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Managing Responsible Agricultural Investments Using an Open Source Solution

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ABSTRACT
To address food insecurity, the Government of Ethiopia embarked on a rapid transformation in the agriculture sector to increase production, productivity, market access and create employment opportunities by promoting large scale agricultural investment projects. However, progress towards achieving set objectives has been rather limited so far due to various challenges. One of the major challenges is that information on commercial farming is outdated and unreliable for decision making. This paper describes the development of an Agricultural Investment Information Management System for Commercial and Contract Farming (AIIMS-CCF), which provide solution to challenges related to information management. AIIMS-CCF is distributed system based on Free and Open Source Software. AIIMS-CCF will have rich features that facilitate the management of accurate, consistent and reliable data and information required for land governance and decision making and will provide tools for monitoring the performance of agricultural investments in terms of their contributions to the national economy.

Keywords: Commercial Farming, Agricultural Investment, Performance Monitoring, Opens Source Solution, Information Management

1. INTRODUCTION

To address food insecurity in the country, the Government of Ethiopia envisages a rapid transformation in the agriculture sector to increase production, productivity, markets and employment. It has, therefore, strategically promoted land investments for agricultural development as part of the two successive five-year Growth and Transformation Plans (GTP). Agricultural investments are supposed to provide input for the processing industry, bring foreign currency as well as technology transfer to the country while the local communities would benefit from employment and infrastructure improvements related to these investments. However, progress towards achieving these objectives has been rather limited so far due to critical challenges facing agricultural investment projects. One of the major challenges is that information on commercial and contract farming arrangements and their performances is fragmented, outdated and unreliable for businesses and decision makers. Critical datasets on these projects are not appropriately captured, managed and analyzed in adequate and timely manner.

Towards solving the information management challenge, the Ethiopian Horticulture and Agricultural Investment Authority (EHAIA) with the assistance from the Support to Responsible Agricultural Investment Project (S2RAI) in collaboration with the Ethiopian Agricultural Transformation Agency (ATA), is currently developing the Agricultural Investment Information Management System for Commercial and Contract farming (AIIMS-CCF).

AIIMS-CCF is distributed information management system that is under development using Free and Open Source Software (FOSS) for managing responsible agricultural investments both at federal and regional state levels. It will have reach features that supports investment land administration for horticulture, large scale agriculture, livestock and forest investment functions; commercial and contract farming administration functions. Specifically, it will have strong monitoring and reporting features that tracks the performance of each investment project. It will also have an interface to cadaster maintenance sub-system of National Rural Land Administration Information System (NRLAIS) developed by the Ministry of Agriculture and Natural Resources (MoANR) for handling transactions applied to investment land.

2. AGRICULTURAL INVESTMENTS IN ETHIOPIA

2.1 History of Agricultural Investments: Ethiopian Perspectives

Commercial large scale agriculture was first introduced to Ethiopia some 50 years ago during the establishment of cotton and sugarcane plantations in the Awash Valley, Humera (North West of Tigray), and Bilate and Arbaminch areas of the present Southern Nations and Nationalities Region (SNNPR) during the reign of Emperor Haile Selassie. This initiative, for the first time, involved the state for an organized agricultural development through the establishment of the first large-scale, agricultural industry based irrigation schemes under the auspices of the Awash Valley Authority. Regime change to the Dergue Military Government in 1974 heralded a period of centralized control over the economy and land reform followed by a proclamation (No. 31/1975) that provides public ownership of rural lands (NG-EMTDACO, 1975). The

proclamation nationally changed all large-scale private estates and authority farms to commercial state farms. The advent of the Ethiopian Peoples' Revolutionary Democratic Front (EPRDF) in 1991 has led to radical changes and brought about re-establishments of private enterprises in all sectors including agriculture sector. In pursuance to the Ethiopian Constitution of 8th December 1994, the EPRDF issued the federal land administration and land use proclamation No. 456/1997 (NG-FDRE, 1997). The proclamation provides ownership of all rural lands to the state and the people permitting inheritance by successors and the right to rent to others. It also allows the leasing of large, adjacent tracts of land to investors for periods up to 45 years depending on projected use.

2.2 Ethiopian Agricultural Investment Policy Frameworks and Incentives

In the past two decades, Ethiopia placed several agricultural development policies and strategies though most of them mainly focused on the smallholder farming sector. Although it is a prominent pro-smallholder initiative, Agriculture Development-Led Industrialization (ADLI) is a policy framework that primarily focused on the intensification of production systems promoting public investment and initiation of market liberalization. The Plan for Accelerated and Sustained Development to End Poverty (PASDEP) was also enforced during two subsequent periods between 2005/06 and 2009/10 (MoFED, 2006). The PASDEP pursues a paradigm shift in strategy towards a more market-oriented agriculture with the promotion of private investment. Two big steps of PASDEP were commercialization of agriculture and accelerating private sector development. Despite PASDEP encourages private sector investment, the participation of private sector has not been realized during its two national development plans. The Agriculture Sector Policy and Investment Framework (PIF) (2010/11-2019/20) is another important long-term policy instrument of the country. It aims in achieving a sustainable increase in agricultural productivity and production, accelerating agricultural commercialization and agro-industrial development. The country also adopted two subsequent five-years' Growth and Transformation Plan (GTP) during 2010/11-2014/15 and 2015/16-2019/20). The GTP-I showed great determination to involve the private sectors where the government committed to identify suitable lands for investment, keeping ready in a land bank from which local and foreign investors can rent or lease. Although it emphasized the manufacture sector rather than agricultural investment, the country also placed an investment proclamation (No 769/2012) and its amendment proclamation (No 849/2014) that resulted in significant inflows of local and foreign direct investments (FDIs). The proclamation No 686/2010 on Commercial Registration and Business Licensing (FNG-FDRE, 2010) also legalized commercial registration of agricultural investments.

The Ethiopian government put forwards both investment and export incentives in an effort to attract both domestic and foreign direct investment (FDI) through its institutional frameworks, proclamations and judicial provisions such as the EIC (2015), Income Tax Proclamation No. 286/2002 (FNG-FDRE, 2002) and others. Some of such incentives include repatriation of capital and profits, guarantee against expropriation, availability of land especially for investors; and existence of stable and peaceful labor

relationships for investments and industrial development. Besides, taxation and funding support, logistics and custom services are also policy initiatives forwarded to investors. Investors are also exempted from payment of custom duty and other taxes on capital goods and construction materials. Spare parts valued not more than 15% of the total value of capital goods for projects are also duty free. Investors are also exempted from payment of income tax for 2-5 years, depending on the type and location of the project. For those interested to involve in export, there are export incentives. Manufacturer exporters are also free from sales and value added taxes and other schemes such as the duty draw back voucher schemes, bonded manufacturing warehouse scheme, export credit guarantee scheme, and foreign credit schemes. Long-term loan provisions by public and private banks of Ethiopia has also special offer to agricultural investors. The government of Ethiopia has also initiated the development of industrial zones and establishment of Integrated Agro-Food Parks (IAFP).The preferential market access to EU and USA markets under the African Growth and Opportunities Act (AGOA) and the Generalized System of Preference (GSP) in USA (respectively), Ethiopia's proximity to the Middle East and its virtue of membership to the Common Market for Eastern and Southern Africa (COMESA) are obvious export advantages through quota and duty free situations (EIC, 2015). Domestic and foreign investors have taken advantage of the liberalization of the agricultural sector since 1992. Impetuses were created in establishing several investment supporting institutions both at federal and regional levels.

2.3 Challenges of Commercial Agricultural Investments

Despite the aforementioned legislatives and strategic policy instruments and institutional arrangements, the anticipated contribution of commercial agricultural investment to the country's economic growth still remained at par for the last more than 20 years' period. Such poor performance is attributed to a wide array of technical (production) and natural (drought, rainfall dependency syndrome, etc.) constraints, inequitable land-distribution, fluctuating prices and unreliable markets, infrastructural constraints, etc. Underlying infrastructural and macro level blockages include insufficient transportation system, poorly constructed/maintained road infrastructure, inefficient marketing system, poor access to regional/international markets, less access to credit, unbalanced labor supply and demands, frequent change of policies, weak research linkage, poor security, and underinvestment by national governments in the physical, institutional, and human capital. The sector is also hindered by weak federal and regional institutional integrations and linkages as land leasing and management is administered by both federal and regional government institutions. In some regions, several government institutions have conflicting mandates that create a complex reality in the entire investment management and exchange of all required information for decision makers and actors.

As it currently stands, information on commercial agricultural investments is fragmented. The diverse institutions also lack infrastructural and human capacity to promptly collect, exchange, and distribute such investment information to all required users. Establishing a central repository of information system is, therefore, critically paramount. It essentially serves the anticipated contributions

of agricultural investment sector to achieve the GTP II goal and objectives.

3. AGRICULTURAL INVESTMENT BUSINESS FUNCTIONS

An assessment study was conducted to map existing investment business functions at EHAIA and Benishangul Gumuz regional state. The major investment business functions identified include land identification and verification, land transfer, investment support and performance monitoring and project evaluation.

3.1 Land Identification and Verification

Land identification is locating, demarcating or setting an area of land for agricultural investments in a given Woreda . The demarcation is made by team of experts and administrative officials from the Regional state, Woreda and Kebele with community representatives living around that particular area where investment is envisaged. During the early investment initiatives, in some regional states, there were cases in which investors were also involved in land identification processes (Dessalegn 2011). According to EHAIA and Benishangul Gumuz regional state experts, the demarcation process may involve series of dialogs with communities and community representatives until consensus is reached among all the parties. Once the demarcation is made, the land will be part of the investment land bank- repository of geospatial data that hold the boundary and characteristics of an investment land. The region and the federal investment agencies maintain their own land banks. Thus far, nearly 3.6 Million ha of agricultural land suitable for commercial crop production (oilseeds, cotton, sugarcane and vegetables, etc.) has been identified all over the country, mainly in the lowlands, and 2.4 million ha of land was transferred to investors.

Identified land goes through formal land suitability analysis study by team of federal (as required), regional and Woreda level experts drawn from different relevant institutions like agriculture, environment, water resources, etc. If identified and verified land is part of agricultural economy zone, further development activities will be carried out like land clearing and leveling, construction of access roads to the farm sites and within the farm blocks, water supply, electricity and telephone infrastructure and construction of camp sites, etc. Though land is earmarked for agricultural economy zone, for instance in Benishangul Gumuz regional state, it is still at planning level and not yet implemented.

The main outputs from land identification and verification processes are profile of parcel/block of land for investment which includes types of strategic crops, soil parameters, infrastructure, climatic conditions, area, etc. and maps which show the bio-physical characteristics of the investment land and the surrounding.

3.2 Land Transfer

Parcels of land in the land banks are transferred to investors by both the federal investment agency and responsible investment institutions in different regional states from the land banks in their custody. Starting from the early stage of agricultural investment processes, mid 1990s (Dessalegn 2011) until very recently, there were no competitive based bid processes adopted at federal and regional levels, on the selection of investors. This is also evident from the then Ethiopian Investment Agency (EIA), which is currently known as Ethiopian Investment Commission (EIC), guideline prepared for new investors for

investing in the agricultural sector (EIA 2008). Recently, this trend has changed due to the rise in the demand for land which necessitated the preparation of investor selection criteria and land transfer guideline by different regions. For instance, in Benishangul Gumuz, Environment, Forest and Land Administration Bureau (EFLAB) locally announces the availability of land for investment and selections are made according to the selection criteria. Currently, to make land transfer process more transparent and effective, the federal and regional institutions are tending to adopt competitive bidding process, which the envisaged system will provide platform for easy promotion and bidding of investment land using online system.

Land transfer to an investor involves the preparation of a business plan and social and environmental impact assessment of the project by the investor. Acceptance of these documents, in addition to fulfilling other requirements like investment permit, business registration and license, etc., leads to entering into lease agreement by both parties (the investor and a regional state or federal agency who administers the investment land).

3.3 Investment Support

To promote and encourage investment, the Ethiopian Government provides incentives to investors who entered into lease agreement in terms of income tax holidays for a certain period (usually 5 years); duty free privileges on import of agricultural machineries, vehicles, fertilizers, and chemicals, etc. and arrangement of loan facilities (EIA, 2008; Keeley et al, 2013).

According to EHAIA, investors are also supported on demand with field level technical assistance, administrative and formal training on farm management activities. There is also a plan by EHAIA to provide investors with extension package program for different strategic crop types and other investment activities, but the packages are yet to be developed.

3.4 Performance Monitoring and Project Evaluation

Monitoring and Evaluation (M&E) are management tools which should be a part of every project, program or intervention to help determine whether a project or program is meeting its objectives or not. There are many good reasons for carrying out monitoring and evaluations. It is an excellent way of learning why and how to improve project performance and it provides important feedback about the progress, as well as the success or failure, of projects.

According to the council of ministers regulation No. 396/2017 article 11, EHAIA has the responsibility to monitor and evaluate investment projects and ensures that investors are implementing as per the business plan and land lease agreement. EHAIA monitoring team usually prepares check list of monitoring indicators related to land development, environmental protection, employment, infrastructure, agricultural input, etc. and carry out field level monitoring of individual investment projects at certain time interval (stated annually but due to logistical and capacity constraints of EHAIA and the regional states, regular monitoring is not done). Based on the report findings and the performance of an investment projects awards can be given to some of the projects, notice for improvement or termination of contract measures are taken.

Current experience shows that during monitoring activities, data are collected from the project documents, from discussions made with the project owners/manager/ and from field observations. Additional information can also be collected from community members, community leaders, project employees, and

other stakeholders such as Civic society organizations (CSO). Information collected from all these provide the right image about the project progress and effectiveness, as the result biasness can be significantly minimized. Moreover, the monitoring is participatory in which the community are involved in the entire process.

EHAIA has good experience in field report communication. The public is not only involved in providing information, but the monitoring results are communicated to the community members.

In the future investment monitoring endeavors, there is a plan to introduce self-reporting scheme. Self-reporting is the process by which the project management writes a report about the project progress, on regular bases using the standard reporting format and then submits online or in hard copy paper format.

4. PROPOSED INFORMATION SYSTEM

To curb the problems facing agricultural investments related to information management and support the prevailing agricultural investment business functions, AIIMS-CCF will be developed and deployed. AIIMS-CCF is a distributed web application system based on open source software tools. It will support a range of investment land administration functions that is comprehensive database of inventory of agricultural investment projects; electronic land lease management functions including promotion, support, performance monitoring and evaluation of investment projects; and different models of contract faming business functions. The land administration functions also involve transactions on parcels that change the legal right of land holding. AIIMS-CCF will not have this function but it will be interfaced with the cadaster maintenance sub-system of an NRLAIS.

4.1 Components of the Proposed System

AIIMS-CCF will have two sub-systems that organize different functions into two major groups: the Land Administration Sub-System (LASS) and the Commercial Farming Administration sub-system (CFASS).

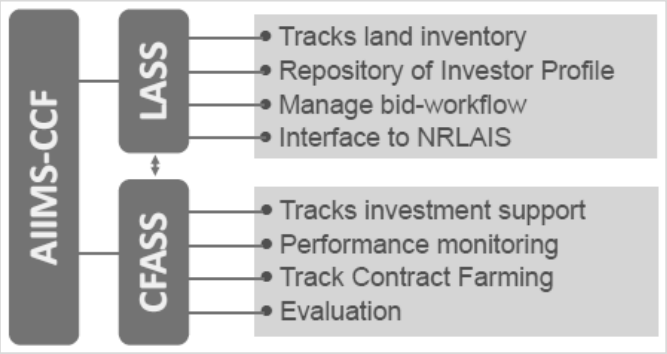

Fig. 1. Components of AIIMS-CCF System

The LASS provides functions that range from land identification to land transfer to investors. It provides the following functions:

- Keep track of land in the land bank and interface with NRLAIS for any transaction to be made on a plot of land. Plot of land can be add to the land bank when new land is identified or leased land is revoked due to contract cancelation or completion of lease period or any other reason. Land from the land bank will be removed when it is leased out/transferred to investor.
- Repository for spatial and non-spatial characteristics data related to investment land and other bio-physical and socio-economic data of the surrounding environment.
- Support the agricultural economy zone that is related to land and infrastructure development. This also includes support functions for project execution and asset inventory management during land transfer to investor.

- Repository of investors profile built during an investor registration for bidding, or when an investor signs a contract or from already existing project or from existing roster of investors.
- Bid workflow management that support bid process from floating to final notification of the result of bid analysis. It is linked to the agricultural investment portal that enables investors register online for bidding and gets necessary information on the status of the bid process.

The CFASS provides functionalities for tracking supports provided by the government to the investors, for performance monitoring and evaluation of commercial investment projects and contract farming operations. CFASS has a repository for time series monitoring and evaluation data of individual investment projects periodically collected from the field and from remote sensing based large scale agricultural monitoring tool. Data collection will be facilitated by making use of self-reporting of projects by filling out online forms or manual paper copy forms and using mobile application which can work offline and easily upload data to the repository using wireless network. CFASS will also have lease contract tracking function, statistical tools for analysis, and pre-defined and customizable monitoring and evaluation reporting modules.

Both LASS and CFASS will have a common document handling module for storing, organizing, searching and visualizing documents like digital pictures, scanned and electronic documents in different standard formats.

4.2 Architecture of the Proposed Information System

Implementation of AIIMS-CCF will be based on three-tiered client/server architecture (Figure 1), i.e. data store, processing/logic and presentation are logically distinct processes (Tiago et al, 2014). To satisfy the requirements under each tier, Free and Open Source Software (FOSS) components, which are well developed, actively developing, and have strong communities, will be used.

The data storage tier will be implemented using an Object Relational Database Management System called PostgreSQL with its spatial extension PostGIS and flat files. Structured tabular data and vector based geographic data layers will be handled by PostgreSQL, while raster datasets for performance reason and digital documents managed by the document management module will be stored as flat files.

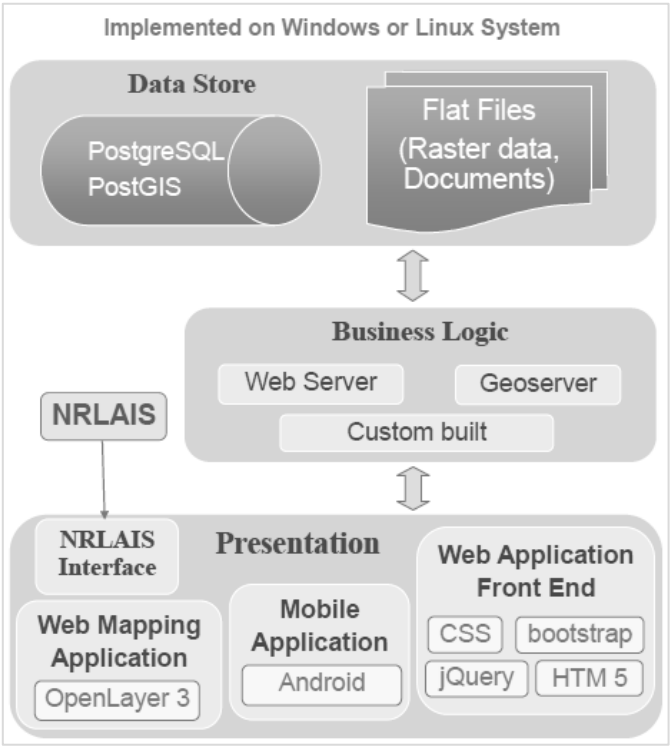

Fig. 2. Overview of AIIMS-CCF System Architecture

The processing/logic/middle tier implements the business rules of AIIMS-CCF. This tier will be implemented using custom made and FOSS software tools. Java programming language will be used for developing custom made tools for platform independency. For web mapping application

Geoserver will be used. The middle tier also includes utility tools like diagnostic, maintenance and security modules.

The presentation tier consists of web based applications that provide interface to LASS and CFASS for visualization and manipulation of textual data, spatial data and digital documents, and NRLAIS interface. The web interface connects to the middle tier via REST communication protocol over secure socket layer.

AIIMS-CCF will be deployed as a distributed system with independent systems running at each region. The federal system will be a central hub which pools data from the regional systems and create national level system (Figure 2). Data entry can also take place at federal level for investment projects managed by the federal agency. Based on the location of the investment projects, the regional level data can also be updated from the federal entry. AIIMS-CFF uses the existing wide area network infrastructure called "WoredaNet", government infrastructure that connects institutions from the federal to the Woreda administrative level, or private virtual network provided by Ethio Telecom.

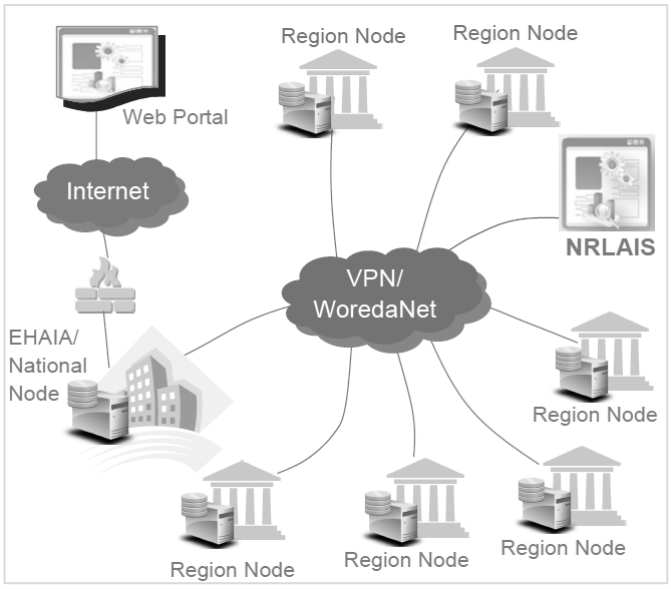

Fig. 3. Schematic Diagram of AIIMS-CCF Deployment

5. CONCLUSION

Development and deployment of AIIMS-CCF will have a significant positive impact in solving the current challenges facing agricultural investments in Ethiopia. It can facilitate the management of accurate, consistent and reliable data and information required for land governance and decision making and will provide tools for monitoring the performance of agricultural investments in terms of their contributions to the national economy. Furthermore, it will enable assessment of contributions to environmental protection and social welfare and creates a common platform for data exchange between federal and regional institutions on land based agricultural investments projects.

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