

Terms of Reference

EMBEDDED DIGITAL AGRICULTURE ADVISOR FOR THE

GHANA AGRICULTURE AND AGRIBUSINESS PLATFORM (GHAAP)

and

NETWORK OPERATING CENTER (NOC)

The Ministry of Food and Agriculture (MOFA), with support from a World Bank Grant, is seeking to hire an Embedded Digital Agriculture Advisor to MOFA to manage and provide technical leadership and strategic oversight for the continued enhancement of the Ghana Agriculture and Agribusiness Platform (GhAAP) and its associated Network Operating Centre (NOC).

The Ghana Agriculture and Agribusiness Platform (GhAAP) is housed within the Ministry of Food and Agriculture: <https://ghaap.com/>. It provides a single, unified platform for farmers, suppliers, buyers, staff of MOFA and Regional and District Agriculture Departments, and other stakeholders, including development partners, to access sector-wide information and services they need. This helps increase efficiency, reduce costs, and improve productivity throughout the value chain.

The GhAAP architecture is built on the principles of interoperability, enabling different modules of the GhAAP to communicate seamlessly. This interoperability also allows the modules to share data and information, coordinate actions and services, and provide a comprehensive view of the agricultural value chain. The interoperable nature of the platform allowed the creation of a central module hosted by MoFA.

The benefits of GhAAP's interoperable architecture are numerous. Through its modules, it improves access to farm inputs, markets, and finance for farmers, enhances efficiency in supply chain management, enables better decision-making through data-driven insights, and increases productivity and competitiveness in the agricultural sector. The interoperable nature of GhAAP is achieved through standardised data formats and APIs, secure data exchange protocols, and a modular design that allows for easy integration of new services. This enables the different modules to work together seamlessly, providing a cohesive and comprehensive platform for the agricultural sector.

There are currently 1.2 million farmers registered on the GhAAP – the goal is 3.5 million. Unlike typical farmer registries this also takes into account not a geospatial point mapping, but a polygon of the farm and Ghana card number. Farmers are then connected to input suppliers, aggregators and other value chain actors. Development Partners can also monitor some of their supports through the platform.

The GhAAP has been supported under the West Africa Food System Resilience Program (FSRP) to support Ghana's agricultural transformation; and the NOC represents the underlying digital infrastructure that powers GhAAP.

Since its introduction, GhAAP has demonstrated remarkable success in crisis response, supporting Ghana's response to recent crisis - 2023 Akosombo and Kpong dam flooding, and 2024 prolonged dry spell. The platform has successfully distributed over \$125 million worth of inputs to more than 655,000 smallholder farmers through its comprehensive digital database of over 1.2 million registered farmers nationwide. The platform's effectiveness has been independently validated, with phone surveys confirming that 86% of flood relief program farmers and macroeconomic crisis program beneficiaries

received their allocated inputs, demonstrating exceptional accountability and transparency in government input distribution. **About GhAAP – Modules**

GhAAP consists of seventeen main modules:

1. Farmer Module,	10. MoFA District Officer Module,
2. Input Supplier Module,	11. Relief Module,
3. Master Aggregator Module,	12. Commodity Leads Module,
4. Aggregator Module,	13. Regional Distribution Center Module,
5. Agriculture Extension Agent Module,	14. Development Partners Module,
6. District Extension Officers Module,	15. Off-Taker Module,
7. Distribution Shop Module,	16. Master Agriculture Mechanization Module,
8. MoFA Admin Module,	17. Agricultural Mechanisation Module.
9. MoFA Regional Officer Module	

Details of some modules are provided below, but more details can be found in the GhAAP documentation manual, GhAAP Administrator Manual, and GhAAP User Manual.

- a. **Government Admin Module (MoFA Admin):** The Government Module serves as the central command and control system for Ghana's Ministry of Food and Agriculture, providing comprehensive oversight and management capabilities for national agricultural operations. This module's primary value proposition lies in delivering accurate field data that directly informs policy development, strategic planning, and program implementation at the national level. The module encompasses a wide range of sophisticated applications including digitalization of directorate-specific business processes, comprehensive food balance sheet management, and advanced crop and livestock suitability mapping capabilities. Weather monitoring and crop prediction systems within this module provide early warning alerts that help prevent agricultural disasters and optimize production planning. The module maintains a comprehensive farmer database while facilitating integration with third-party applications, ensuring seamless data flow across different systems. Additionally, it incorporates Interactive Voice Response (IVR) and call center functionalities, spatial and Geographic Information System (GIS) capabilities, and robust content and knowledge management systems that support integrated digital extension and advisory services. The module's data analytics capabilities, including predictive modeling, optimization algorithms, and comprehensive dashboarding, enable evidence-based decision-making at the highest levels of agricultural governance.

- b. **Farmer Module:** The Farmer Module represents the grassroots foundation of the GhAAP ecosystem, designed specifically to empower individual farmers with direct access to essential agricultural resources and services. Each farmer registered on the platform receives a unique identification number, while their farm locations are precisely mapped using GPS coordinates to document farm size and commodity production details. This module's core value proposition centers on providing farmers with a comprehensive one-stop platform that significantly increases their access to products, services, and agronomic information, ultimately leading to enhanced productivity and increased income.

The module offers farmers access to extensive agro inputs databases, professional technical support and advisory services, and real-time weather and soil information critical for informed farming decisions. Farm planning tools help farmers optimize their operations, while inventory management systems enable better resource tracking and utilization. Advanced tracking systems utilizing Internet of Things (IoT) technology provide farmers with unprecedented visibility into their operations, supported by data analytics capabilities that offer predictive insights, optimization recommendations, and intuitive dashboards. The integration of warehouse management systems ensures efficient storage and distribution of agricultural products, completing the comprehensive suite of tools available to farmers.

- c. **Master Aggregator and Aggregator Module:** The Master Aggregator and Aggregator Module functions as the crucial intermediary layer that bridges the gap between input suppliers and farmers while ensuring efficient service delivery and cost recovery mechanisms. These entities bear the responsibility for providing essential production inputs, including seeds, fertilizers, and agrochemicals, alongside mechanization services and agricultural extension support to farmers within their networks. A fundamental aspect of their operation involves ensuring that farm produce equivalent to the cost of provided inputs and services is successfully recovered, creating a sustainable credit system that benefits all parties involved.

The value proposition for aggregators centers on gaining access to essential products and services needed to enhance the productivity of their farmer networks, coupled with access to critical information systems that enable effective risk management. The module incorporates sophisticated supply chain management tools specifically designed for aggregation, delivery, and recovery operations, ensuring smooth logistics throughout the agricultural value chain. Enterprise Risk Management (ERM) systems provide aggregators with comprehensive risk assessment and mitigation capabilities, while advanced data analytics offer predictive insights, operational optimization recommendations, and detailed performance dashboards that support informed decision-making and strategic planning.

- d. **Input Supplier Module:** The Agro Input Dealers Module facilitates the participation of private sector input suppliers who commit to providing agricultural inputs on credit terms through designated aggregators within the GhAAP network. Input suppliers registered on this module include providers of fertilizers, seeds, and various agrochemicals essential for modern agricultural production. The module's design ensures that these private dealers can efficiently integrate into the broader agricultural value chain while maintaining their commercial viability and expanding their market reach.

The primary value proposition for input dealers includes gaining access to a verified customer base within the established network, significantly reducing customer acquisition costs and credit risks. Additionally, the module provides comprehensive tracking and tracing capabilities for products and inventory management, enabling dealers to maintain better control over their supply chains and reduce losses. The module incorporates Customer Relationship Management (CRM) systems that help dealers maintain strong relationships with their customers, supported by sophisticated credit management systems that facilitate responsible lending practices. Data analytics capabilities provide dealers with predictive insights into market demand, optimization opportunities for inventory management, and comprehensive dashboards that support strategic business decisions.

- e. **Off-takers Module:** The Off-takers Module serves as the crucial market access component of the GhAAP ecosystem, connecting agricultural producers with various buyers including industrial processors, wholesalers, institutional buyers, market vendors, and government agencies such as NAFCO. These entities play a vital role in the agricultural value chain by purchasing produce from warehouses and making deposit payments through designated financial institutions, ensuring cash flow and market liquidity for farmers and other stakeholders.

The value proposition for off-takers and commodity traders focuses on providing improved access to reliable suppliers within the ecosystem while offering enhanced quality and quantity assurance for agricultural products. This reduces transaction costs and risks associated with sourcing agricultural commodities while ensuring consistent supply chains. The module incorporates comprehensive market access tools that facilitate efficient buyer-seller connections, supported by sophisticated trading platform functionality that streamlines transaction processes. Advanced data analytics provide market participants with predictive insights into price trends, optimization opportunities for procurement strategies, and detailed dashboards that support informed trading decisions and risk management.

1.1 About GhAAP – Data Domains

GhAAP is expected to operate on some critical data domains that provide comprehensive agricultural intelligence and decision-support capabilities across Ghana's agricultural value chain. The proposed data domains currently include weather and climate, pest and diseases, food security and nutrition, market intelligence and trade performance, and agricultural public expenditure, agricultural finance and credit. The weather and climate domain is currently being developed; and the other proposed data domains are yet to be developed. The Embedded Digital Agriculture Advisor is expected to supervise the development of these domains and propose new relevant domains. Additionally, the Advisor is expected to support the management and publicity of the GhAAP and NOC. The domains currently proposed are described below:

- a. **Weather and Climate Domain:** This domain will serve as the meteorological backbone of GhAAP, providing comprehensive weather and climate information essential for agricultural decision-making. The domain will deliver real-time weather data, seasonal forecasts, and climate projections to support farmers, extension agents, and policymakers in optimizing agricultural activities. Additionally, the domain will integrate meteorological data from Ghana Meteorological Agency and international weather services while also maintaining robust early warning systems for extreme weather events and climate-related agricultural risks. Furthermore, it will ensure delivery of location-specific weather advisories and seasonal forecasts directly to farmers, thereby supporting climate change adaptation strategies and drought/flood preparedness protocols. The domain will also maintain comprehensive agro-meteorological databases and advanced climate modeling capabilities that enable climate-smart agriculture initiatives through data-driven insights and evidence-based agricultural planning.
- b. **Pest and Disease Domain:** This domain will provide comprehensive pest and disease surveillance, early warning, and management systems critical for crop protection and food security. The domain will enable rapid identification, reporting, and response to agricultural pests and diseases through sophisticated digital tools and real-time monitoring systems. Moreover, it will incorporate integrated pest and disease monitoring capabilities with advanced image recognition and diagnostic tools for accurate pest and disease identification. The domain will also maintain comprehensive databases of pest and disease occurrence patterns, distribution mapping, and proven management strategies while simultaneously coordinating closely with the Plant Protection and Regulatory Services Directorate. In addition, early warning systems for pest outbreaks and disease epidemics will be complemented by digital advisory services that promote Integrated Pest Management practices. Furthermore, the domain will include robust pesticide usage tracking and residue monitoring systems to ensure safe and sustainable crop protection practices.
- c. **Food Security and Nutrition Domain:** This domain will focus on monitoring, analyzing, and improving food security and nutritional outcomes across Ghana's agricultural value chain. The domain will systematically track food availability, accessibility, utilization, and stability indicators through comprehensive monitoring and early warning systems. Concurrently, it will manage nutrition-sensitive agriculture databases and track intervention effectiveness while also conducting regular household food security assessments and vulnerability mapping exercises. The domain will additionally maintain food availability databases and nutritional outcome indicators that inform food security decision-making at national and local levels. Through digital platforms, it will also support nutrition education and awareness programs while ensuring seamless integration with national nutrition surveillance systems. Moreover, the domain will facilitate coordination with relevant ministries and agencies on food security policies and interventions, thereby providing evidence-based insights for improving nutritional outcomes across Ghana's population.
- d. **Market Intelligence and Trade Performance Domain:** This domain will provide comprehensive market information and trade intelligence to support informed decision-making across Ghana's agricultural value chain. The domain will deliver real-time market data and price forecasts to farmers, traders, and policymakers through sophisticated analytical systems. It will maintain continuous real-time commodity price monitoring and market trend analysis while integrating agricultural trade data from local, regional, and international markets. Additionally, the domain will track export volumes, values, and destination markets for major agricultural commodities while

monitoring import quantities, costs, and source countries for essential agricultural inputs and food products. The domain will furthermore operate advanced supply and demand forecasting models for major agricultural commodities and maintain comprehensive databases of market access opportunities, buyer-seller networks, and trade partnerships. It will also monitor trade balances, seasonal trade patterns, and price competitiveness indicators across different agricultural products while tracking compliance with international standards and certification requirements. Moreover, the domain will provide market linkage services that connect farmers to buyers and export opportunities while capturing data on trade agreements, tariff structures, and regional trade flows within ECOWAS. Furthermore, it will monitor trade facilitation metrics and emerging market opportunities for Ghana's agricultural products while ensuring seamless integration with the Ghana Commodity Exchange and other trading platforms.

- e. **Agriculture Public Expenditure Domain:** This domain will provide comprehensive tracking, analysis, and optimization of government agricultural investments and spending patterns to enhance fiscal transparency, accountability, and effectiveness. The domain will report data on producer support indicators including production subsidies based on outputs, production subsidies based on input use (covering fertilizers, other variable inputs, capital, and on-farm services), income support, and non-classified support to producers. Additionally, the domain will track consumer support indicators such as food aid, cash transfers, school feeding programs, and other non-classified consumer support programs. Furthermore, the domain will monitor support to other agents including payments to input suppliers, transporters, traders, and other agricultural value chain actors. The domain will also capture sector support indicators covering agricultural research, technical assistance, training, extension services, inspection activities, agricultural infrastructure (including feeder roads, irrigation, and other infrastructure), storage and public stockholding, marketing support, administrative costs, and other sector support activities. Moreover, the domain will track other expenditures and maintain comprehensive totals across all expenditure categories, with data captured annually to enable trend analysis and multi-year comparisons. The collated data will be used for basic agricultural public expenditure analyses that inform evidence-based budget planning, assess program cost-effectiveness, support transparent reporting to stakeholders, and optimize resource allocation across Ghana's agricultural sector.

- f. **Agricultural Finance and Credit Domain:** This domain will provide comprehensive tracking and analysis of financial services and credit access across Ghana's agricultural value chain. The domain will monitor credit disbursement patterns, loan performance metrics, interest rates, and collateral requirements across different agricultural sub-sectors and farmer categories. It will track agricultural insurance coverage, premium rates, claim processing efficiency, and payout ratios to assess risk mitigation effectiveness. Additionally, the domain will maintain databases of financial institutions serving agriculture, their product offerings, and service delivery channels including mobile banking and digital payment platforms. The domain will also monitor savings mobilization, investment patterns, and financial inclusion indicators among agricultural stakeholders. Furthermore, it will track government credit guarantee schemes, subsidy programs, and their impact on agricultural productivity and income generation. The domain will capture data on informal credit sources, cooperative lending activities, and value chain financing mechanisms to provide a holistic view of agricultural finance ecosystems.

3. SCOPE OF WORK

3.1 Platform Enhancement and Management

- Oversee the continuous improvement and expansion of the GhAAP platform beyond input distribution, farmer registration, and other existing modules.
- Supervise the development of the listed data domains – Weather and Climate, Pest and Disease, Food Security and Nutrition, Market Intelligence and Trade Performance, Agriculture Public Expenditure, and Agricultural Finance and Credit – and propose and supervise the development of relevant new data domains for effective agricultural services delivery, market linkages, and financial inclusion
- Supervise the strengthening of the Ghana Card integration and farmer verification systems
- Ensure system scalability and performance optimization for emergency response scenarios

3.2 Emergency Response and Crisis Management

- Maintain and enhance GhAAP's proven emergency response capabilities
- Develop rapid farmer registration protocols for unregistered farmers during crises
- Establish real-time monitoring and distribution tracking systems
- Create contingency plans and standard operating procedures for various emergency scenarios
- Coordinate with disaster management authorities and humanitarian organizations
- Conduct post-crisis impact assessments and platform performance evaluations

3.3 Technical Leadership and System Integration

- Oversee the technical architecture and continued development of GhAAP and Network Operating Centre
- Enhance georeferencing capabilities and farm mapping functionalities
- Strengthen data security, privacy, and fraud prevention mechanisms
- Supervise the integration of emerging technologies (IoT, AI, blockchain, mobile platforms) to expand platform capabilities
- Ensure interoperability with other government systems and development partner platforms
- Conduct regular technical reviews and quality assurance assessments

3.4 Stakeholder Engagement and Capacity Building

- Facilitate coordination between MoFA, Regional & District Agric Depts, World Bank, and implementation partners
- Design and implement capacity building programs for extension agents and agricultural service providers
- Enhance farmer onboarding and digital literacy initiatives
- Engage with private sector partners to expand platform services and functionalities
- Coordinate with academic institutions for research and impact assessment

- Support policy dialogue on digital agriculture frameworks and regulatory compliance
- Improve capacity of key users in MOFA, Regional & District Agric Depts, and Project Staff

3.5 Monitoring, Evaluation, and Accountability

- Oversee the implementation of robust monitoring and evaluation frameworks building on successful phone survey methodologies
- Conduct regular beneficiary verification surveys and impact assessments
- Establish real-time dashboard systems for tracking platform performance and input distribution
- Create transparent reporting systems for all stakeholders
- Document best practices and lessons learned for replication in other countries

4. KEY DELIVERABLES

Phase 1

- Platform Performance Assessment and Enhancement Strategy
- Farmer Database Expansion and Quality Improvement Plan
- Emergency Response Protocol Documentation and Refinement
- Stakeholder Engagement Strategy and Partnership Framework
- Baseline Assessment of Current Platform Capabilities and Usage

Phase 2

- Enhanced GhAAP Platform with fully developed data domains and modules
- Improved Farmer Verification and Anti-Fraud Systems
- Comprehensive Emergency Response Simulation and Testing
- Capacity Building Program Implementation for 1,000+ Extension Agents
- Quarterly Platform Performance and Impact Reports

Phase 3

- Comprehensive Impact Assessment covering 655,000+ beneficiaries
- Platform Sustainability and Expansion Strategy
- Best Practices Documentation for Regional Replication
- Policy Recommendations for Digital Agriculture Framework
- Final Implementation Report with Lessons Learned and Future Roadmap

5. REQUIRED QUALIFICATIONS

5.1 Educational Background

- Minimum of a Master's degree in Computer Science, Information Systems, or related field with experience in agriculture and food systems
- PhD in a related field would be an added advantage

5.2 Professional Experience

- Minimum 8 years of post-qualification experience in digital agriculture, agricultural development, or related fields
- At least 5 years of experience managing large-scale digital transformation projects with proven impact
- Demonstrated experience in emergency response and crisis management in agricultural contexts
- Experience with farmer registration systems, input distribution programs, and beneficiary verification
- Track record of managing platforms serving 500,000+ users or beneficiaries
- Experience working with World Bank or other multilateral development institutions preferred
- Proven experience in West Africa or similar agricultural contexts strongly preferred

5.3 Technical Skills

- Strong understanding of digital agriculture technologies and applications
- Experience with data management systems, databases, and analytics platforms
- Knowledge of mobile technology applications in agriculture
- Familiarity with IoT, AI, and emerging technologies in agriculture
- Understanding of agricultural value chains and market systems

5.4 Soft Skills

- Excellent leadership and team management capabilities
- Strong communication and presentation skills
- Ability to work effectively with diverse stakeholders
- Cultural sensitivity and adaptability
- Fluency in English (French proficiency an advantage)

6. REPORTING AND MANAGEMENT

The Embedded Digital Agriculture Advisor will report to the Chief Director, Ministry of Food and Agriculture, Ghana, through the IT manager with a dotted line to the World Bank Task Team Leader of FSRP and will work closely with:

- Ministry of Food and Agriculture, Ghana
- Ghana Agricultural Development Bank
- Private sector partners and technology providers
- Development partners and donor agencies
- Academic and research institutions

7. DURATION AND LOCATION

- **Contract Duration:** 36 months (renewable annually based on performance and program needs)
- **Contract Type:** Extended Term Consultant (ETC)
- **Location:** Accra, Ghana with travel to project sites as required
- **Level of Effort:** Full-time engagement

8. COMPENSATION

Compensation will be commensurate with World Bank ETC guidelines and the candidate's qualifications and experience. The package will include:

- Competitive monthly consultancy fee
- Travel and accommodation allowances
- Health insurance coverage
- Other benefits as per World Bank ETC policies

9. APPLICATION REQUIREMENTS

Interested candidates should submit:

- Detailed CV highlighting relevant experience
- Cover letter explaining suitability for the position
- Technical proposal outlining approach to the assignment

The application documents should be submitted to the following address:

The Chief Director

Ministry of Food & Agriculture

P.O. Box M37, Ministries

Accra