Rwanda Fertilizer Assessment

In Support of

The African Fertilizer and Agribusiness Partnership

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Porfirio Fuentes, IFDC senior scientist – economics and trade, of IFDC's Office of Programs (OP), produced this report based on information and data collected through interviews with stakeholders in Rwanda during April and June 2013 and based on secondary information and data. Peter Heffernan, Chief Program Officer, Sarah Gavian, Chief Economist and Program Leader – Markets and Economics, and Joshua Ariga, Economist, all from the Office of Programs, contributed to this report.

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Acronyms

A-SWAp	Agriculture Sector-Wide Approach
AU	African Union
CAADP	Comprehensive Africa Agricultural Development Program
CIA/WFB	US Central Intelligence Agency/World Facts Book
CIP	Crop Intensification Program
DAP	Di-ammonium Phosphate
EDPRS	Economic Development and Poverty Reduction Strategy
ENAS	Ets Nikubili Alfred & Sons
GDP	Gross Domestic Product
GoR	Government of Rwanda
ha	hectare
IFDC	International Fertilizer Development Center
ISFM	Integrated Soil Fertility Management
kg	kilogram
MINAGRI	Ministry of Agriculture and Animal Resources
MINECOFIN	Ministry of Finance and Economic Planning
mt	metric ton
NAP	National Agriculture Policy
NEPAD	New Partnership for Africa's Development
NGO	Non-Governmental Organization
NPK	Nitrogen, Phosphate and Potash
PRS	Poverty Reduction Strategy
RADA	Rwanda Agriculture Development Authority
REMA	Rwanda Environmental Management Authority
RWF	Rwandan Franc (Currency)
SDFDS	Strategy for Developing Fertilizer Distribution Systems
SPAT	Strategic Plan for Agriculture Transformation
USAID	United States Agency for International Development
WB	World Bank

Rwanda Fertilizer Assessment

Executive Summary

The agriculture sector in Rwanda is dominated by smallholder farms whose productivity is low. Considering the small size of the country and the limited available arable land for expansion, there is a need to raise productivity through agricultural intensification. In order to accelerate agriculture sector productivity and address the challenges of poverty, food insecurity and malnutrition, the Government of Rwanda (GoR) is implementing the Strategic Plan for Agriculture Transformation (SPAT) in line with key objectives of the Comprehensive Africa Agriculture Development Program (CAADP) to raise annual agricultural growth to 6 percent or more and allocate at least 10 percent of the national budget to agriculture.

This report explores fertilizer markets in Rwanda and provides estimates of the levels of fertilizer consumption required to achieve the SPAT agricultural growth targets, analyzing the challenges in the fertilizer supply chains and recommending appropriate policies. Results from the estimation indicate that Rwanda must increase its consumption of fertilizer more than four-fold, from the current annual level of 35,000 metric tons (mt) of fertilizer products to 144,000 mt, to meet the agriculture sector growth targets. This increase is expected to strain the capacity of the current value chain unless existing constraints are addressed to accommodate a larger volume of inputs.

The fertilizer value chain in Rwanda faces a number of challenges that need to be tackled in order to bolster fertilizer consumption and raise agricultural productivity. To encourage use of fertilizer requires improvements in financing, logistics and research and extension services to build the capacity of agro-dealers and farmers. Due to its landlocked location, Rwanda's fertilizer imports have to traverse neighboring countries with overland transport and transactions costs coupled with poor storage infrastructure adding to the costs at retail level. Increasing investments to improve logistics can reduce the costs of delivering fertilizer to farmers. Good roads or rail can encourage private investment in other support businesses and services in the

rural sector such as rural markets and food processing plants, which will provide a pull factor for increased demand for fertilizer. Recent ongoing efforts to promote cross-border trade by some of the East African states by cutting delays at the port of Mombasa, reducing the number of road checks and weighbridges for trucks moving cargo from ports to the hinterland, and establishing joint one-stop border posts will reduce the number of days trucks travel to reach their destinations and hence reduce costs.[1]

To meet the objective of increasing productivity for priority crops under the Crop Intensification Program (CIP), the GoR funded a fertilizer subsidy for smallholder maize and wheat farmers. However, beginning in 2013 and continuing in 2014 the GoR revised its fertilizer subsidy program, in a move to control public expenditures and build a more sustainable market structure based on increased private sector participation. Though the government continues to provide subsidies, set retail prices (or ceiling prices) and arrange for private importers and agro-dealers to manage trade, there is an effort to encourage the establishment of appropriate financing mechanisms to strengthen the emerging private sector. Achieving the goal of raising agricultural productivity will require agricultural policy and subsidy program reforms that ensure smallholder farmer access to appropriate technologies. This calls for a judicious mix of private and public roles and changes in the legal and regulatory framework to encourage private investment.

[1] http://www.trademarkea.com/east-africa-eac-border-stations-set-to-ease-delays/.

Rwanda Fertilizer Assessment

1.0 Introduction

In the last decade, the landlocked country of Rwanda has been among the fastest-growing economies in East Africa, registering an impressive average gross domestic product (GDP) annual growth rate of 7.9 percent compared to 4.8 percent for the previous decade (WB, 2014). With a population of 12 million growing at 2.8 percent annually, Rwanda ranks as the most densely populated country in Africa, with an estimated 416 inhabitants per square kilometer (km^2) (CIA-WFB, 2013). With an annual GDP per capita of U.S. $644, Rwanda ranks 35th among the poorest countries in the world, and 21st out of 52 African countries (WB, 2013). Despite its economic growth and declining poverty incidence, poverty remains relatively high with an estimated 45 percent of the overall (49 percent of the rural) population living on incomes below the poverty line in 2010/11, down from 57 percent (62 percent of rural) (NIOS, 2012). Approximately 81 percent of the population lives in rural areas, engaged primarily in smallholder subsistence farming.

While Rwanda's economy is diversified, agriculture plays a significant role on employment and export earnings (MINAGRI, 2011), hence the focus on improving agriculture sector performance. There are three major export crops – coffee, tea and pyrethrum – generating income and foreign exchange earnings, with bananas, beans, sorghum, potatoes, maize and livestock contributing to overall food security. In 2012, agriculture accounted for about 90 percent of total employment and 33 percent of GDP, implying low labor productivity. The service and industry sectors accounted for 14 and 53 percent of GDP, respectively (CIA-WFB, 2013). Economic growth and stability are constrained by unreliable supply of electric power, poor infrastructure, high transportation costs, high inflation rate and high domestic debt, and dependence on donor funding.

To address the challenges posed by poverty, food insecurity, and malnutrition and low agriculture sector productivity, the GoR has been implementing policies and programs in line

with the pillars of the CAADP framework and has committed to boost agricultural growth to at least 7 percent per year. To provide some insights into what might be necessary to achieve these goals, this study estimates the quantities and types of fertilizer required to meet the agricultural production targets laid out in the GoR agriculture development plans and policy documents and identify the primary challenges facing the fertilizer sub-sector that should be addressed to reach these goals. The report addresses two fundamental questions:

- How much fertilizer is needed to produce the quantities of food, cash crops and export crops to achieve the agriculture growth target?
- What public investments and policy changes are necessary to ensure a smooth flow of these increased quantities of fertilizer through the supply chain to meet demand?

1.1. A Conceptual Framework

This study adopts a value chain framework as the core methodology to address the question of procuring and distributing enough fertilizer to meet the agricultural growth targets. An analysis of the amount of fertilizer needed and the capacity of the existing fertilizer distribution system to meet those needs requires an assessment of the nodes in the value chain, associated stakeholders at each node and commodity flows along value chains.

To estimate the quantity of nutrients needed to meet the crop output targets and the measures required for the smooth flow of these volumes through the existing fertilizer distribution system, the following simplifying assumptions are made: (a) crop production targets accurately reflect the quantities needed to achieve national food requirements; (b) markets will adapt and absorb the increased levels of crop production; and (c) fertilizer use will be profitable despite changes in relative prices occasioned by demand and/or supply forces in input and output markets.

The study discusses the role and effect of policy on the value chain participants in light of increased fertilizer use and examines the complementary role played by the existing physical, human, institutional and financial capacity in raising efficiency of the distribution system. The challenges to increasing fertilizer flow through the chain are identified using simple tabular, graphic and descriptive analyses.

2.0 The Rwanda General Policy Context

Since 2000, the GoR has promoted economic growth under Vision 2020 with an agricultural strategy emphasizing increased trade and incomes to alleviate poverty and food insecurity. By 2020, Rwanda aims at completing its transformation from a poor, post-conflict nation to a thriving, middle-income regional trade and investment hub (MoTI, 2009) by increasing the level and quality of investments in the productive sectors and creating an environment conducive to private sector development.

The business environment in Rwanda is faced with a number of challenges: infrastructure constraints, mainly transportation and unreliable supply of electricity and water, and poor telecommunication as well as insecure land rights, high tax rates, lack of or limited access to finance, policy uncertainty, among others. Therefore, a conducive legal and regulatory framework including investments in public infrastructure and improved service delivery is essential in creating an environment that allows for a thriving competitive private sector.

2.1 The Institutional and Policy Framework for Agriculture

The Vision 2020 and related development strategies reflect the priority and commitment the GoR has placed on agriculture sector development. The implementation of agricultural policy and strategies is the responsibility of MINAGRI in close collaboration with other government institutions, non-governmental organizations (NGOs) and development partners.

The descriptions below highlight the most recent policies and programs in support of agriculture sector development in Rwanda. Vision 2020 and the Economic Development and Poverty Reduction Strategy (EDPRS) constitute the government's seminal policy documents and strategic framework for economic development and poverty reduction from which other policies, strategies, plans and programs emanate.[2]

[2] We recognize that there are a series of supporting subsector policies that will not be addressed in this document, including: the National Rice Policy, the Tea and Coffee Strategy for Rwanda, the National Decentralization Policy,

2.1.1. Vision 2020 and the National Agricultural Policy

In 2000, the GoR launched Vision 2020, an umbrella policy document defining the country's future and providing the framework for other strategic plans. The goal was to reach middle-income country status by 2020 with per capita GDP of U.S. $1,240 up from U.S. $220 in 2000, reduce incidence of poverty by more than one-half and improve life expectancy and other indicators of living standards. To achieve these objectives, the agriculture sector is slated to maintain at least an annual growth rate of 7 percent through productivity increases and market orientation.

In support of Vision 2020, in 2004 MINAGRI issued a National Agricultural Policy (NAP) guideline focusing on augmenting production and soil and water management; therefore, its specific objectives were to intensify production of traditional and non-traditional crops for local consumption and export markets while protecting water sources and improving soil fertility. In 2007, an updated version of the Poverty Reduction Strategy (PRS) document (MINECOFIN, 2007) provided a medium-term policy framework to achieve the country's long-term development goals emphasizing the need to raise productivity in rural areas in support of Vision 2020, delineating the roles of the private sector, donors and government in providing the necessary funding to meet various activities. In line with NAP, the PRS recognized the role of the private sector in accelerating agriculture growth, employment and poverty reduction through intensification alongside public investments in building rural capacity, promoting access to credit, strengthening institutional frameworks and building capacity for various actors. The current PRS covers the period 2013-2018 and sets a more ambitious target of sustained growth at 11.5 percent and reduction of poverty to less than 30 percent of the population (MINECOFIN, 2012) through agricultural diversification, value-addition activities, commercialization of farming, reduction of post-harvest loses, improving input marketing and distribution and provision of agriculture advisory services and mechanization services.

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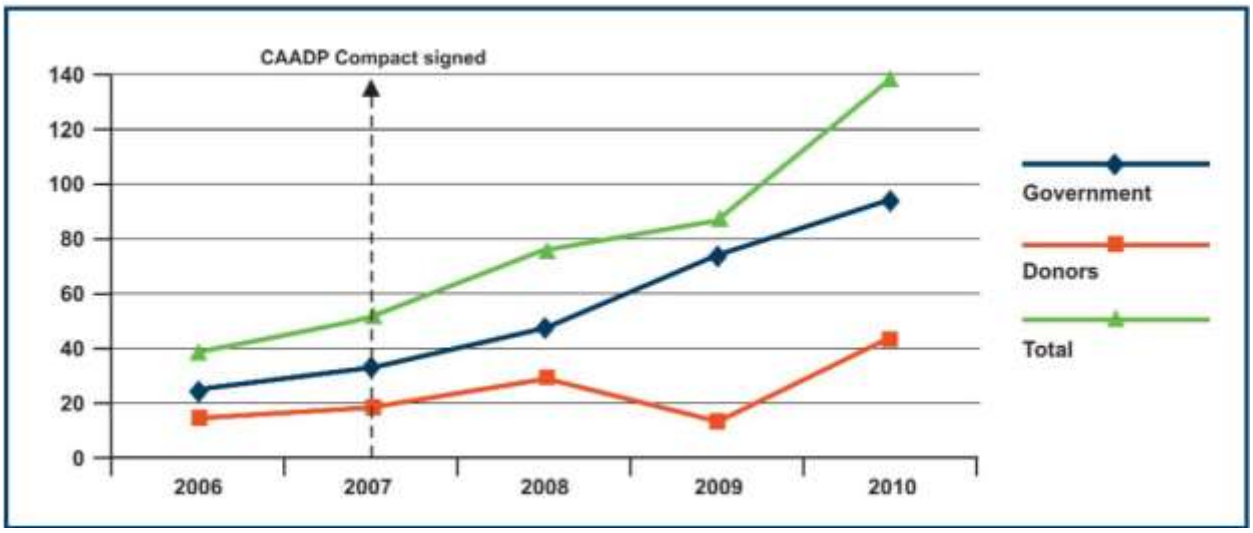
the Decentralization Implementation Program, the National Agricultural Extension Services Strategy, the 2005 Land Policy and Gender Equity Laws, among others.

Beginning in 2004, MINAGRI developed three successive Strategic Plans for Agriculture Transformation (SPAT I, 2004; SPAT II, 2009; and SPAT III, 2012) emphasizing effective implementation of the NAP, market and export orientation of rural agriculture, and productivity increases through use of improved inputs including fertilizers. SPAT I (2004) encouraged a concerted, multi-stakeholder approach to raise economic growth by increasing productivity of factors of production and diversification of income sources while conserving natural resources. SPAT II (2009) focused on transforming agriculture from a subsistent to commercial sector to raise incomes and alleviate food insecurity with emphasis on encouraging production of export crops. To achieve these objectives, a number of areas were targeted: (a) increase rice cultivated area and its intensification; (b) subsidize fertilizer and seed; (c) offer farmers training and access to finance; (d) promote the use of farm mechanization; (e) develop an efficient private sector to promote agro-processing industries; and (f) enhance overall agricultural technology and increase public investments in infrastructure through the construction and rehabilitation of feeder roads (MINAGRI, 2009). The latest SPAT III (2013-17) expands on SPAT II, emphasizing nutrition, food security and inclusive economic development and improving fertilizer distribution and markets through policy actions. The Agriculture Sector Investment Plan (MINAGRI, 2008), a component of SPAT, details the cost of activities and estimates of capital investments gaps and the expected contributions from stakeholders to close the budgetary gaps.

Rwanda signed the AU's CAADP Compact in 2007 to strengthen the SPAT policies through increased investments and growth by: (i) helping define a coherent long-term framework to guide the planning and implementation of current and future EDPRS and SPAT plans under Vision 2020; (ii) identifying strategic options and sources of growth for poverty reduction in the agriculture sector to 2020; and (iii) improving existing and developing new analytical approaches and knowledge support systems to facilitate peer review, dialogue and evidence-based planning and implementation of agriculture sector policies and strategies. By aligning SPAT with CAADP, MINAGRI got the support of development partners in implementing the Sector-Wide Approach in the agriculture sector (A-SWAp), which led to an increase in resource allocation to the agriculture sector, particularly from government sources. Figure 1 shows that resource

allocation to the agriculture sector increased from about RWF 25 billion (U.S. $40,000,000) in 2006 to about RWF 90 billion (U.S. $144,000,000[3]) by 2010 (AU/NEPAD, 2010).



Source: CAADP, 2010.

Figure 1. Government and Donor Funding to Agriculture Sector, 2006-2010 (million RWF)

2.1.2. Fertilizer Policy

In 2006, MINAGRI developed the National Fertilizer Strategy (NFS) for the Africa Fertilizer Summit and embodied in the *Abuja Declaration on Fertilizer for the African Green Revolution*. The aim was to achieve timely delivery of quality fertilizer to farmers in a cost-effective manner and address the constraints limiting the use of inorganic and organic fertilizer. In 2007, the NFS was replaced with the Strategy for Developing Fertilizer Distribution Systems (SDFDS) with the objective of establishing market-based mechanisms to improve fertilizer distribution systems that enable the right product to be delivered at the right time in sufficient quantities and at the most cost-effective manner by a competitive and profitable private sector. Its overall goal was to increase fertilizer use to achieve the SPAT target of 7 percent agricultural growth and significantly reduce poverty in rural areas. This includes improving fertilizer distribution systems to increase the availability, accessibility and affordability of fertilizer to farmers; developing enabling policy, regulatory and investment environments for fertilizer market development;

[3] Exchange rate U.S. $1 = RWF 625.

strengthening the capacity of the private sector to supply quality fertilizer at affordable prices and in a timely manner.

The Crop Intensification Program (CIP), which was launched in 2007 under SPAT, is closely interwoven with the fertilizer sub-sector in Rwanda and SDFDS in particular. The objective of CIP was to increase agricultural productivity of high-potential food crops by creating incentives for producers to adopt new production technologies, especially fertilizer, seed and irrigation, to improve soil fertility. In line with SDFDS, the CIP aimed at creating awareness of the benefits of using fertilizer among small farmers; using subsidy vouchers to promote and stimulate fertilizer markets; refining outdated technical recommendations; implementing regular quality control; implementing land consolidation; and providing credit facilities for fertilizer and seed buyers. In support of CIP and to address constraints in the adoption of new technologies, MINAGRI is also striving to improve agricultural extension and information dissemination, encourage investments in storage facilities, reform credit systems to improve recovery rates from farmers and encourage registration of new businesses to avoid unfair competition. In 2013 and again in 2014, the GoR revised its program to subsidize fertilizers in an effort to move fertilizer import and distribution to a competitive private sector.

3.0 Overview of the Agriculture Sector

Total arable land in Rwanda is reported at 2.3 million hectares (ha), but net cropped area in any season is only about 1 million ha (MINAGRI, various). Rwanda has approximately 1.5 million smallholder subsistence farmers, more than 80 percent of which cultivate less than 1 ha of land¸ about half cultivate less than half a hectare and more than a quarter cultivate less than 0.2 ha. The Rwanda Environmental Management Authority (REMA) estimates that land shortages and poor soil fertility (REMA, 2009) contribute to more than 60 percent of poverty in Rwanda. Much cropped land is on steep slopes and therefore subject to erosion.

Food crop production is a major agriculture activity covering cereals, roots and tubers, legumes, bananas and plantains along with fruits and vegetables, which have emerged as important

smallholder crops. Maize, the main cereal crop, plays an integral role in food security alongside legumes and roots, especially in rural areas where less than 40 percent is sold and the rest consumed at home. Tea, coffee and pyrethrum are the main commercial and export crops. Table 1 provides a list of crops, area planted and production average for the period 2007-2012. Maize, sorghum, cassava, Irish potatoes, beans, and bananas and plantains account for over 65 percent of total area planted.

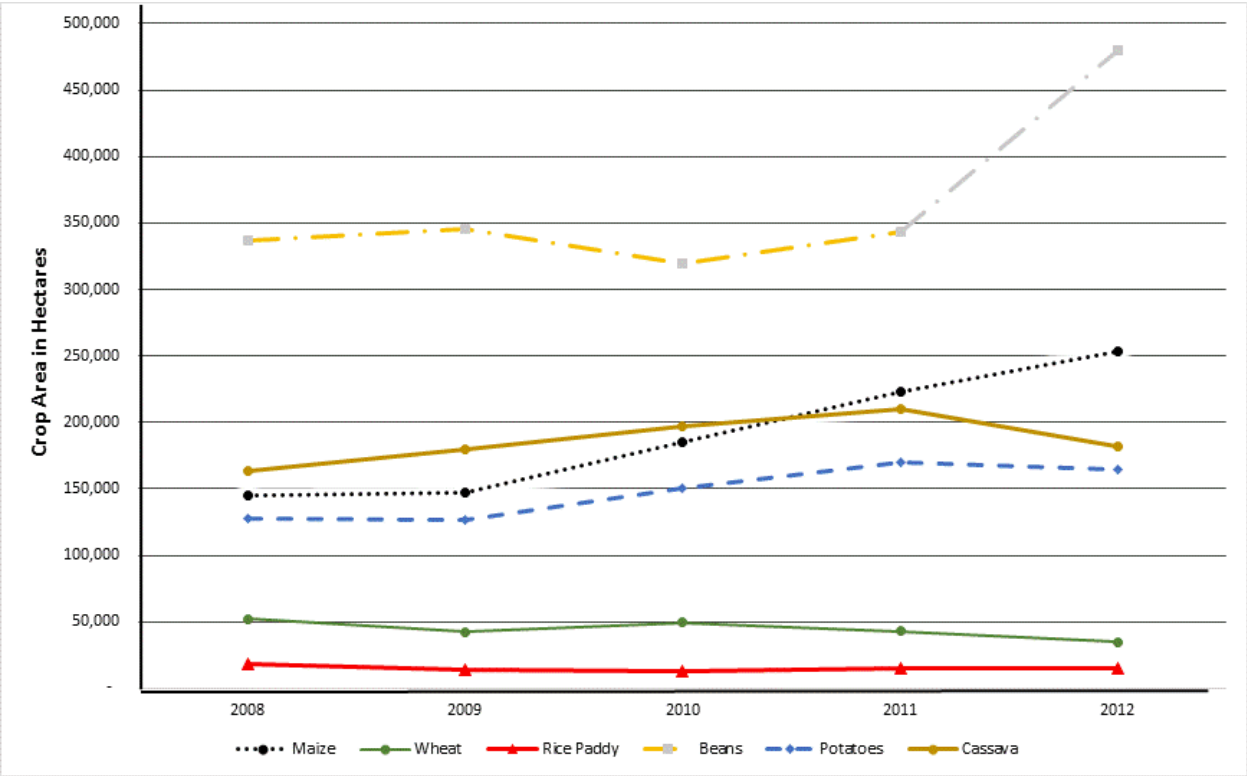
Table 1. Average Area, Yields and Crop Production in Rwanda, 2007-2012

	Production (mt)	Gross Crop Area* ('000 ha)	Yields (mt/ha)	Crop Area as % of Total Area Under All Crops
Maize[fs]	347,763	182,494	1.8	10%
Sorghum	155,842	135,275	1.2	7%
Wheat[fs]	68,055	41,596	1.6	2.3%
Rice paddy[fs]	76,129	15,050	5.1	0.8%
Cereals				**20.10%**
Cassava	2,025,602	179,323	11	10%
Irish potato[fs]	1,619,579	143,844	11	8%
Sweet potato	860,204	124,710	7.1	7%
Taro	158,560	25,119	6.4	1.4%
Yam	20,227	3,585	5.4	0.2%
Roots and Tubers				**26.60%**
Beans	342,770	363,851	0.95	20%
Soya	43,726	54,944	0.78	3%
Peas	29,576	41,185	0.71	2.3%
Groundnuts	12,860	21,280	0.60	1.2%
Legumes				**26.50%**
Bananas	1,802,193	223,836	8.05	12.4%
Plantains	1,086,408	120,527	9.03	6.7%
Vegetables	532,222	48,512	11.02	2.7%
Fruits	444,697	39,869	11.12	2.2%
Other Crops				**24.00%**
Sugarcane	93,995	3,625	25.89	0.2%
Made tea	21,632	13,109	1.64	0.7%
Green coffee	17,930	32,713	0.56	1.8%
Commercial/Cash Crops				**2.70%**
Totals	**9,728,640**	**1,811,053**		**100.0%**

* Approximately half of gross cropped area is planted in season A (beginning generally in September), and half is planted in season B (beginning in the following February).
CIP priority crops are bolded and italicized.
[fs] Indicates that the CIP priority crop benefits from fertilizer subsidy.
Source: MINAGRI, various: 2010-2012.

3.1. The CIP Priority Crops

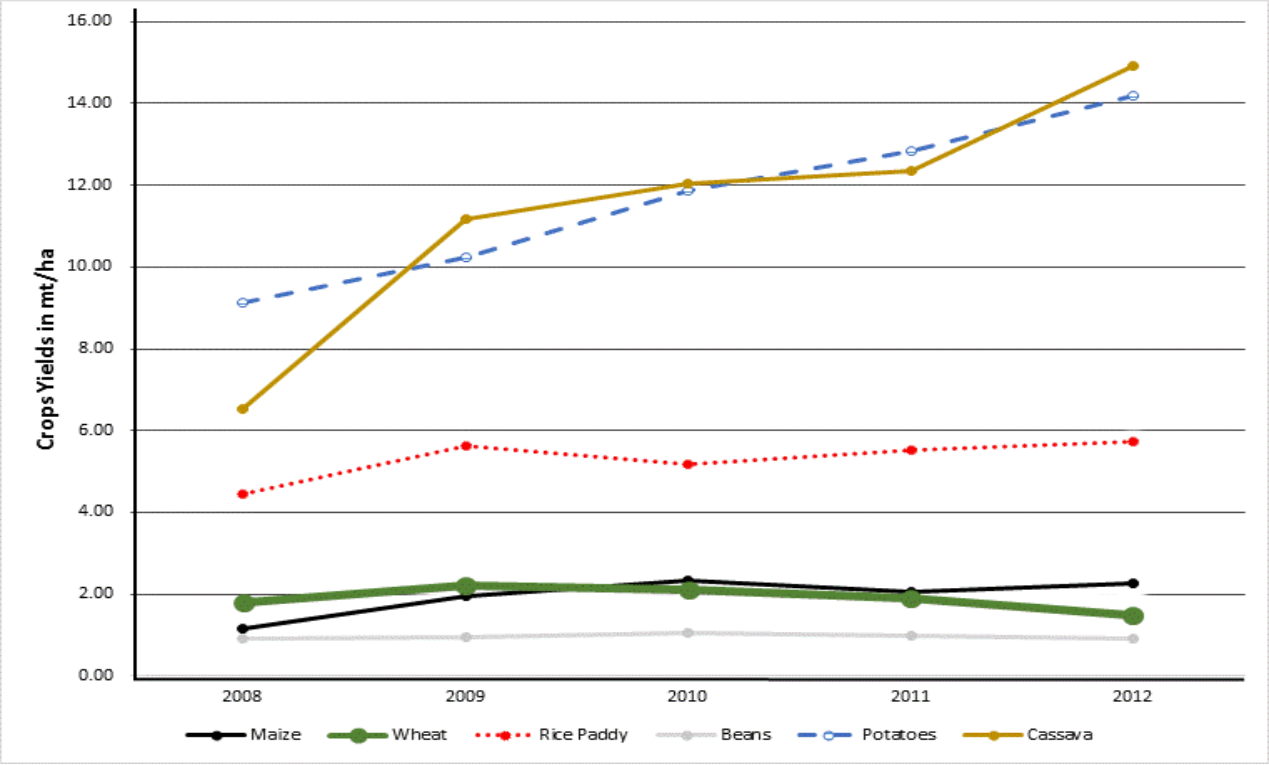
The CIP program focuses on selected priority crops, proposing to raise agricultural productivity among smallholder farmers by providing subsidized inputs and encouraging farmers to cooperate and grow the same crop on contiguous fields. To reduce food security by raising agricultural incomes, the GoR has from 2007 subsidized fertilizer CIP's priority crops: maize, wheat, rice, Irish potatoes, beans and cassava. The specific procedures for delivering subsidies have changed over the years. For example, for maize and wheat, the subsidy on fertilizer through early 2014 was delivered through vouchers distributed to smallholder farmers cooperating to farm at least 1 ha under the priority crops. Through early 2013, fertilizer subsidies for potatoes and rice were calculated on the basis of transport cost from Pacific ports to Kigali. While rice received the larger portion of the CIP development funds, maize took a significant amount of the subsidy allocation to fertilizer (Diao et al., 2010). Legumes, root and tuber crops account for a significant part of total planted area while maize and sorghum cover approximately 80 percent of the area under cereal crops (Table 1). There has been an increase in yields for some priority crops since the implementation of CIP and an increase in land under maize and wheat while that under sorghum has declined (Figures 2 and 3).



Source: MINAGRI Annual Reports, various.

Figure 2. Trend in Area Under the CIP Priority Crops (2008-2012)

Crop productivity trends are presented in Figure 3, which shows the trends in yields (mt/ha) over the period 2008-2012. Maize yields rise and then level off at approximately 2.20 mt/ha while potato and cassava yields increase throughout the period. Under CIP, the use of improved seeds by farmers has risen from 3 percent to 40 percent, and this has contributed to higher yields, especially for maize, using hybrids from several regional seed companies, and also for potatoes and cassava, using improved planting materials (cuttings) from neighboring countries (MINAGRI, 2011a, 2011b).



Source: MINAGRI Annual Reports, various.

Figure 3. Trend in Yields for the CIP Priority Crops (2008-2012)

Coffee, a non-CIP crop grown by 400,000 smallholder farmers, has experienced stagnant production in the last 10 years, reaching 16,000 mt in 2009/10 compared to a target of 44,160 mt. However, quality improvements are leading to increased exports, and recent investments in new plantings are expected to generate a significant increase in overall production once these come into production (MINAGRI, 2009). The tea sub-sector has followed a steady growth trend in production and good prices as a result of improved quality of tea from better processing techniques, increased blending and packaging.

4.0 The Rwanda Fertilizer Market: Supply and Demand

The importation and distribution of fertilizer in Rwanda has been carried out by private companies and, at times, by MINAGRI. The involvement of MINAGRI is generally recognized to be temporary, insofar as GoR is committed to private sector development, investment and

trade, mostly under the CIP program. The CIP fertilizer is distributed to farmers using vouchers that offer a transport subsidy, a price subsidy or both transport and price subsidies.

4.1. Fertilizer Consumption and Demand

Before the CIP was launched in 2007, fertilizer application averaged 4.2 kilograms per hectare (kg/ha) per year – well below sub-Saharan Africa's average of 16 kg/ha (WB, 2011). More recent estimates indicate that fertilizer application rates in Rwanda reached an average of 29 kg/ha/year in 2012 (MINAGRI 2013), an impressive growth. Fertilizer is mainly used on cereals (Table 3), roots and tubers, legumes, fruits and vegetables and tea and coffee. The main types of fertilizers used are urea, diammonium phosphate (DAP) and NPK formulations (mainly 17-17-17). The 25-5-5 and 20-10-10 NPK formulations are used on tea and coffee, respectively.

Table 2. Share of Fertilizer Use by Type and Crop, 2012A Season

Crops		NPK	Urea	DAP
Cereals	**Maize**	25%	61%	62%
	Rice	10%	5%	3%
	Wheat	0%	0.1%	0.4%
	Total Cereals	35%	66%	64%
Legumes	**Beans**	3%	5%	7%
	Other Beans	5%	7%	14%
	Peas	3%	0.7%	0.9%
	Soybeans	0%	0.7%	0.9%
	Total Legumes	10%	13%	22%
Other Crops	**Irish Potatoes**	41%	13%	10%
	Fruits & Vegetables	13%	8%	3%
Total		100%	100%	100%

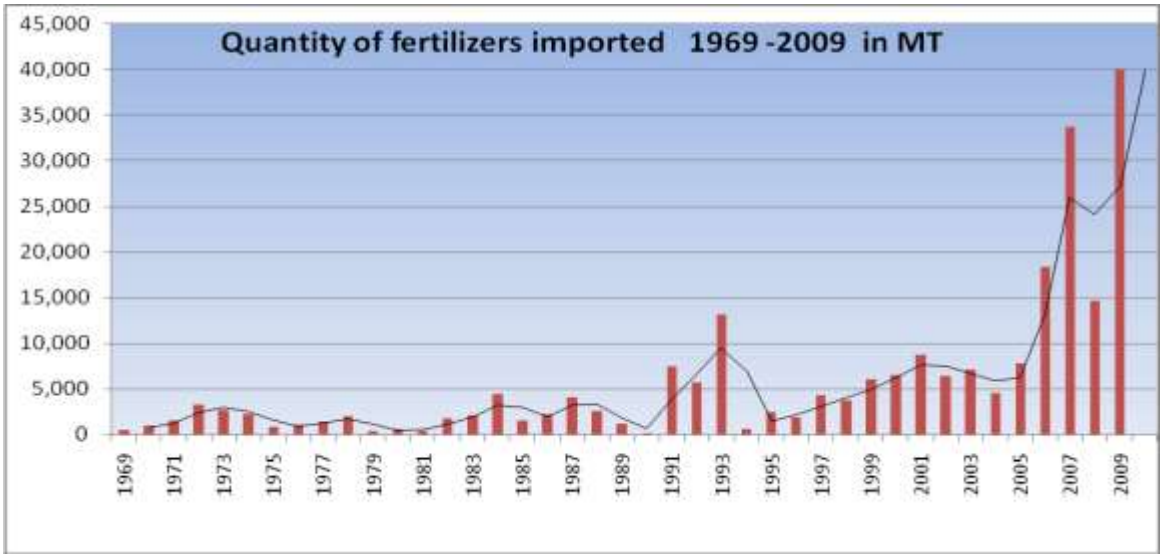
Source: MINAGRI Crop Assessment 2012A Season.

For coffee and tea, the private sector has been left to market fertilizer without GoR involvement; for the fertilizers intended for use on other crops, the government has been intervening in a bid to raise consumption through subsidies. It has been estimated that for coffee and tea, the potential consumption is 15,000-20,000 mt of fertilizers per year based on the area planted and the recommended rate of fertilizer application. Some of the constraints are: (1) difficulty in acquiring a timely supply of the appropriate fertilizers; and (2) difficulty accessing finance as a result of (a) poor rate of credit recovery from growers; (b) diversion of

fertilizers meant for tea and coffee to other crops; and (c) unstable tea/coffee prices in the world market.

4.2 Fertilizer Imports and Supply

All fertilizer used in Rwanda is procured from international sources because there is no local production. Figure 4 shows the import trend over the years. Fertilizer use has been fairly low for a number of years despite the GoR adopting an open system in the 1990s and early 2000s, mostly imported by development partners and NGOs under farmer support efforts. In 2006, the GoR intervened in the market in an attempt to raise fertilizer use for smallholder growers by procuring and distributing fertilizer under the CIP program.

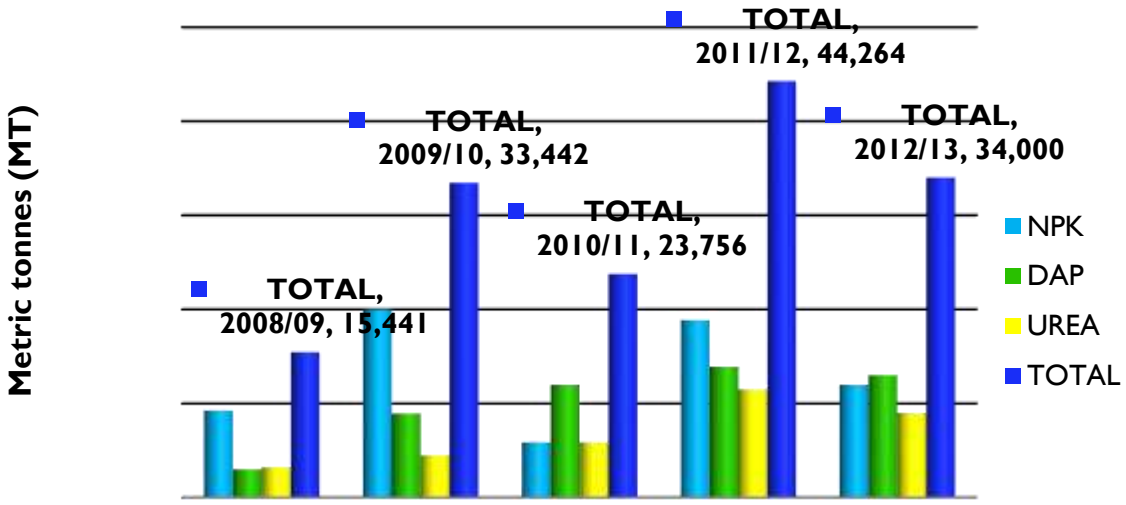


Source: MINAGRI, Byakweli (2004), RADA and BNR.

Figure 4. Quantities of Fertilizer Imported in Rwanda, 1969-2009

Pre-CIP, fertilizer imports averaged 8,000 mt, mostly for tea, coffee and other commercial or cash crops. Under CIP, fertilizer imports increased significantly, driven by the subsidy, and reached 35,000 mt by 2013, covering an estimated 240,000 beneficiaries (Wolfe, B., 2013). Out of an estimated total of 34,000 mt of fertilizer imported in Rwanda (urea, NPK compounds and DAP combined) during 2012/13, about 4,000 mt (or 12 percent) were imported outside the CIP program, mainly for the production of tea, coffee and other out-grower schemes (Figure 5); consequently, this fertilizer does not receive any type of subsidy. The remaining 30,000 mt have

been imported by MINAGRI, consisting of 8,000 mt of urea, 12,000 mt of DAP and 10,000 mt of NPK 17-17-17, as of the 2012-13 seasons. It is expected that the first 2014A season will account for approximately 21,000 mt of subsidized fertilizer, if demand is at a similar level as the 2013A season.



Source: MINAGRI Strategy and Policy Unit.

Figure 5. Urea, DAP, NPK and Total Fertilizer Importation Under CIP

Beginning in mid-2013, as part of the CIP program, the GoR has arranged for private companies to import and distribute fertilizers at fixed, subsidized prices to farmers. GoR has been paying the subsidy to importing companies based on evidence of sale to farmers. Promoting private fertilizer trade at the retail level, GoR, with development partner support, has helped to train more than a thousand agro-dealers. Considering the relative roles played by the government and the private sector, fertilizer supply is mostly a private sector activity with government oversight and, in the case of subsidized fertilizers, some tight controls by GoR.

Through 2012, MINAGRI imported fertilizers for the CIP program on its own account from regional fertilizer suppliers like Yara and Export Trading Company and then auctioned these to local distributors, who bid for regional distribution monopolies in specified districts to agro-

dealers at a subsidized pan-territorial retail price. Companies bid by setting the margin at which they could distribute fertilizers, with the lowest margin winning the contract.

During the auction, distributors who won the bids were expected to make a 30 percent down payment of their bid price, and the balance of the bidding price would be paid after receiving payment from farmers. This credit extension by GoR to distributors was to allow the distributors to extend credit to agro-dealers (and, by extension, farmers) who will pay for the fertilizer after farmers sell their harvested crop, allowing payments to flow back up the chain from farmers to MINAGRI. Distributing fertilizer on credit was a serious design fault in the system, which was not fixed until MINAGRI turned off the credit in 2013. In the interim, farmers, agro-dealers and distributors built up a backlog of more than $20 million in unpaid credit. For much of this credit, it is unclear who along the chain has paid and who might have received payment from debtors but not paid creditors.

The MINAGRI price determination allowed for markups for distributors and agro-dealers in a process that attempted to account for costs involved in moving cargo from Kigali to various territories; these markups adjusted whenever there was a change in exchange rates (Gregory and Fuentes, 2013). In 2013, the unilateral price determination system by MINAGRI was reformed to include the participation of the private sector in negotiations to establish retail prices and markup margins that better reflect underlying market conditions.

4.3 Structure of Fertilizer Supply in Rwanda

Figure 6 illustrates the structure of fertilizer distribution in Rwanda following changes introduced by MINAGRI in 2013. The input supply chain consists of importers, distributors and retailers interconnected as depicted in the diagram. The roles of the main players in the Rwanda fertilizer supply chain are summarized below.

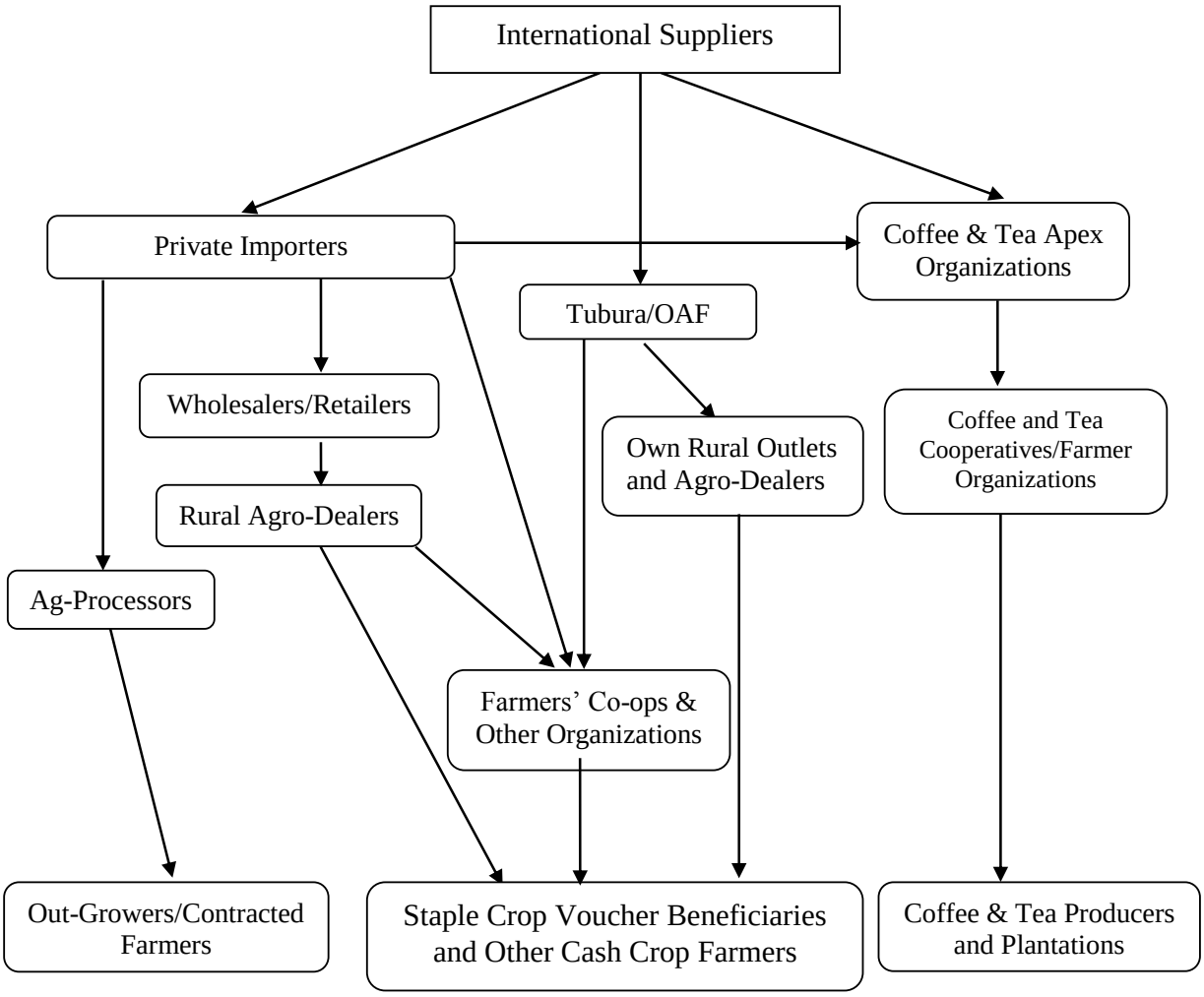


Figure 6. Flow of Fertilizer Distribution in Rwanda (2013)

Importers **–** There have been three types of fertilizer importers operating in Rwanda: (a) suppliers to primarily tea and coffee plantations/sectors; (b) small-scale suppliers buying from neighboring countries to satisfy the localized demand; and (c) MINAGRI importing in large quantities for distribution to all categories of customers, mainly in the subsidized market. The latter no longer exists since MINAGRI relinquished these roles to the private sector in 2013. Prior to 2007, most fertilizers were imported by the private sector, which changed to a system in which MINAGRI was the sole importer of fertilizers (with private distribution within Rwanda) until 2012. Then another set of changes were instituted to allow the private sector to participate in both importation and local distribution, partnering with GoR to determine retail prices in the implementation of a subsidy program. By 2013, MINAGRI ceased to import fertilizers in line

with the fertilizer market privatization agenda set in the SDFDS. Two private distributors and an NGO were selected to import all the country's fertilizer needs covering both open and subsidized markets. Other distributors assumed or maintained roles as distributors and/or retailers.

Wholesale/Distributors – Three types of fertilizer wholesalers have been operating in Rwanda: (a) tea and coffee wholesalers: direct imports or procurement from local importers by sub-sector apex organizations who then distribute to their member associations which in turn distribute to growers on credit; (b) agro-processors: supplying their out-grower farmers or farmer cooperatives whose farm produce they process; and (c) cooperatives, grain producer associations and private importers-cum-distributors: an important link in the distribution of subsidized and non-subsidized fertilizer and other inputs to farmers. They procure fertilizer from private suppliers and supply it to their members on cash/credit basis.

Retailers – This group represents sales outlets where farmers buy fertilizers, either in bags (50-kg or sometimes 25-kg) or simply by weight from open bags. Rwanda has more than 1,000 trained and registered agro-dealers, of which more than half have distributed subsidized fertilizers in under the CIP program. Retail stores, typically located in major towns, serve as outlets for a wide variety of agricultural inputs. These retailers repackage the 50-kg bags into smaller units of up to 5 kg, according to farmers' demand. This process can result in product quality deterioration and/or adulteration with foreign materials.

Other important players implicit in the Figure 6 illustration are financial institutions, transporters and the government. As part of the privatization process, financial institutions are being encouraged to increasingly participate in their essential role of financing the supply chain as MINAGRI transitions away from providing loan guarantees. Fertilizer importation no longer enjoys subsidy on transport costs from port to Kigali; and the GoR is now starting to shift its role to a facilitator through policies and increased public investments and facilitate access to fertilizer for target farmers through vouchers subsidies.

Some importers have access to finance at internationally competitive rates while most distributors and small retailers face difficulties accessing financing and higher interest rates in

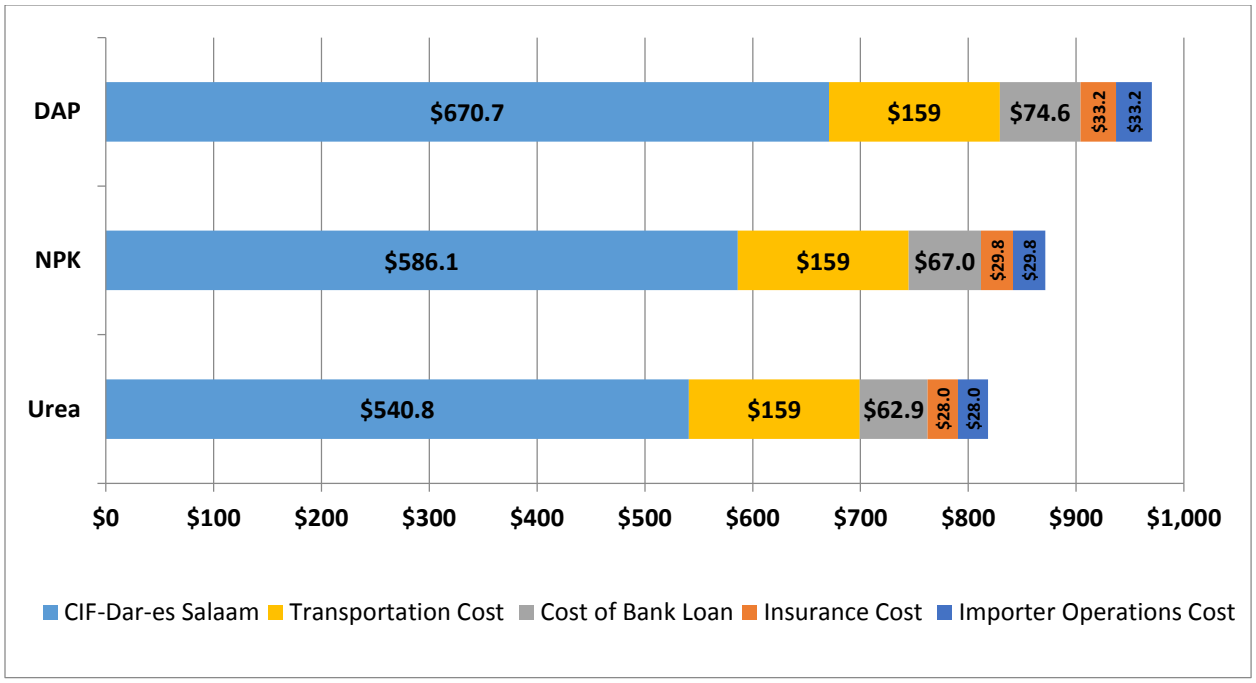
the domestic financial markets, which along with reluctance by financial institutions to lend to the agribusiness and agriculture sector, hampers efforts for business expansion.

4.4 Fertilizer Supply Chain Cost Structure

All fertilizer used in Rwanda is imported through neighboring countries, through the regional ports of Mombasa or Dar es Salaam (both located more than 1,300 kilometers driving distance from Kigali). Most of the cargo is imported through Mombasa due to a more competitive international trade, greater port efficiency and fewer delays, and better roads despite the longer distance to Kigali. The retail price in rural Rwanda is a function of various costs including procurement, port handling and clearing, transport and transaction, financing, border clearing, and other local distribution charges. Rent-seeking at road checks, weighbridges and border crossings along the transport route has been estimated at U.S. $30 in Tanzania and Kenya and U.S. $150 in Uganda per haul (All Africa, 2013). Recent efforts by regional governments have dramatically reduced the number of road checks and weighbridges, and reforms of border clearing procedures are ongoing to reduce delays and costs to businesses.

Figure 7 presents the estimated cost of procurement and delivery to Kigali using the port of Dar es Salaam.[4] The costs associated with moving the product from Dar es Salaam to warehouses in Kigali add roughly 34 percent to the ex-Kigali cost. Figures 7 and 8 illustrate the overall and domestic cost structure of fertilizer imported to and distributed in Rwanda for DAP, urea and NPK (17-17-17).

[4] Data was not available for the Mombasa route at the time this survey was conducted.



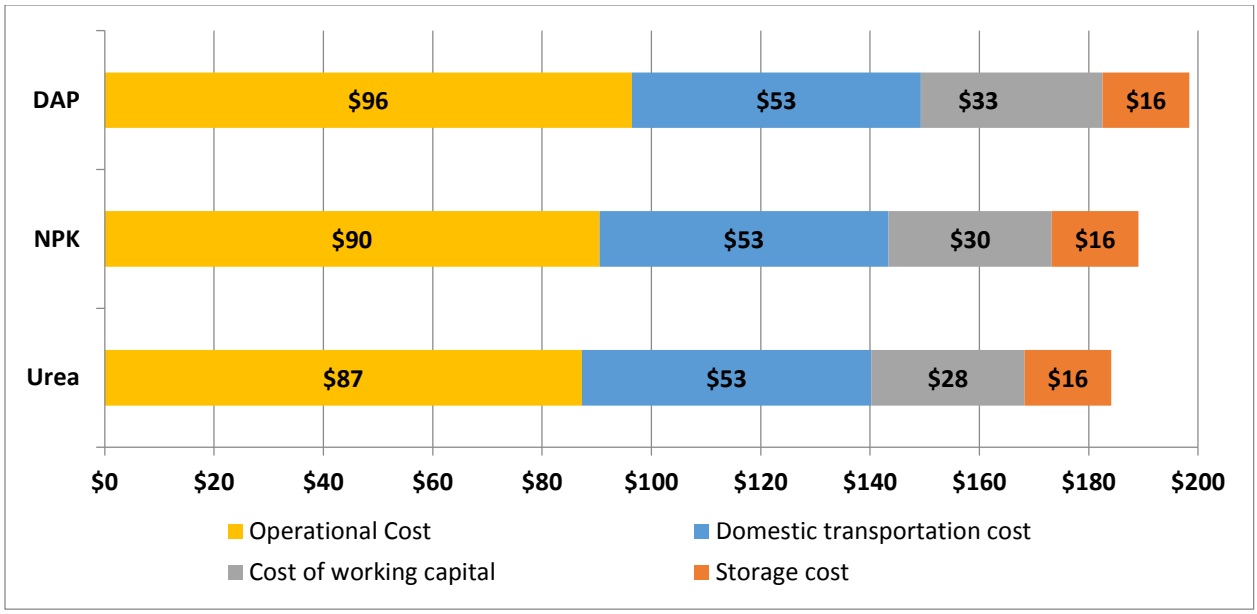
Source: Authors' estimation based on data gathered during field visit.

Notes: Transportation cost is from regional entry port to Kigali warehouse and includes loading/unloading and border-crossing fees. Cost of bank loan is for procurement in the international market. Insurance cost includes currency hedging. Importer operation cost includes the administrative costs and overhead for running the importation business.

Figure 7. Procurement and Importation Cost/mt from Dar es Salaam to Kigali in 2013.

Movement of fertilizer through the distribution system beyond Kigali adds another 18 percent to the total cost, for an overall cost increase of about 45 percent from port to regional warehouses in Rwanda.

Figure 8 depicts the main domestic cost components that are influenced by subsidy support by GoR to farmers, which could be higher without the support. These analyses imply that, on average, the cost of a ton of DAP fertilizer in rural Rwanda is over U.S. $1,000 compared to free on board (f.o.b.) prices of around U.S. $500, more than double the procurement costs.



Source: Authors' estimation based on data gathered during field visit.

Notes: Operations cost includes the administrative costs of running the business. Domestic transportation cost is from Kigali to regional warehouse. Cost of working capital is the cost of bank loan or business owner capital opportunity cost based on bank interest rate. Storage cost includes at Kigali and regional storage.

Figure 8. Proportions of Domestic Fertilizer Costs/mt Kigali – Regional Warehouses in Rwanda

The overall transportation cost from port to retail outlets in Rwanda is a major component of the overall cost structure given the larger distances and the poor infrastructure investments in Rwanda and in neighboring countries.

The overall gross margin for handling fertilizer represents about 11 percent of the total cost from port to regional warehouses, of which 3 percent accrues to importers and 8 percent to the domestic distribution network. Considering only the additional domestic cost, the domestic gross margin represents almost half (48 percent) of the domestic additional cost. Of the domestic margins, 70 percent accrues to distributors and 30 percent to agro-dealers. In cases in which importers also play the roles of distributors and retailers, these margins are combined. The system of determining domestic margins through a negotiation between MINAGRI and distributors is imperfect and may constrain agro-dealer efforts to establish their businesses in areas outside the main markets not serviced by major importers-distributors.

4.5 The Fertilizer Subsidy Program (2007-2012): Challenges and Performance

The MINAGRI subsidy component of the CIP program included transport subsidies as well as an additional subsidy not linked to transport. The transport subsidy, covering 50 percent of the transport costs from port to Kigali, was ended in 2013. At that point, all subsidies were consolidated into a single subsidy on specific fertilizers (NPK, DAP and urea). This subsidy was set in Rwandan francs per kilogram and was paid to importers on evidence that farmers had bought their fertilizers at the established subsidized price. Through mid-2014, this subsidy has been targeted to specific farmers for specific crops through a voucher system. As of 2013, the subsidy was approximately 50 percent on DAP and urea sold to maize and wheat farmers with at least 0.5 ha of land. Thus, maize and wheat farmers who meet this threshold or those who consolidate smaller plots to reach this threshold got this subsidy under CIP.

The implementation of the subsidy program has yielded some benefits: total consumption of fertilizer increased from about 8,000 mt in 2007 to about 35,000 mt in 2012, out of which 30,000 mt were supplied by MINAGRI under the CIP subsidy program. This increased awareness of the benefits of fertilizer and the willingness of some farmers to pay for it even without GoR support. As a result, application rates have increased from 3-4 kg/ha to about 30 kg/ha in the last five years, though it is unclear whether this growth will survive the ongoing reforms.

However, the above gains have been associated with a number of challenges from the implementation of the subsidy: (a) A significant number of subsidized farmers have contributed to millions of dollars in accumulated credit arrears – mostly government credit transferred from distributors to farmers who reneged on the payments of 50 percent of the retail price. However, farmers who were not eligible for the subsidy had to pay by cash and therefore were not part of the defaulters, e.g., potato and rice farmers. (b) Local officials lacked the capacity and facilities to produce vouchers for distribution to eligible farmers, leading to an ad hoc approach to distribution and poor targeting of the subsidy to maize and wheat farmers who met land consolidation criteria. (c) Subsidized fertilizer reportedly leaked across the borders to neighboring countries as a result of the transportation subsidy from ports to Kigali, which makes

the product relatively cheaper. (d) Because bids are offered by region within Rwanda, it is possible for a bidder to win fertilizer lots intended for a region that is different from their last area of operation. This creates uncertainty, discourages the establishment of organized retail networks and disrupts the relationships with agro-dealers in the districts for any given distributor.

4.6 Recent Efforts to Privatize the Fertilizer Market

In 2013, in line with the SDFDS, the GoR introduced fundamental changes in the way it administers its fertilizer subsidy program in order to address the above shortcomings, including the prohibitive costs of administering the program consisting of millions of dollars for annual product procurement and cumulative credit arrears not paid by farmers (MINAGRI 2010): (a) Based on their financial status, logistics and storage capacities, the GoR allowed three private distributors (ENAS, Top Services and Tubura/One Acre Fund) to procure, import and distribute subsidized fertilizer in time for the 2014A growing season. (b) The GoR eliminated its interest-free credit that flowed from the distributors to the farmers, letting private importers fend for themselves and make new arrangements with other players in the value chains. The GoR thus transferred credit decisions and risks to the private sector. (c) The selected importers have been assigned quantities to import and regions to distribute. Two of the three importers, ENAS and Top Services, worked together. These two companies imported 25,000 mt while Tubura/One Acre Fund imported 5,000 mt in the first season, but more in the second.

The initial launch in mid-2013 was rocky as the financial system was unwilling to extend credit to these new entrants in a sector that has had bad credit history, forcing MINAGRI to provide guarantees through the private banking system for importers to have access to credit. Still, the amount of credit was not enough to cover the total importation of fertilizer needed for the 2014 seasons. Despite the withdrawal of MINAGRI trade credit, forcing agro-dealers and farmers to finance fertilizer trade and use from their own resources, fertilizer sales increased 10 percent in 2013/14 compared with the previous year.

In mid-2014, MINAGRI took a further step toward competitive markets, approving five importers and arranging for them to compete (at least three in every district), setting maximum retail prices for three subsidized fertilizers (NPK, DAP and urea) and cutting subsidies by about

a third compared with the previous year. At the same time, MINAGRI also stopped trying to target fertilizers through vouchers to reduce controls on trade at the retail level and, at the same time, to reduce costs to administer and track subsidies – moving from a targeted subsidy to a flat rate subsidy.

5.0 Estimating Fertilizer Requirements

There have been a number of attempts to estimate the total national fertilizer needs for Rwanda's agriculture sector. A number of sources have given a wide variety of estimates of the amount of fertilizer needed to sustain agricultural growth in Rwanda. The FAO (1995) estimated that Rwanda would need 271,915 mt/year of fertilizers (232 kg/ha) to reach its agronomic potential. An IFDC (2004) assessment resulted in a more conservative figure of 65,025 mt/year of fertilizers (55 kg/ha), factoring in agro-economic conditions and covering only beans, barley, potato, tea and coffee; the estimate decreased to 22,798 mt/year if only 6 percent of the planted area is considered economically viable and basing the calculations on 2004 input prices and 2000 crop output. Kelly et al. (2001) estimated the effective demand for fertilizers in Rwanda to be 6,765 mt, taking into consideration the current constraints in demand and supply. In 2006, MINAGRI estimated projected requirements of 38,614 mt/year of fertilizers by 2011, taking into account economic growth as projected by EDPRS and based on an initial consumption of 8,406 mt in 2005. In this section, we estimate quantities of fertilizer required to meet the agricultural production targets as stated in the SPAT-III to achieve the EDPRS-II growth goals. These estimates are based on the crop nutrients removal approach that relies on a number of assumptions to determine the level of nutrients necessary to reach targeted production levels, as explained below. This range of estimates is an indication of the difficulty of getting the necessary inputs required for estimation and the complexity of the agricultural systems that challenge any analytical methods in trying to capture and explain the relevant aspects. The following sections elaborate on the approach used for this study.

To provide relevant estimates, first we determined the gaps between the 2008-12 average crop production and the SPAT-III target crop production growth of 6 percent by 2017 (Table 3). Then

we applied the nutrient removal factors for each crop to estimate additional and total fertilizer nutrients required to meet the increased production.

Assuming no significant change in cultivated area, crop yields and production would need to increase by about 34 percent from 2012 levels to meet the 2017 targets, which implies an incremental production of more than 2 million mt of produce. The projected increase in the production of CIP crops represents 82 percent of the total increase in production. The crops included in Table 3 were selected based on available data and represent 60 percent of total planted area, which includes cereals, roots and tubers, legumes, fruits and vegetables and coffee.

Table 3. Yield and Production Gaps Based on Estimated SPAT Targets

Major Crops	2008-12 Average Cultivated Area	Yield		Production		
		Current 2008-12 Average	SPAT 2017 Target	Current 2008-12 Average	SPAT 2017 Target	Targeted Increase
	(ha x 10^3)	(mt/ha)		(mt x 10^3)		
Maize	191	2.0	2.7	397	513	116
Sorghum	130	1.2	1.6	154	209	55
Wheat	44	1.8	2.4	77	105	28
Rice paddy	15	5.3	7.1	79	107	28
Cassava	187	12.1	16.3	2,267	3,034	767
Irish potato	148	11.6	15.6	1,720	2,301	582
Sweet potato	120	7.3	9.8	881	1,179	298
Beans	365	1.0	1.3	346	465	119
Soya	56	0.8	1.0	44	57	13
Peas	42	0.7	1.0	32	42	10
Groundnuts	22	0.6	0.8	13	18	5
Coffee	34	0.6	0.7	19	25	7
Totals	**1,353**			**6,028**	**8,055**	**2,027**
CIP crops only	**994**			**4,962**	**6,630**	**1,668**

Source: Authors' calculations based on data from various sources, mainly MINAGRI production statistics.

5.1 Estimating Fertilizer Use on Key Crops Using Nutrient Removal Approach

The next step is to calculate how much fertilizer would be needed to reach the 2017 production targets. We thus calculate for each crop the supplemental quantity of nitrogen (N), phosphate (P_2O_5) and potash (K_2O) needed to produce the incremental quantities to meet the 2017 targets (the final column of Table 3) and convert those into fertilizer product equivalents, adjusted using

efficiency recovery factors[5] for N, P and K. Table 4 shows the incremental nutrient removal estimates for the same set of crops shown in Table 3.

Table 4. Nutrient Removal for the Incremental Production Needed to Meet SPAT Targets

Key Crops	2012-17 Incremental Crop Production	Nutrient Removal			2012-17 Total Incremental Nutrient Removal
		N	P_2O_5	K_2O	
	(mt x 10^3)	(mt x 10^3)			(mt x 10^3)
Maize	116	1.65	0.72	0.42	2.79
Sorghum	55	0.91	0.37	0.23	1.51
Wheat	28	0.62	0.25	0.14	1.01
Rice, paddy	28	0.34	0.16	0.13	0.63
Cassava	767	0.88	0.30	1.15	2.32
Irish Potato	582	2.04	0.87	3.26	6.17
Sweet Potato	298	1.55	0.69	2.98	5.22
Beans	119	4.42	1.26	1.94	7.63
Soya	13	0.78	0.18	0.22	1.19
Peas	10	0	0	0	0
Groundnuts	5	0.18	0.03	0.03	0.24
Coffee	7	0.27	0.03	0.35	0.65
Totals	**2,027.6**	**13.6**	**4.9**	**10.8**	**29.3**
CIP crops only	**1,668**	**10**	**3.6**	**7**	**20.5**

Source: Authors' calculations using estimated nutrient content of crops based on MINAGRI production statistics.

Table 4 shows that the incremental output of 2 million mt (the difference between 2008-12 current average and 2017 target production) for crops included in Table 3 will require 29,300 mt of additional nutrients (13,638 mt N, 4,861 mt P_2O_5 and 10,845 mt K_2O). Of this total, CIP crops will require 70 percent, or 20,500 mt of nutrients (10,000 mt N, 3,600 mt P_2O_5 and 7,000 mt K_2O). Table 5 is derived from Table 4 by adjusting nutrient removal for fertilizer use efficiency factors and then expressing it as metric tons of fertilizer products.

[5] To estimate the total amount of nutrients necessary to achieve the SPAT targets, we applied a use efficiency factor of 50 percent, 35 percent and 70 percent for N, P and K, respectively.

Table 5. Incremental Nutrient and Product Requirements

Crop Categories	Nutrient*	Product
	(mt x 10^3)	
a. Total Crops in Table 4	56	109
b. CIP Crops Only	40	78

Sources: Authors' estimates. The nutrients are converted to urea, DAP and MOP fertilizer products.

*Note that the total nutrients were adjusted for urea, DAP and MOP use efficiency factors.

The additional amount of nutrients necessary to meet the SPAT-II targets will require consumption of 56,000 mt of nutrients, which is equivalent to about 109,000 mt of fertilizer product (urea, DAP and MOP) combined; this is in addition to the current consumption of 35,000 mt for an estimated total of nearly 144,000 mt of fertilizer product by 2017, more than four times the current fertilizer consumption. The CIP crops will absorb an estimated 78,000 mt of fertilizer products in addition to the 30,000 mt used as of 2012 under CIP, for a total of 108,000 mt of product, or 75 percent of the projected total requirements.

6.0 Conclusions and Recommendations on Key Issues Facing the Fertilizer Value Chain in Rwanda

The results from the estimation of fertilizer requirements indicate that to meet the agricultural growth targets, Rwanda faces a challenging prospect of increasing its annual fertilizer consumption substantially from 35,000 mt to 144,000 mt. What would it take for the value chain to accommodate an additional 109,000 mt of fertilizer?

To alleviate constraints in fertilizer value chains in Rwanda, it is necessary to tackle both demand and supply-side issues that will lead to increased fertilizer consumption to meet the agricultural strategic objectives by establishing efficient input markets. To achieve this objective, it is necessary to encourage private sector participation and embrace a holistic approach that includes other technologies in an Integrated Soil Fertility Management (ISFM) framework and incorporating the development of output markets as well. The GoR recognizes the important role that the private sector can play to complement its efforts in raising agricultural productivity. This

is particularly crucial as budgetary constraints and pressures result from alternative public investments competing for same scarce resources and dwindling donor funding.

Strengthening the Policy and Regulatory Environment Conducive to Private Sector Development – The new GoR development strategies place great importance on private sector participation to expand production and increase productivity. To encourage farmers and other private businesses to invest in improved technologies and related services, it is important to minimize the costs of doing business, reduce market-distorting interventions and provide regulatory oversight on issues of quality. Despite the efforts to stimulate demand by intervening in the fertilizer market, the GoR sent mixed signals to private traders by announcing intentions to fully privatize the market while intervening occasionally in importation and price controls. Even after reforming markets to allow for privatization, the GoR is still influencing markets through determination of retail prices, which denies market forces from setting prices.

While the GoR participation in the subsidy program has led to increased national consumption of fertilizer, the intervention has skewed private fertilizer market participation to the mostly commercial export-oriented production sector, catering to tea, coffee, potato, and rice growers while neglecting the smallholder farmer producers of food grains (maize and wheat) who are the beneficiaries of the subsidy program. This has raised questions about the role of the GoR in the fertilizer market, particularly its impact on private investment and development in the fertilizer supply chain. Recognizing these issues, the GoR has started taking steps toward the privatization of fertilizer supply while maintaining control on prices and supporting farm-level demand as means to encourage fertilizer use.

Expanding the role of the private sector in markets should continue to be encouraged as GoR reduces its operations and limits them to regulatory roles. The establishment of a legal framework and the improved capacity of regulatory agencies are needed to enforce quality control standards at borders and rural agricultural markets. Although fertilizer quality is not currently a major problem in Rwanda, the country is at risk of substandard products and illegal border trade. As supply becomes privatized and the distribution network expands, there is a need

to develop a fertilizer quality control system that includes testing, setting normative quality thresholds, putting in place adequate human resources and providing proper storage.

Inadequate Institutional Capacity and Human Capital – Other complementary investments are required to sustain the gains that have been achieved through CIP and the subsidy program: (a) developing well-researched and scientific-based crop protocols for achieving high yields profitably and sustainably (e.g., maintaining soil fertility); (b) strengthening advisory and extension services to ensure farmers use fertilizer and extension agents are well trained with sound technical knowledge and sufficient funding; and (c) training agro-dealers and farmer associations across the country in basic business management and marketing skills to grow their businesses, link to agro-processors and banks and build their credit profiles.

Macro-Economic Constraints – This is related to the fluctuations and depreciations of the national currency. Rwanda's economy faces external shocks, low domestic savings and reliance on foreign aid to implement public programs (WB Doing Business report, 2012) with fluctuating exchange rates and inflationary pressures making imports costly and the resulting increase in interest rates raising financing costs.

The development of input markets requires stable exchange rate regimes to reduce risks and uncertainty to importers in the procurement of fertilizer. It is necessary for public sector programs to help ease banking sector constraints to lending through sharing risks and establishment of business-friendly regulations. It is crucial that businesses have the benefits derived from a legal and regulatory framework that is clearly defined and not subject to the indirect costs of navigating a complex and changing system that can deter investments.

Improve Access and Availability of Financial Capital – Rwanda, like most developing countries, lacks sufficient financial instruments and risk-mitigating tools to increase access to credit. Where such financial services exist, agro-dealers and farmers are often excluded as a result of banks' perceived risks associated with agricultural activities, the uncertain policy environment in terms of privatization and the history of farmers' non-payment of credit for GoR-subsidized fertilizer. The high cost of finance leads to a shortage of available agro-input finance,

thus discouraging traders from markets and farmers from using fertilizer. The cost of financing is exacerbated by the GoR borrowing in the domestic market to finance its operations, further crowding out private investment. The finance constraint is more relevant for the distributors, retailers and farmers in the domestic supply chain that rely solely on domestic financing with some government support through the subsidy program. The three importers that have been selected to replace MINAGRI in importing fertilizer have links to international sources of credit and occasional guarantees by the GoR through the domestic banking system.

According to an IFDC 2012 survey of over 2,000 potato producers, access to and availability of credit were the most frequently cited factors limiting the use of productive inputs, limiting the expansion of potato production (Muhinyuza et al., 2012). In light of the recent changes introduced by MINAGRI, another IFDC assessment of the fertilizer supply and subsidy management in Rwanda (Ian and Fuentes, 2013) identified the importance of dealing with the following issues: lack of credit to finance fertilizer purchases; potential disruption of the supply networks already built in various regions across the country due to these changes; and the possibility of a decrease in fertilizer consumption due to credit constraints.

The key questions on this track are how to establish the appropriate financing mechanism going forward and what form the subsidy program should take. Some key issues that build onto possible solutions include: (a) importation would be open to more entrants and business relationships established with the agro-dealers in their service districts; (b) the MINAGRI could help establish financing mechanisms for the new dispensation by either establishing a revolving fund, providing a government "letter of guarantee" to importers or providing incentives to financial institutions to build instruments like index insurance; (c) the retail subsidy could be reformed to a flat rate subsidy that is cheaper to manage, reduces margins and thereby allows the subsidy to be reduced; (d) the establishment of financial institutions/markets should be encouraged in rural areas and allowed to issue vouchers against farmers' payments, thus lowering costs; (e) MINAGRI could consider allowing farmers to make choices on which crop to use the subsidized fertilizer, which helps with credit especially for high-value crops.

The Tubura/One Acre Fund import and distribution operational structure has been assessed as effective in incorporating credit in a successful way with a repayment rate above 90 percent. Under the Tubura scheme, farmers are organized into peer groups to receive services. Tubura provides intensive technical advice, and in-kind credit in the form of inputs, locates markets for their outputs and deducts input loans at harvest time. Credit payment discipline is maintained by the group combined with individual responsibilities. The group as a whole is responsible for repayment of all credit within that group; non-repayment by individuals is punished by exclusion from the group and hence exclusion from access to credit.

On the Demand Side of the Market – At the farm level, a number of factors, including poor knowledge on technical agronomic aspects in using fertilizers, affect yields and hence profitability. It is therefore important to alleviate challenges along the chain that add to costs and to ensure that farmers receive all the fertilizer technologies they need to realize high returns, i.e., a full range of fertilizers including micronutrients. Easing logistical constraints is crucial through improved road and storage infrastructure, reduced border crossing delays, reduced number of road checks and weighbridges, and better international coordination.

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