



**STATE DEPARTMENT FOR AGRICULTURE
MINISTRY OF AGRICULTURE AND LIVESTOCK DEVELOPMENT**

**TERMS OF REFERENCE (TOR)
FOR
BACKEND DEVELOPER EXPERT**

Contract No: KE-MOALF-571595-CS-INDV

Client:

State Department for Agriculture
Ministry of Agriculture and Livestock Development
Kilimo House, Cathedral Road
P.O Box 30028 -00100
Nairobi , Kenya

Email: info@kilimo.go.ke

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1.0 BACKGROUND

1.1 Introduction

The Food Systems Resilience Project (FSRP) is a Government of Kenya project with co-funding from the World Bank and the National Government. The project will be implemented in 13 counties targeting to increase preparedness against food insecurity and improve the resilience of food systems in targeted project areas of Kenya. The project will be implemented over 6 years commencing September 2023 to August 2029. The FSRP will build on the strong foundation laid by National Agriculture and Rural Inclusive Growth Project (NARIGP), Kenya Climate Smart Agriculture Project (KCSAP) and Emergency Locust Response Project (ELRP). The project will broaden and deepen investments in existing interventions through a multiphase programmatic approach (MPA). The five MPA program pillars of FSRP are: (1) Responding to a deteriorating food security situation, (2) (Re-)building resilient agricultural production capacity, (3) Supporting the sustainable development of natural resources for resilient agricultural landscapes, (4) Getting to market, and (5) Promoting a greater focus on food systems resilience in Policymaking.

1.2 Project Development Objectives and Indicators

The FSRP project development objective (PDO) is to increase preparedness against food insecurity and improve the resilience of food systems in targeted project areas of Kenya. In order to realize this objective, project activities will be implemented through five components namely (i) (Re-) Building Resilient Agricultural Production Capacity; (ii) Supporting the Sustainable Development of Natural Resources for Resilient Agricultural Landscapes; (iii) Regional and domestic markets for food security; (iv) Promoting a Greater Focus on Food Systems Resilience in National and Regional Policy making; (v) Contingency Emergency Response (vi) Project Coordination and Management.

Progress towards the realization of the PDO will be measured through the following five (Outcome) indicators:

- i). Percentage reduction of food insecure people in project-targeted areas
- ii). Number of farmers adopting resilience-enhancing technologies and practices: of which female (percentage); of which, climate-resilient (percentage)
- iii). Hectares of land area under integrated land management practices
- iv). Percentage increase in volume of agricultural production sold on domestic and regional markets

Number of policy products related to agriculture, natural resources management, and food systems resilience adopted with project's support.

2.0 OBJECTIVE OF THE ASSIGNMENT

The overall objective of the assignment is to strengthen the Agricultural Information Resource Centre (AIRC) capacity as it transforms into the Kenya Agricultural Digital Information Centre (KADIC) to design, develop, deploy and maintain secure, scalable, reliable and interoperable backend services that support agricultural information systems, digital applications and service delivery across the agricultural value chain.

The consultant will be responsible for the following key objectives:

- a) To design, develop, test, deploy and maintain robust server-side applications, services and APIs that support the Ministry's agricultural digital products and services.
- b) To develop secure and scalable business logic and backend services for agricultural data collection, farm management, irrigation scheduling, crop monitoring, subsidy management, credit access, early warning systems and market information dissemination.
- c) To develop and maintain secure APIs and service interfaces that enable reliable exchange of information among agricultural applications, databases, climate systems, geospatial platforms, supply chain applications and other digital systems.
- d) To support the implementation of the National Agricultural Data Stack and Digital Public Infrastructure (DPI) through interoperable backend services and secure digital integrations.
- e) To implement appropriate authentication, authorization, validation, transaction processing, error handling, logging and application-level security controls within backend services.
- f) To optimize backend application performance, scalability, reliability and maintainability in response to growing agricultural data volumes, service demands and diverse user environments.
- g) To collaborate with Database Administrators on efficient database access, data transactions and database-related performance issues without assuming responsibility for database administration, backup, recovery or database operational security.
- h) To integrate analytical and data-science outputs into backend services in collaboration with Data Scientists and other technical teams.
- i) To strengthen backend engineering capacity and contribute to reliable, secure and sustainable digital service delivery within the Ministry.

3.0 SCOPE OF SERVICES AND SPECIFIC TASKS

3.1 Scope of service

The Agricultural Information Resource Center (AIRC), a directorate under the State Department for Agriculture, Ministry of Agriculture and Livestock Development, is implementing strategic initiatives to strengthen the Ministry's digital presence and enhance agricultural information and service delivery. These initiatives are aligned with AIRC's transition into KADIC to coordinate data and digital agriculture in providing

timely, relevant, and accessible agricultural information to farmers, policymakers, researchers, private-sector actors, and other stakeholders.

Over the years, AIRC has accumulated substantial data, information and knowledge across diverse agricultural thematic areas. The Centre is progressively digitizing these resources and transforming them into digital agricultural products and services to improve access, usability and uptake. Key initiatives include the Farmer Registry and the Fertilizer Subsidy Programme, which currently support the issuance of vouchers to 7.3 million farmers nationwide.

As the Centre advances its data and digital roadmap, there is a need to strengthen its internal technical capacity in backend development. The engagement of the Backend Developer Consultant is to design, build, integrate, secure, optimize and maintain robust server-side services that support agricultural digital applications and services.

The Backend Developer will provide technical expertise in backend architecture, server-side programming, API development, systems integration, application security, performance optimization, automated testing, deployment support, monitoring and backend lifecycle management. The Consultant will coordinate closely with Database Administrators, User Interface Developers, Webmasters, Data Scientists, Knowledge Management teams and other relevant technical stakeholders.

3.2 Specific tasks

3.2.1 Backend Architecture and Service Development

- a) Design and implement modular, scalable and maintainable backend architectures for agricultural digital applications.
- b) Develop server-side business logic, services, background processes and application components based on approved functional and technical requirements.
- c) Select and apply appropriate backend technologies, frameworks and service patterns within approved Ministry standards.
- d) Write clean, maintainable, secure and well-documented source code.
- e) Maintain development, testing, staging and production backend components in collaboration with the ICT and application teams.

3.2.2 API Development and Systems Integration

- a) Design, develop, document, test and maintain secure RESTful APIs and other approved service interfaces.
- b) Implement reliable integration services for agricultural applications, databases, climate systems, geospatial platforms, supply chain systems and other digital platforms.
- c) Implement API validation, authentication, authorization, rate limiting, error handling and transaction controls as appropriate.
- d) Maintain API specifications, service contracts, integration documentation and versioning practices.

- e) Support interoperability requirements under the National Agricultural Data Stack and Digital Public Infrastructure (DPI).

3.2.3 Application Security and Secure Coding

- a) Apply secure coding practices throughout backend development and maintenance.
- b) Implement authentication, authorization, input validation, session management and appropriate application-level security controls.
- c) Identify, document and remediate backend vulnerabilities and insecure configurations.
- d) Support security testing, code reviews and vulnerability remediation in collaboration with ICT/security teams.
- e) Ensure appropriate protection of sensitive agricultural information during processing and transmission.

3.2.4 Performance, Scalability and Reliability

- a) Profile, monitor and optimize backend services, APIs and application processes.
- b) Improve response times, resource utilization, throughput and service reliability.
- c) Implement appropriate caching, asynchronous processing, queues or other scalability mechanisms where required.
- d) Design backend services to accommodate variable demand and operational realities, including low-connectivity environments where applicable.
- e) Investigate and resolve service failures, bottlenecks and production incidents.

3.2.5 Database and Data-Service Integration

- a) Develop efficient application-level database access, queries and transaction handling in collaboration with the Database Administrator.
- b) Coordinate with the Database Administrator on schema changes, migrations, indexing requirements and database performance issues.
- c) Implement appropriate data validation, transaction integrity and error handling within backend services.
- d) Support data migration and integration activities without assuming ownership of database administration, backup/recovery or database operational security.

3.2.6 Testing, Deployment and Operational Support

- a) Develop and maintain unit, integration and API tests for backend services.
- b) Support controlled deployment of backend services across development, testing, staging and production environments.
- c) Maintain source code repositories, branching, release and change management practices.
- d) Monitor application logs, service health, errors and backend operational metrics.
- e) Document deployment procedures, service dependencies, configuration requirements and troubleshooting runbooks.

4.0 DURATION AND LOCATION OF THE ASSIGNMENT

The duration of the assignment will be three (3) calendar years. The consultant shall be contracted for an initial period of twenty-four (24) calendar months from the contract commencement date. This period is subject to extension up to the project closing date, based on project needs, availability of funds, and satisfactory performance.

The position shall be based in Nairobi, Kenya, at the Agricultural Information Resource Centre Office, with travels to participating Counties where necessary.

5.0 REPORTING REQUIREMENTS AND TIMELINES FOR DELIVERABLES

The Backend Developer will be expected to deliver the following outputs:

Table 1: Reporting requirements

No.	Deliverables/Reports	Timelines after contract commencement	Format of Submission
1	Monthly Progress Report summarizing activities undertaken during the reporting month, level of effort, stakeholder engagements, progress against the assignment, outputs/work products developed, issues, risks, challenges and planned activities for the following month.	Monthly, throughout the contract period	Soft copy
2	Contract completion report - summarizing all the activities undertaken by the consultant during the contract period, challenges, and recommendations as to how the challenges should be addressed.	Within 14 days after the end of contract	Soft copy

All reports shall be submitted in both hard and soft copies and addressed to:

Principal Secretary,
State Department for Agriculture
Ministry of Agriculture and Livestock Development
Cathedral Road, Nairobi
P. O. Box 30028-00100,
Nairobi, Kenya.
Attention: National Project Coordinator

All reports prepared by the Consultant shall be reviewed and submitted to the Director, AIRC, with copies to the National Project Coordinator by the 7th day after the end of the reporting month

6.0 PAYMENT SCHEDULE/REMUNERATION

The Backend Developer shall be remunerated based on a monthly rate (a consolidated amount inclusive of all costs with clearly identified applicable taxes), which will be as proposed in the financial proposal and agreed upon at contract award. Remuneration will be based on national competitive rates, commensurate with the selected candidate's area of expertise and work experience, provided he or she has satisfactorily fulfilled all requirements stipulated here-in above.

Costs incurred by the Consultant outside the head office will be reimbursed upon submission of a statement of expense and verifiable supporting documentation.

Payment shall be monthly upon submission and approval of the monthly reports.

7.0 CONSULTANT'S QUALIFICATION AND EXPERIENCE REQUIREMENTS

- a) A minimum of a bachelor's degree in Computer Science, Software Engineering, Information Technology, Information Systems, or a related field from a university/institution recognized in Kenya.
- b) At least five (5) years' demonstrable general experience in backend/software development.
- c) At least three (3) years' demonstrable specific experience in server-side application development, RESTful APIs, systems integration, secure coding, database-backed services, automated testing, performance optimization and production deployments.

8.0 MANAGEMENT AND ACCOUNTABILITY OF THE ASSIGNMENT

The Ministry of Agriculture and Livestock Development (MoALD), State Department for Agriculture is the Client for these services. The Backend Developer will report directly to the Director, Data and Digital Agriculture, and will work closely with the ICT team and relevant technical teams to facilitate the effective and successful implementation of the assignment.

9.0 OBLIGATIONS OF THE CLIENT

The Client will provide:

- a) Suitable furnished office space
- b) Telecommunication
- c) Transport to field assignments as and when required

The Client shall provide, free of charge, all existing information and will assist the Consultant in obtaining other relevant information and materials from governmental institutions and State authorities, where necessary. However, it is the duty of the Consultant to check the viability, quality, and suitability of this information. The information, data, and reports mentioned above will be available to the Consultant for unlimited use during the execution of the proposed services within the project.

When traveling individually on project duties, subsistence allowance shall be paid in the equivalence of the Public Service Job Group R rates. All individual travel shall be approved by the National Project Coordinator prior to the task.

10.0 OBLIGATIONS OF THE BACKEND DEVELOPER

The Backend Developer shall perform and carry out the services with all due diligence, efficiency and economy in accordance with generally accepted professional standards and practices and shall observe sound management practices.

The consultant shall always act with respect to any matter relating to this Contract or to the Services and shall at all times support and safeguard the Ministry's legitimate interests in any dealings with third parties.

The Backend Developer has an obligation to disclose any situation of actual or potential conflict that impacts on capacity to serve the best interest of the Client, or that may reasonably be perceived as having this effect. Failure to disclose such situations may result in the disqualification of the Consultant or the termination of his/her Contract.

11.0 CONFIDENTIALITY, PROPRIETARY RIGHTS OF CLIENT IN REPORTS AND RECORDS.

All the reports, data, information, products and services developed, collected, or obtained from the implementing agencies etc., Client, and other Institutions during this exercise shall belong to the Client. No use shall be made of them without prior written authorization from the Client.

At the end of the Services, the Backend Developer shall relinquish all data, products and services, manuals, reports and information (including the database, codes, and related documentation) to the Client and shall make no use of them in any other assignment without prior written authority from the Client.