalisation (MoCD), 2024. Ghana Digital Economy Policy and Strategy. [online] Available at: <<https://nita.gov.gh/theevooc/2024/12/Ghana-Digital-Economy-Policy-Strategy-Document.pdf>> [Accessed 30 May 2025].
21. Ministry of Education Ghana, 2023. Education Sector Annual Review. Accra: MoE.
22. Ministry of Environment, Science, Technology and Innovation (MESTI), n.d. Ghana Climate Policy. Accra: MESTI.
23. MoCD, Smart Africa, GIZ FAIR Forward & The Future Society (TFS), 2022. Ghana's National Artificial Intelligence Strategy 2023–2033. Accra: Government of Ghana.
24. Osei, R. & Amankwah, J., 2023. MLOps for African AI: Strategies for scalable deployment. *Journal of African Computing*, 10(4), pp.15–29.
25. Oxford Insights, 2023. Government Artificial Intelligence Readiness Index 2023. London: Oxford Insights.
26. Owusu, K. & Adjei, E., 2022. Data protection in Ghana: Implementing Act 843 for AI development. *Ghana Law Review*, 19(1), pp.33–47.
27. Penplusbytes, 2024. Tech-Driven Climate Action in Ghana: Making a Case for the Use of Artificial Intelligence. Accra: Penplusbytes.
28. Royal Society, 2017. Machine Learning: The Power and Promise of Computers that Learn by Example. London: The Royal Society.
29. Sarpong, T. & Boateng, R., 2023. Model selection for AI applications in Ghanaian industries. *West African Journal of Technology*, 7(2), pp.55–70.
30. Sey, A. & Mudongo, O., 2021. Case studies on AI skills capacity building and AI in workforce development in Africa. Cape Town: Research ICT Africa.
31. The State of AI in Africa Report 2023, 2023. The State of AI in Africa Report. Deep Learning Indaba.
32. UNDP Ghana, 2023. Supporting Ghana's digital transformation for development. Accra: UNDP.
33. UNDP Regional Bureau for Africa, 2024. Africa Development Insights. Addis Ababa: UNDP.
34. UNESCO, 2021. Recommendation on the Ethics of Artificial Intelligence. Paris: UNESCO.
35. United Nations, 2015. Transforming our world: the 2030 Agenda for Sustainable Development. New York: UN.
36. WASCAL, 2023. AI for Climate Monitoring and Adaptation. Accra: West African Science Service Centre on Climate Change and Adapted Land Use (WASCAL).
37. WHO Ghana, 2021. Health Systems Strengthening through Technology. Accra: World Health Organisation Ghana Office.
38. World Bank, 2020. Artificial Intelligence in Africa: Opportunities and Challenges. Washington, DC: World Bank.
39. World Economic Forum, 2020. Unlocking Technology for the Global Goals. Geneva: WEF.
40. Zipline Ghana, 2022. Zipline Ghana. [online] Available at: <<https://flyzipline.com/locations/ghana>> [Accessed 30 May 2025].



Glossary

A

- **Accountability:** The principle that individuals, Organisations, and AI system operators must be responsible for the outcomes of the AI systems they develop, deploy, and use.
- **Act 843:** The Data Protection Act, 2012 of Ghana, which governs the collection, use, and protection of personal data.
- **Act 1038:** The Cybersecurity Act, 2020 of Ghana, which establishes a legal framework for cybersecurity activities and created the Cyber Security Authority (CSA).
- **Act 772:** The Electronic Transactions Act, 2008 of Ghana, which provides the legal foundation for electronic communications and e-commerce.
- **AfCFTA:** African Continental Free Trade Area. A major trade agreement aiming to create a single market for goods and services in Africa. The guide links AI development to supporting its digital trade objectives.
- **Agile Development:** An iterative approach to project management and software development that emphasizes flexibility, collaboration, and rapid prototyping.
- **AI (Artificial Intelligence):** Computer systems capable of simulating human intelligence. These systems can learn, adapt, sense their environment, reason, plan, and extract insights from data to achieve human-defined objectives.
- **AI Fairness 360:** An open-source toolkit (by IBM) used to check for and mitigate unwanted bias in machine learning models throughout the AI lifecycle.
- **Algorithm:** A set of step-by-step instructions or rules a computer follows to perform a calculation or solve a problem. AI systems are built on complex algorithms.
- **AkooBooks Audio:** A Ghanaian initiative mentioned that uses AI (text-to-speech) to convert books into audiobooks in local languages, supporting education and inclusion.

B

- **Bias (Algorithmic Bias):** Systematic and repeatable errors in an AI system that create unfair outcomes, such as privileging one arbitrary group of users over others. Often a result of biased training data.

C

- **CI/CD (Continuous Integration/Continuous Deployment):** A method to frequently deliver apps to customers by introducing automation into the stages of app development, specifically building, testing, and deployment

- **Computer Vision:** A field of AI that enables machines to interpret and understand visual information from the world, such as images and videos. (Example: Analyzing medical X-rays).
- **Containerization:** The practice of packaging an application's code together with all its dependencies (libraries, frameworks) into a single, lightweight, portable unit called a container (e.g., using Docker).
- **CSA:** Cyber Security Authority. The national regulator for cybersecurity in Ghana, established by the Cybersecurity Act, 2020 (Act 1038).

D

- **Data Protection Commission (DPC):** The independent regulatory body in Ghana responsible for enforcing the Data Protection Act, 2012 (Act 843).
- **Data Sovereignty:** The concept that data is subject to the laws and governance structures of the nation where it is collected. The guide emphasizes keeping Ghanaian data within Ghana.
- **Deployment:** The process of integrating a trained AI model into an existing production environment to make practical, real-world decisions.
- **Docker:** A platform used to develop, ship, and run applications inside containers.
- **DPC:** See Data Protection Commission.

E

- **Edge Computing:** A distributed computing paradigm that brings computation and data storage closer to the location where it is needed (e.g., on a local device or router) to improve response times and save bandwidth.
- **Explainability:** The ability to explain in understandable terms the decision-making process of an AI model. Closely related to transparency.

F

- **FAIR Forward:** A GIZ initiative (“Artificial Intelligence for All”) dedicated to the open and sustainable development of AI, supporting Ghana and six other partner countries (Kenya, India, Indonesia, Rwanda, South Africa and Uganda) with open AI resources (data and models), capacity building, and policy frameworks.
- **Fintech:** A portmanteau of “financial technology,” referring to the use of technology and innovation to compete with traditional financial methods in the delivery of financial services.

G

- **GCPI:** Ghana Investment Promotion Centre. Governs foreign investment in Ghana, including for tech businesses, under the GIPC Act (Act 865).
- **General AI (Strong AI):** A theoretical form of AI that would possess the ability to understand, learn, and apply intelligence to any problem, much like a human being. This does not yet exist.
- **Generative AI:** A type of AI that can generate new content—such as text, images, audio, and code—based on the patterns it has learned from existing data. (Example: Tools that generate text in Twi).
- **GIZ:** Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. A German development agency that provides support and funding for numerous AI initiatives in Ghana mentioned in the guide.

- **GPU (Graphics Processing Unit):** A specialized electronic circuit designed to rapidly manipulate and alter memory to accelerate the creation of images. GPUs are highly effective for training deep learning AI models.
- **Green AI:** The development and use of AI systems that are energy-efficient and environmentally sustainable, minimizing their carbon footprint.

H

- **Human-in-the-Loop (HITL):** A model that requires human interaction to ensure AI systems function correctly, typically for validation, handling edge cases, or providing critical oversight.

I

- **Inclusivity:** The practice of ensuring AI systems are designed for and accessible to everyone, including underrepresented groups like women, persons with disabilities, and rural populations.

K

- **KNUST:** Kwame Nkrumah University of Science and Technology. A major Ghanaian university with significant AI research and educational Programmememes, including the Responsible AI Lab (RAIL).
- **Kubernetes:** An open-source system for automating deployment, scaling, and management of containerized applications.

L

- **Lacuna Fund:** A collaborative initiative that provides grants to create, expand, and maintain labeled datasets for machine learning in low- and middle-income contexts, including Ghana.
- **Localization:** The adaptation of an AI system or product to meet the language, cultural, and other specific requirements of a particular country or region. (Example: Building NLP models for Twi and Ewe).

M

- **Machine Learning (ML):** A subset of AI that provides systems the ability to automatically learn and improve from experience without being explicitly Programmemeed.
- **MEST Africa:** Meltwater Entrepreneurial School of Technology. A pan-African technology entrepreneurship training Programmeme, seed fund, and incubator with a campus in Accra.
- **MLOps (Machine Learning Operations):** A set of practices that aims to deploy and maintain machine learning models in production reliably and efficiently. It combines ML, DevOps, and data engineering.
- **Model Training:** The process in machine learning where an algorithm learns from a dataset by identifying patterns and adjusting its internal parameters.
- **MoCDTI:** Ministry of Communications, Digital Technology and Innovation. The lead Ghanaian government ministry overseeing the development of the National AI Strategy and digital governance.

N

- **Narrow AI (Weak AI):** AI that is designed and trained for a particular task. Most current AI, including

voice assistants and image recognition systems, are Narrow AI.

- **National AI Strategy:** A forthcoming national policy document (under development by MoCDTI) that will outline Ghana's roadmap for the safe, inclusive, and beneficial adoption of AI.
- **Natural Language Processing (NLP):** A field of AI that gives machines the ability to read, understand, and derive meaning from human languages. (Example: Multilingual chatbots for rural communities).
- **NCA:** National Communications Authority. The regulatory body for communications services (telecoms, broadcasting) in Ghana.
- **NITA:** National Information Technology Agency. A Ghanaian government agency under MoCDTI responsible for implementing IT policies, setting standards, and driving e-government initiatives.
- **NLP:** See Natural Language Processing.

O

- **OECD AI Principles:** A set of five values-based principles and five recommendations for public policy on AI, promoting innovative and trustworthy AI that respects human rights and democratic values. A key reference for the guide.
- **ONNX (Open Neural Network Exchange):** An open format used to represent AI models, allowing them to be transferred between different frameworks (e.g., PyTorch to TensorFlow) for interoperability.

P

- **Procurement:** The process of finding, agreeing to terms, and acquiring goods, services, or works from an external source. The guide provides guidelines for the ethical procurement of AI systems by public institutions.
- **PyTorch / TensorFlow:** Popular open-source machine learning frameworks used for developing and training AI models.

R

- **RAIL:** Responsible Artificial Intelligence Lab. A research lab at KNUST, established with support from GIZ and IDRC, focused on promoting the responsible and ethical development of AI in Africa.
- **Responsible AI:** The design, development, deployment, and use of AI systems in a way that is ethical, transparent, accountable, inclusive, and aligned with human rights and societal well-being. The focus of Chapter 2.
- **Robotics:** A field of engineering and AI focused on the design, construction, operation, and use of robots. (Example: Automated seed-planting robots).

S

- **SDGs:** Sustainable Development Goals. A collection of 17 interlinked global goals designed to be a "blueprint to achieve a better and more sustainable future for all" by 2030. A central theme of Chapter 7.
- **Smart Agriculture (Precision Agriculture):** A farming management concept using AI, IoT, and data analytics to optimize returns on inputs while preserving resources. (Example: Using drones and AI to monitor crop health).
- **Soronko Academy:** A Ghanaian social enterprise mentioned for its women-focused tech skills training

Programmemes, aimed at improving gender inclusivity in the AI field.

- **Stakeholder:** Any person or group with an interest or concern in something, in this case, the AI ecosystem. Key stakeholders include government, academia, private sector, civil society, and international partners.

T

- **Transparency:** The principle that the decisions and processes of an AI system should be open, understandable, and explainable to users and those affected by its outcomes.
- **TPU (Tensor Processing Unit):** An AI accelerator application-specific integrated circuit (ASIC) developed by Google specifically for neural network machine learning.

U

- **UNESCO Recommendation on the Ethics of AI:** A global standard-setting instrument adopted by all UNESCO Member States (including Ghana) that provides a comprehensive ethical framework for the development and use of AI. A key reference for the guide.

Z

- **Zipline:** A company using AI-enabled drones to optimize the delivery route and delivery of medical supplies, blood, and vaccines to remote clinics in Ghana. Cited as an example of AI for social good.

