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Support for the Establishment of a Regional Fertilizer Policy and Regulatory Framework in East and Southern Africa

An Assessment of National Fertilizer Policies, Regulations and Standards for Tanzania

Prepared

by

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Fertilizer Policy Expert

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Acronyms (TBD)

GDP - Gross Domestic Product

MAFC- Ministry of Agriculture, Food Security and Cooperatives

TBS- Tanzania Bureau of Standards

TFRA- Tanzania Fertilizer Regulatory Authority

TPRI - Tropical Pesticides Research Institute

TRA- Tanzania Revenue Authority

USA- United States of America

UV- Ultra violet

WPP- Woven Propylene

Executive Summary

Despite the potential in meeting its food requirements Tanzania remains a net importer of food. This is exacerbated by low agricultural productivity among Tanzanian farmers which is primarily fuelled by low adoption of productivity enhancing technologies such as the use of fertilizer and improved seeds. Fertilizer consumption among smallholder farmers in Tanzania remains low on the backdrop of nutrient depletion which is estimated at five times high than annual replenishment rate. This underscores the need for more efforts to improve smallholder farmers' adoption of productivity enhancing technologies and improve both productivity and soil health.

The sub-optimal use of fertilizer is attributed to both supply side (non-availability of fertilizer) as well as demand side (eg high prices, lack of awareness of the recommended application rates, ignorance about the potential benefits from optimal application of fertilizer) constraints, both of which can be addressed by an appropriate mix of policy and regulatory framework and enforcement mechanisms. This paper presents findings from an assessment of the fertilizer policy and regulatory environment in Tanzania. Although Tanzania has a consistent set of policies and strategies for agriculture and rural development that reflect the importance of the sector in the nation's development aspirations the assessment found some gaps in the fertilizer policy and regulatory environment especially in their enforcement.

Fertilizer law: Tanzania has a Fertilizer law enacted in 2009 to regulate the importation, distribution, storage, and marketing of fertilizer in Tanzania. The broad thrust of the act is to ensure that fertilizers used in Tanzania are of good quality. Although the act applies to all fertilizers, in its details it focuses on industrially produced fertilizers, which are primarily inorganic fertilizers. This underscores the importance of revising the Act and making provisions for organic and bio fertilizers. The principal elements of the 2009 Act are that all fertilizers manufactured, imported, or sold in Tanzania must be registered, packed, and labeled in accordance with the act. All dealers in fertilizers must be registered, with a minimum level of knowledge concerning the management and use of their products. Moreover, all premises used for activities related to fertilizers must be registered. Importation of fertilizers into Tanzania, as well as exports of fertilizer from the country, requires a permit. Such permits are given only to registered fertilizer dealers who seek to trade in registered products.

Fertilizer Policy: Tanzania does not have a policy specifically focusing on fertilizer. Nonetheless Policy statements on fertilizer issues are contained in the National Agricultural Policy produced in 2013 (NAP, 2013) where agricultural inputs are covered. In this policy Tanzania acknowledges that increased use of productivity enhancing technologies such as fertilizers, agrochemicals, seeds and farm machinery is a pre-requisite for achieving sufficient agricultural production and growth to meet economic development, poverty reduction and food security and nutrition goals.

Fertilizer Regulations: Tanzania has a Fertilizer Regulations Act, of 2011. According to the Regulations no fertilizer or fertilizer supplement shall be used in Tanzania unless it has been sampled, tested, analysed, evaluated and recommended for use. All imports have to conform to these standards and this is enforced by the Tanzania Fertilizer Regulatory Authority (TFRA) in accordance with the provisions of the Fertilizer Act, 2009. However, there are problems with regards to registration process of new fertilizers due to multiple institutions and fees involved with fertilizer regulatory services. There is need to provide for one stop centre for dealing with fertilizer regulations and also to address gaps in the current law to facilitate timely fertilizer registration and release. As it stands, Fertilizer Act provides for 3 years of testing before registration. Many investors want the testing period to be shortened.

Fertilizer recommendations: Tanzania's fertilizer recommendations tend to be pan-territorial and therefore do not account for area-specific nutrients requirements. There is need to develop area specific fertilizer recommendations that identify specific geographic domains with specific nutrient supplementation requirements for different crops. In addition, there is inadequate facility and resources for soil testing. Extension coverage is weak and smallholder farmers lack full knowledge about proper seed and fertilizer use. The knowledge constraint prevents the growth on fertilizer demand. Additional training is needed for both extension workers (*bwana shamba*) and agro-dealers.

The National Fertilizer Strategy: Aimed at improving productivity, its specific objectives are to improve fertilizer adoption by Tanzanian farmers and promote the development of National fertilizer procurement. The strategy also aims at lowering transaction and transportation costs of fertilizer within the country by removing non-tariff fiscal and bureaucratic constraints to fertilizer trade, and assisting in harmonizing national fertilizer regulations to lower transaction costs and increase intra-regional trade in fertilizers.

Fertilizer Procurement and distribution: The fertilizer market is competitive with visible private sector participation although Yara- a private company controls much of the fertilizer supply chain. Wholesale distribution of fertilizer up-country is done by most of the 10 member companies of the Fertilizer Society of Tanzania. Most of these firms have wholesale depots in the principal farming areas of the country—primarily in the Southern Highlands, but some also have depots elsewhere, notably Kilimanjaro. Over 3,000 retailers participate in fertilizer trading in Tanzania with a wide variation in the level of participation across Tanzania. Larger numbers of fertilizer traders are found in districts with high agricultural potential where there are likely to be clear positive returns to the use of commercial agricultural inputs. While very few fertilizer retailers operate in drier regions of central and coastal Tanzania and in the more remote areas of western Tanzania

Fertilizer production: Despite the provisions of fertilizer production in the fertilizer Act of 2009 there are no rules and regulations yet governing the production and blending of fertilizers. To date, Tanzania produces Minjingu fertilizer from rock phosphates in quantities of about 60,000 MT per annum. Increasingly they also have made attempts to do some blending albeit at very small scale. Tanzania does not yet import intermediate products and blend but with the discovery of huge deposits of natural gas in southern Tanzania around Lindi and Mtwara there are plans to boost the national capacity for producing and blending fertilizer locally and to produce fertilizer out of gas. Notably the private sector dominates the importation, trade, production and distribution of fertilizers in Tanzania as such it should play an important role in capacity building of farmers and grodealers.

Fertilizer subsidy: The Government of Tanzania has been implementing a subsidy program called the National Agricultural Input Voucher Scheme (NAIVS) since 2009. While preliminary observations suggest that the overall downward trend in total fertilizer imports and consumption in Tanzania has been reversed in the last few years due to the government's subsidy program, there is mixed evidence about the general performance (efficiency, effectiveness) and impact of the program. Some studies on the impacts of the subsidy program on agricultural input use, productivity, and profitability indicate the tension between efficiency and equity. Notably, most studies seem to show suggestive evidence of elite capture in the voucher system where members of the local elite have a higher likelihood of being voucher beneficiaries hence the need for revisions of such programs.

Bio-fertilizer policy environment: There is no written policy and law governing the production and distribution of bio-fertilizers in Tanzania. However, a number of efforts are being made to improve the policy and regulatory environment for bio-fertilizers in Tanzania. In 2014, TFRA spearheaded a process of developing and the launching of national registration guidelines which stipulate the process involved in registering, distributing and monitoring of bio-fertilizer products. They also started spelling out enforcement mechanisms for bio-fertilizer regulations including stiff penalties in case of non-compliance and the roles played by different enforcement agencies. This process is expected to help establish quality requirements of bio-fertilizer products that are allowable in the Tanzanian market.

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Section 1: Introduction

Background

The economies of eastern and southern Africa are heavily dependent on agriculture. It is estimated that more than 70% of the population in this region is involved in agriculture and the majority of these producers are smallholders farming less than two hectares. Agriculture contributes on average 35% of GDP and employs 65% of the population. Therefore, agriculture is a critical driver of the future economic development of the region. However, while economies in many Africa countries have exhibited healthy growth - real GDP in sub-Saharan Africa grew at an average rate of 5% between 2003 and 2009 - this growth has not emanated from the agriculture sector (Camara and Edeme, 2013).

Despite its importance to the economy, performance of the agriculture sector is poor. Cereal yields in sub-Saharan Africa are the lowest in the world, having stagnated at around 1 ton/ha for the past 50 years compared to 4 tons/ha in developing countries. The key reasons for the poor performance of the agriculture sector are the continued reliance on traditional agricultural practices in the region and the low adoption of modern productivity enhancing technologies such as mineral fertilizers and quality seeds of superior varieties which severely constrain increased yields in East and Southern Africa.

Farmers in the region use on average 10 kg of fertilizer per hectare, compared to their counterparts in Asia who consume on average 209 kg/ha. The result is severe soil nutrient depletion; the rates of soil nutrient depletion exceed 60 kg/ha (Wanzala and Groot, 2013). This low rate of usage is due to a number of reasons including a thin network of agrodealers; lack of technical knowledge on appropriate fertilizers; lack of access to finance all along the value chain which prohibits the purchases of sufficient quantities to capture economies of scale; and high transport costs due to inadequate ports, rail and road networks. These factors result in high costs, putting fertilizer beyond the reach of most farmers.

The policy environment often exacerbates the situation. Government subsidy programs crowd out commercial demand and introduce uncertainty into the system, which creates disincentives for private companies to invest in distribution networks. Government's lack enforcement capacity to oversee quality control, which increases the risk of adulterated fertilizers, fosters distrust of

fertilizer and discourages honest businesspeople from participating in the fertilizer trade. Outdated fertilizer recommendations in many African countries are outdated due to defunct or non-existent research and extension systems.

Similarly, government subsidy programs often do not involve the private sector in planning and distribution. Hence the private sector has no incentive to identify which nutrients farmers need for their crops and soils and provide the appropriate blends. Moreover, government policy in many of these countries discourages blending. Many countries have a list of approved fertilizers. If the private sector wants to introduce a new fertilizer it must undergo efficacy testing, which can take three years thus imposing costs the private sector cannot afford. The list of approved fertilizer products also discourages cross-border trade and the development of regional markets. Countries have very strict specifications for approved fertilizers, and although often there are very minor differences in nutrient content these differences can result in the entry of a new fertilizer product being delayed or even denied.

The outcome of these constraints is that fertilizer markets in eastern and southern Africa have failed to reliably provide the right type of quality fertilizers to small-scale farmers in the rural interior in a timely manner and at an affordable price. If agriculture in the region is to become competitive, the performance of the fertilizer markets in the region needs to be improved.

Clearly no single intervention will address these constraints effectively. Rather, a number of interventions are required and many must be implemented simultaneously. These include: investments in ports, roads and rail infrastructure to reduce transport costs; provision of technical and business training to agro dealers; improving access to finance all along the fertilizer value chain; and development of market information systems. However, an overarching factor to foster the growth of fertilizer markets is a stable and transparent policy and regulatory environment that is conducive to private sector investment.

This study support SSTP's mission and foster the creation of stable and conducive fertilizer policy and regulatory environment in the region by doing the following:

- 1) Develop a regional policy and regulatory framework that can be used as a guide by countries in East and Southern Africa to embark on a policy reform agenda for the fertilizer sector

that will result in higher levels of fertilizer use and concomitant higher levels of agricultural productivity and food security;

- 2) Prepare/revise draft fertilizer legislation for Tanzania - which is compatible with open markets and are harmonized with each other;
- 3) Review and critique of Tanzania's trade policies that impact fertilizer and recommendations for common trade policies; and
- 4) Establish Tanzania's action plans that also detail the requirements for establishing fertilizer regulatory systems in each country.

Objectives of the Study

This report presents an analysis of the status of national fertilizer policies, standards and regulations and proposes recommendations and regulatory changes that would lead to an enabling policy and regulatory environment in Tanzania. Specifically this report attempts to do the following:

- a) Review and critique the status of fertilizer policy in Tanzania
- b) Describe and analyse the fertilizer subsidy programs in Tanzania with regards to the design and implementation characteristics, the role of the private sector, and the overall impacts;
- c) Delineate the laws and regulations governing the fertiliser industry and the impacts thereof
- d) Assess fertiliser registration requirements clearly articulating the requirements and processes for registering and re-registering fertilizer companies and brands, and
- e) Assess fertiliser quality enforcement and identify gaps and weaknesses

This report is based on findings from a review and critical analysis of different reports on agriculture and fertilizer policies and regulation and other related issues in Tanzania.

Methodology

A desk top was carried out to review fertilizer policies in Tanzania. A number of literature were consulted which includes previous work done by IFDC, AFAP, ACTESA, IFA, FAO in Tanzania and other development agencies. In addition to this National fertilizer policies were also reviewed

Section 2: Overview of the Agriculture Sector in Tanzania and the Role of the Fertilizer Policy and Regulatory Framework

Tanzania's population is approximately 50 million people on approximately 947,300 square kilometers of land area. Almost 46% (440 000 square kilometers) of the land is arable land. Out of this, only 26% (115 000 square kilometers) is under cultivation. Despite this arable land endowment, Tanzania remains a net food importer.

The role of agriculture in the Tanzanian economy cannot be overemphasized. Agriculture contributes about 28% of the national Gross Domestic Product (GDP) and employs 75% of the Tanzanian labor force. Nonetheless agricultural productivity remains low. Low adoption of productivity enhancing technologies remains a major contributor of low agricultural productivity (United Republic of Tanzania, 2007). Fertilizer use rate in Tanzania is very low (about 9 kg ha⁻¹) while the annual nutrient depletion rate is estimated to be 41 kg nitrogen (N), 4 kg phosphorus (P) and 31 kg potassium (K) per hectare and among the highest in Africa (Bekunda et al 2004). The study by URT (2007) estimates the percentage of rice and maize farmers adopting improved seed varieties at 5.7 and 0.7 respectively. In addition, it is estimated that only about 6.6% of the planted area uses inorganic fertilizers (NASC, 2007-2008). This underscores the need for more efforts to promote smallholder farmers' adoption of productivity enhancing technologies.

The sub-optimal use of fertilizer is attributed to both supply side constraints (non-availability of fertilizer) as well as demand side constraints (eg high prices, lack of awareness of the recommended application rates, ignorance about the potential benefits from optimal application of fertilizer) all of which can be linked to a number of policy related constraints. Other bottlenecks that are compounding soil fertility problems include: i) limited access to credit ii) long-term use of land without using fertilizer iii) poor pricing policies, fertilizer inspection and testing fees iv) poor marketing infrastructure for fertilizer and v) Low participation of the private sector in supplying fertilizer.

Numerous attempts were made to improve the supply and use of fertilizer in Tanzania. For instance, the economic development policies of the socialist regime in Tanzania aimed at modernizing the agricultural sector through facilitation of diffusion and adoption of new

technologies into the sector. The new technologies included use of hybrid seeds, chemical fertilizer inputs, and tractors (Wobst and Mhamba, 2000). However, with the introduction of structural adjustment programmes limited support was rendered to the sector leading to low performances (ibid). Beginning in 2007, the Ministry of Agriculture, Food Security and Cooperatives (MAFC) introduced fertilizer and seed subsidy scheme on a pilot basis, with the aim of scaling up to reach as many as 2 million smallholder farmers in 57 districts by 2009. However, beginning in 2011/2012, the scale of NAIVS began to decline due to a combination of the end of World Bank funding for the scheme and the lower-than-anticipated Government of Tanzania revenues (David Mather et al, 2015). The Agricultural Input Division (AID) proposed to pilot an Agricultural Credit Subsidy Program (ACSP) starting 2013/2014 season, but this has not been implemented.

This study assesses the policy and regulatory environment for fertilizers in Tanzania. It assess three aspects of the policy and regulatory system: 1) Fertilizer Policy; 2) Fertilizer Law and Regulations; 3) Fertilizer Import, Export, Production and Distribution. The study is organized as follows: the next section provides a brief overview of the structure of Tanzania's fertilizer market. Section 4 describes the policy and regulatory framework for the fertilizer sub-sector in Tanzania and includes a description of the the institutional environment for the enforcement of regulations. Section 5 describes the factors affecting fertilizer regulation and legislation in Tanzania. Section 6 presents the conclusions and recommendations

Section 3: Structure of the Tanzania's fertilizer market

Tanzania's Fertilizer Market

Rules and regulations for importation including fertilizer in transit are as stipulated under the Fertilizer Act, 2009 and associated rules and regulations. As reported by Benson et al (2012), overall, the business of fertilizer importation in Tanzania is competitive. However, there is considerable risk of monopolistic conditions' emerging in fertilizer supply to Tanzania. For example, Benson et al (2012) report that several of Yara's competitors expressed concern that Yara could soon assert a monopoly position for fertilizer supply to the country. In addition to being part of an international corporation with considerable assets and financial resources, Yara also was seen by some to be receiving preferential treatment by the government of Tanzania. The company intends to invest US\$20 million in a product-handling facility just outside of the port of Dar es Salaam that will reduce port congestion by moving fertilizer-bagging operations out of the port. Yara received considerable assistance from the government in obtaining a long-term lease on land for this facility—land that its competitors said the government would never have assisted them to obtain if they had proposed similar plans. Moreover, to a greater degree than its competitors, Yara is also active in international development initiatives in Tanzania that should enable it to grow its business substantially.

Yara does not have its own distribution network up-country—its business model in Tanzania is solely importation, with some attention to product development for the national market—the *Chapa Meli brand of fertilizers*. In an interview, the Yara manager stated that the firm intends to supply the Tanzania market from Dar es Salaam with both high-analysis fertilizers (which wholesalers may market under their own labels) and its blended branded fertilizers. As such, it does not compete at the wholesale level up-country. However, if the firm is successful in the coming years in its efforts to further dominate the supply of fertilizer into Tanzania, and if Export Trading and Premium Agro-chem decide in consequence to no longer import fertilizers for the smallholder farming sector, all of the wholesalers serving such farmers will be dependent on Yara for their supplies¹

¹ Most of this paragraph draws from Benson et al (2012)

Most fertilizer are imported in bulk and bagged on the quay or shipside at Dar es Salaam port by private companies (AfricaFertilizer.org, 2015). Most of the companies have their warehouses in the city. Fertilizer is transported to the regions or market centres in bags by road.

Port handling charges and discharge rate: Port inefficiencies such as low port discharge rate of 1500 tons/day increase the costs for importers. In addition, Dar es Salaam port has a limitation on the size of ship that can dock there. Bigger ships are more economical in terms of freight charges. Moreover, speed of off-loading also affects freight charges. Cargo removal by wagon is much faster than removal by trucks. Slow removal by use of trucks results into importers paying demurrage charges because of prolonged holding of cargo at the port.

Limited use of railways: Fertilizer products from the port are shipped through road transport; railways are used for minimal quantity. Although TAZARA can be an efficient means of transportation but inefficient management and slow movement of goods prevent the use of this source for moving fertilizers to Southern Highlands. TAZARA's management and efficiency should be improved and covered railway wagons should be added to move fertilizers. Bulk discharge and movement through railway can lead to significant cost savings

Wholesaling As reported by Benson et al (2012) most of the 10 members of the Fertilizer Society of Tanzania primarily engage in the wholesale distribution of fertilizer up-country as their core business- Yara being the principal exception to this business model. Many of the firms, including those that claim to specialize in fertilizer, integrate their fertilizer marketing with agricultural output trade: Firms with Lorries /trucks ship fertilizer up-country and bring back agricultural commodities. Most of the firms have wholesale depots in the principal farming areas of the country—primarily in the Southern Highlands, but some also have depots elsewhere, notably Kilimanjaro. Fertilizer is stocked in these depots for sale to retailers before planting. However, after harvest, the depots are then used for bulking of stocks of commodities for shipment to Dar es Salaam and elsewhere.

Although the depots are used for retail sales direct to farmers, a common pattern is for wholesalers to promote and maintain networks of private retail dealers from the farming area served by each of their depots. The firm would have established a good commercial working relationship with these dealers, so it would offer fertilizer to them on credit terms—generally expecting full payment

within 30 or 90 days of delivery, depending on the firm involved and the strength of the relationship with the retailer. For example, Premium Agro-chem reported that it has four depots in the Southern Highlands, each with 50 to 100 stockists to whom it regularly supplies fertilizer. This model is seen with several of the other wholesalers (Benson et al 2012).

Transport costs up-country are high but competitive. Not all of the fertilizer wholesalers have their own transport fleets as there is considerable competition in the road transport sector in Tanzania. In general transport of fertilizer from Dar es Salaam to the main wholesale centers in the Southern Highlands will cost US\$30 to US\$50 per mt. A closer assessment of transport costs was done in 2007 estimated truck transport costs at US\$0.12 per mt per kilometre (km), whereas rail transport costs about half that at around US\$0.05 per mt per km (Marine Logistics 2007). However, the inflexibility in place of delivery and the opportunity costs associated with delays in the operations of the rail networks in Tanzania are such that most fertilizer is delivered by road.

Retailers (Traders) Over 3,000 retailers participate in fertilizer trading in Tanzania with a wide variation in the level of participation across Tanzania. Larger numbers of fertilizer traders are found in districts with high agricultural potential where there are likely to be clear positive returns to the use of commercial agricultural inputs. While very few fertilizer retailers operate in drier regions of central and coastal Tanzania and in the more remote areas of western Tanzania. One of the more significant developments in private-sector fertilizer supply in Tanzania in the past several years has been the strengthening of the capacity for agro dealers through funding from the Alliance for a Green Revolution in Africa and the World Bank. A number of agrodealers have been trained and assisted to gain access to inventory credit. Training has been offered on business management, product knowledge, output marketing, and corporate governance. CNFA's Tanzania Agrodealer Strengthening Program reports that more than 2,600 agrodealers have been certified under the CNFA/TAGMARK training scheme. Such agrodealers are then permitted to offer inputs to voucher recipients under the NAIVS voucher program.

The Farm Inputs Subsidy Programme

In order to improve productivity through the adoption of productivity enhancing technologies among smallholder farmers in Tanzania, the Government of Tanzania (GoT) introduced the National Agricultural Inputs Voucher Scheme (NAIVS) in 2008. The program was designed to

cover 65 districts and 2.5 million farmers in high potential areas over a six-year period. In 2007, the program was piloted in two districts; in 2008, it was scaled up to cover 53 districts targeting 700,000 beneficiaries. In 2009/10, the program covered 74 districts and over 2 million farmers and in 2010/2011 it covered 87 districts with 1.8 million beneficiaries. The vouchers provide a subsidy for the purchase of urea and DAP in amounts sufficient for application to one acre of maize or rice. Farmer beneficiaries receive vouchers for up to three years, after which they graduate from the program. Farmers present the voucher to participating agro-dealers and pay the difference between the face value of the voucher and the market price before taking ownership of the fertilizer. The agro-dealer redeems the voucher by depositing it in the National Microfinance Bank (NMB) which was contracted by the Government to manage voucher redemptions. For handling charges the NMB charged 4%. The NMB makes payments to agro-dealers in an amount equal to the face value of the vouchers. NMB transfers the money into the agro-dealer's account using the funds that have been transferred from the Ministry of Agriculture (MoA) to an account that is designated for redeeming vouchers. NMB verifies the authenticity of the voucher, records the transaction and informs the MoA of the completion of the transaction. The program was budgeted at USD 299 million over three years, of which USD 139 million was covered by the Government of Tanzania and the rest financed by the World Bank.

Through the NAIVS the GoT also intends to strengthen the growing private fertilizer market in Tanzania. In order to participate in the subsidy program agrodealers have to undergo business and technical training from government appointed service providers. Over 3,000 agrodealers received training during the course of the subsidy program. The importation and distribution of the subsidized fertilizer is done by the private sector in response to GoT communication on the quantity and value of the input vouchers to be distributed. The GoT informs importers of the expected demand at the district level for fertilizer under the NAIVS program for the following season so that importers can procure the stocks required and position them at appropriate distribution points along the supply chain in a timely manner.

The amount of fertilizer consumed in Tanzania before the NAIVS was 119,291 mt in 2005/2006. The NAIVS commenced in 2008/2009 and in 2012/2013 fertilizer consumption had increased to 210,876 mt. Maize productivity has increased from an average of 0.7 tons/ha before the NAIVS to 2 tons/ha after the NAIVS. Similarly, average yields of rice increased from 1 ton/ha before the

NAIVs to about 4 tons/ha after the program was introduced. Tanzania was a net importer of rice and maize up to 2007/2008 but is now a net exporter of both crops. The challenge now is to find markets for the surplus production

While preliminary observations suggest that the overall downward trend in total fertilizer imports and consumption in Tanzania has been reversed in the last two years due to the government's subsidy program, there is mixed evidence about the general performance (efficiency, effectiveness) and impact of the program. Furthermore, although the implementation of the NAIVS is an indicator of Governments commitment to supporting Tanzania's Agriculture sector and is consistent with the objective of Kilimo Kwanza, there is concern that any future Government policy decision to refine, extend or abolish the fertilizer voucher scheme in Tanzania would be undertaken without sufficient knowledge of the social and economic impacts of the scheme. As a result there is potentially scope for Government to revise the implementation of the voucher scheme but with an adverse economic impact on smallholder farmer household incomes, input and output prices, the private sector participation and trade.

Moreover, studies on the performance of NAIVS have revealed mixed findings regarding the impact of NAIVS on agricultural production, household nutrition and household welfare. Padian et al (2014) report that the analysis of the impacts of the subsidy programme on agricultural input use, productivity, and profitability in Arusha indicate the tension between efficiency and equity. In villages where the local village committees chose beneficiaries, farmers who were most able to benefit from the programme appear to have been targeted more efficiently than in other villages in which beneficiaries were randomly chosen, resulting in higher use of inputs and in some cases yields among households in these villages. Findings also suggest that in villages where farmers were randomly selected to receive the voucher, selling or sharing of vouchers between beneficiaries and non-beneficiaries was more common, thus highlighting spillover effects of the programme. Consistent with this notion, Pan and Christiansen (2012), in their analysis of the performance of the subsidy program in Tanzania report elements of elite capture in the voucher system where members of the local elite have a higher likelihood of being voucher beneficiaries, partly through their disproportionate membership in the village voucher committee, instituted to propose the voucher allocation list within each village. The Village voucher committee (VVC) members and the elected village officials together were eligible for about 60% of the

distributed vouchers. While this ought not to be a problem as such, this “ pre-allocation ” of vouchers to the local elite had a strong negative effect on the targeting performance.

Section 4: Tanzania's Fertilizer Policy and Regulations

Fertilizer Policy

Evolution of the Fertilizer Policy Environment in Tanzania

The current Fertilizers Act of 2009 was enacted to regulate the importation, distribution, storage, and marketing of fertilizer in Tanzania. The broad thrust of the act is to ensure that the fertilizers that farmers in Tanzania obtain for use are of the quality advertised. The 2009 act replaced the much more succinct but broad Fertilizers and Animal Foodstuffs Act of 1962. This Act principal focus is on the industrially produced fertilizers, which are primarily inorganic Benson et al (2012).

The 2009 Act establishes a framework for a comprehensive set of regulations to govern how fertilizers are to be made available to Tanzanian farmers. These regulations are to be developed by the Ministry of Agriculture to define how the act is to be implemented in practice. Benson et al (2012) also reports that although draft regulations have been developed, they still have not been approved by the Minister of Agriculture. In consequence, many of the details of the regulatory regime are not yet in place—notably, the establishment of the Tanzania Fertilizer Regulatory Authority (TFRA). The act contains provisions for the issuing of permits for exporting and importing fertilizers.

However, Tanzania does not have a stand-alone policy specifically focusing on fertilizer. Policy statements on fertilizer issues are contained in the National Agricultural Policy produced in 2013 (NAP, 2013) where agricultural inputs are covered. Therefore there is a need to put efforts towards developing a stand-alone fertilizer policy for Tanzania.

Current Fertilizer Policy

Tanzania does not have a Fertilizer policy specifically focusing on fertilizer however there are policy statements on fertilizer issues in the National Agricultural Policy produced in 2013 (NAP, 2013). In this policy statement Tanzania acknowledges that increased use of productivity

enhancing technologies such fertilizers, agrochemicals, seeds and farm machinery is a pre-requisite for achieving sufficient agricultural production and growth to meet economic development, poverty reduction and food security and nutrition goals. The policy statements in the NAP, 2013 which focus on fertilizer among other inputs are as follows:

- i) The Government shall enforce laws and legislation to safeguard farmers from the supply of substandard inputs;
- ii) Input production, procurement and distribution shall be strengthened;
- iii) Private sector participation in multiplication of pre-basic and basic seed shall be promoted;
- iv) Domestic production, multiplication and distribution of agricultural inputs shall be promoted to involve both public and private sectors;
- v) Farmers shall be supported to access modern inputs; and
- vi) Agro-chemical and fertilizer manufacturing industry shall be developed.

The fertilizer policy statements identifies the role of the government in fertilizer importation, trade, production and distribution as providing an enabling environment for performance of the sector and encourages private sector participation in the input supply chain. The private sector is currently the dominant player in all aspects of importation, trade, production and distribution of fertilizers in Tanzania. It accounts between 50 to 60 percent of the fertilizer demand in Tanzania as such it should a leading role in capacity building of farmers and agrodealers.

The Government of Tanzania is also implementing a National Fertilizer Strategy with the vision of improving agricultural productivity so as to enhance economic growth, reduce rural poverty, and improve food security. The strategy has specific objectives that include:

1. Increasing agricultural productivity and national food security through increased and efficient use of fertilizers, both mineral and organic, by Tanzanian farmers,
2. Encouraging the development of national fertilizer procurement to achieve economies of scale that will lower the cost of fertilizers,
3. Lowering transaction and transportation costs of fertilizer within the country by removing non-tariff fiscal and bureaucratic constraints to fertilizer trade,

4. Assisting in the Development of a national fertilizer Management Information System (MIS) incorporated into a planned National Agricultural Sector to support national procurement and policy development, and
5. Assisting in harmonizing national fertilizer regulations to lower transaction costs and increase intra-regional trade in fertilizers.

The National Fertilizer Strategy is designed to assist improve accessibility and affordability of fertilizer, promote procurement and promote the development of value chains of agricultural produce.

The government is also promoting the efficacy of subsidies through improved private sector participation, capacity building and soil mapping. Under this initiative, the Government has taken a number of measures, these include: assigning the private sector the role of importing, transportation and selling of fertilizers as opposed to Government doing the business; developing an extensive agro-dealer network which aims at making fertilizer shops in each village; introduction of the fertilizer subsidy to smallholder farmers amounting to about 50% of the fertilizer market price. The government is also putting an emphasis on issues related to integrated soil fertility and integrated nutrient management plans so that fertilizers are properly used.

Scope for Bio-fertilizer policy

Tanzania does not have a policy and law governing the production, distribution and use of bio-fertilizers. Furthermore it does not have policy statement provisions for handling, storage, minimum required quantities of active ingredients, directions for use and packaging of bio-fertilizers. This is exacerbated by the fact that it also does not have accredited microbiological laboratories for testing bio-fertilizer products. These observations underscore the need to develop and enforce a conducive policy and regulatory framework for bio fertilizers in Tanzania.

As reported by Simiyu et al. (2013) key policy characteristics for the bio fertilizer policy environment in most of the Eastern African countries including Tanzania are as follows (i) Inadequate policies and guidelines for regulation of bio-fertilizers and bio-pesticides (ii) Multiple and often overlapping regulatory mandates by government agencies (iii) Limited capacity including staff, skills, and laboratory for product monitoring (iv) Inadequate enforcement of quality control for bio-fertilizers and bio-pesticides (v) Lack of bio-fertilizer and bio-pesticide

specific regulations, standards and guidelines (vi) Weak institutional arrangements with limited collaboration between relevant agencies.

However, a number of efforts are being made to improve the policy and regulatory environment for bio-fertilizers in Tanzania. In 2014, TFRA spearheaded a process of developing and the launching of national registration guidelines which stipulate the process involved in registering, distributing and monitoring of bio-fertilizer products. They also started spelling out enforcement mechanisms for bio-fertilizer regulations including stiff penalties in case of non-compliance and the roles played by different enforcement agencies. This process is expected to help establish quality requirements of bio-fertilizer products that are allowable in the Tanzanian market.

Fertilizer Law

Tanzania has a Fertilizer law which was enacted in 2009. The Fertilizers Act of 2009 provides a frame work of governing the importation, distribution, storage, and marketing of fertilizer in Tanzania. The broad thrust of the act is to ensure truth in labeling. The 2009 Act replaced the much more broader Fertilizers and Animal Foodstuffs Act of 1962. Although the Act applies to all fertilizers, in its details it focuses on industrially produced fertilizers, which are primarily inorganic (Benson *et al*, 2012).

The 2009 act establishes a framework for a comprehensive set of regulations to govern how fertilizers are to be made available to Tanzanian farmers. In 2011, fertilizer regulations were developed to help with the implementation of the Act. One consequence of the fertilizer regulations is the formation of the Tanzania Fertilizer Regulatory Authority (TFRA) which became operational in 2012. However, TFRA is facing challenges that limit its ability to discharge its responsibilities fully. For example, TFRA has no laboratory of its own for testing quality of fertilizer nor offices to accommodate its staff.

The principal elements of the 2009 act are that all fertilizers manufactured, imported, or sold in Tanzania must be registered, packed, and labeled in accordance with the act. All dealers in fertilizers must be registered, with a minimum level of knowledge concerning the management and use of their products. Moreover, all premises used for activities related to fertilizers also must be registered. Importation of fertilizers into Tanzania, as well as exports of fertilizer from the country, requires a permit. Such permits are given only to registered fertilizer dealers who seek to

trade in registered products. Agricultural inspectors² are to be put in place to enforce these regulations to ensure that the quality of the fertilizer is as stated on the label and that this quality is maintained along the marketing chain. There are only few inspectors in place currently to adequately enforce the regulations, and this is one shortcoming that will require addressing. Moreover, the plan is to train two part- time inspectors are to be trained from the staff of the District Councils in each of the more than 125 districts in Tanzania in addition to those under the TFRA.

Enforcement of fertilizer regulations

Tanzania has draft fertilizer Regulations, of 2011. According to the draft Regulations no fertilizer or fertilizer supplement shall be used in Tanzania unless it has been sampled, tested, analyzed, evaluated and recommended for use. All imports have to conform to these standards and this is enforced by the TFRA in accordance with the provisions of the Fertilizer Act, 2009. Some of the regulatory problem areas are: registration process of new fertilizers and multiple institutions and fees involved with fertilizer regulatory services. Some of the institutions involved in fertilizer regulations, especially the clearing of fertilizer imports are: Tanzania Bureau of Standards, Radiation Commission, Chief Chemist, Weight and Measure Agency and SUMATRA and the Tanzania Fertilizer Regulatory Agency (TFRA). There is need to provide for one stop centre for dealing with fertilizer regulations and also to address gaps in the current law to facilitate timely fertilizer registration and release. As it stands, Fertilizer Act provides for 3 years of testing before registration. Many investors want the time to be shortened.

The Fertilizer Regulations specify that fertilizer shall be packed in ultra violet stabilized woven polypropylene (wpp) bags with polyethylene (pe) inner lining. The bag shall be secured in lock stitches. The stitching thread must be acid and heat resistant and of sufficient strength to hold the package secure and withstand multiple stages of handling. The bags shall be packed in weights of kg, 10kg, 25kg and 50kg. In practice most importers import fertilizer in 50 kg bags and little repackaging into small packages is done. Although TFRA and the Government at large encourage

² This review did not establish the number of fertilizer inspectors in Tanzania but several reports suggest that they are inadequate

importers to pack in smaller sizes to assist small farmers opening bags increase the risk of fertilizer adulteration.

In regard to labelling the regulations specify that the information on the label or outside of a package of fertilizer or fertilizer supplements shall be conspicuously, legibly and indelibly written or printed in both English and Swahili, and shall appear on one exposed face of the package or label and shall be of a size and colour that can be easily read and that every package of fertilizer shall be labelled with the following information –

- (a) name of the fertilizer
- (b) name and address of the manufacturer/packer and importer/distributor
- (c) nutrient content
- (d) net content by mass in kilogram
- (e) country of origin
- (f) handling instructions-including the words “Use No Hooks”
- (g) batch number
- (h) production date and expiry date.

TFRA acts the central regulatory and enforcement authority. This agency is responsible for the bulk of regulatory work including registration of all dealers, management of importation and exportation of fertilizers including issuance of permits, quality control enforcing and regulating all matters relating to quality of fertilizers, fertilizer supplements and sterilizing plants and registration process of new and approved ones. Pursuant to the Act and its accompanying Fertilizer Regulations no fertilizer or fertilizer supplement shall be used in Tanzania unless it has been sampled, tested, analysed, evaluated and recommended for use. All imports have to conform to these standards and this is enforced by the TFRA in accordance with the provisions of the Fertilizer Act, 2009. TFRA performs surprise random checks, sampling and other controls periodically along the fertilizer supply channel. TFRA has the jurisdictional powers of revoking licences for non-conformity with the provisions of the Act.

Registration: Rules and regulations involving registration of business, licensing and validity of license are covered under general trade act under the Ministry of Trade and Industry. Any local production has to undergo the same licensing procedures under the Ministries of Trade and

Industries and that of Labour and Employment. The TRFA is responsible for the issuance of business licences. For one to be a fertilizer distributor they have to obtain a business license from TFRA as a fertilizer dealer and that they have to also obtain a trading license from local authorities for business premises. These licenses are valid for a year and have to be therefore, renewed annually. The Licensing process with the TFRA and local authorities takes up to a maximum period of two months. For one to register as a distributor they need to also have reliable storage facilities.

Rules and regulations Governing Fertilizer Imports, Exports, Production and Distribution

Fertilizer Imports

Fertilizer Act of 2009, together with the fertilizer regulations of 2011 sets out the rules that must be fulfilled to import fertilizers into Tanzania. It requires that all importers must be registered and must possess a minimum level of knowledge concerning the management and use of the product in which they deal. Such permits are given only to registered fertilizer dealers who seek to trade in registered products. The Agricultural Input Section of the Ministry of Agriculture Food Security and Cooperatives (MAFC) is responsible for issuing the import permits.

As mentioned in earlier sections, a major concern relating to fertilizer importation is the multiplicity of organizations and fees involved in approval and clearing fertilizer imports. This mean a dealer pays more money and transactions take far long to complete because of the need to visit many offices to get the clearance. Therefore, one area regarding fertilizer importation that need to be streamlined is for the government to harmonize various laws governing clearing of fertilizer and make TFRA a one stop centre or a sole body handling fertilizer legislative issues.

Fertilizer Production

Part 1V of The Fertilizer Act, 2009 covers the provisions of manufacturing, importation and trading in fertilizer or fertilizer supplements. There are no rules and regulations governing the production and blending of fertilizers. Despite this, Tanzanian government has been promoting

private sector investment in the production of fertilizer. To date, Tanzania produces Minjingu fertilizer from rock phosphates in quantities of about 60,000 MT per annum. Increasingly they also have made attempts to do some blending albeit at very small scale. The discovery of natural gas in southern Tanzania (around Lindi and Mtwara) have boosted national plans to promote fertilizer production in the country

Fertilizer Distribution

The distribution of fertilizers in Tanzania is also governed by the fertilizer Act (2009). Similar to fertilizer imports and exports, a person cannot distribute any fertilizer or fertilizer supplements unless he is registered pursuant to the fertilizer Act and conform to the standards prescribed in the regulations. The distribution of adulterated fertilizers is prohibited by law.

Fertilizer Exports

The compliance steps required to export fertilizer are similarly covered under regulations of the Fertilizer Act, 2009. There are no export quotas. Taxes, fees and levies charged for fertilizer export at the border are:

- (i) Clearing and forwarding costs of US \$2.7 per MT
- (ii) Road toll varies with border crossing, the highest rate as per record is at the Tunduma/Nakonde, Tanzania/Zambia Border US\$240 per motor vehicle/truck
- (iii) Insurance for non-COMESA members varies from US\$ 35.7 to US\$ 60.
- (iv) Other local charges (reference at Kabanga and Tunduma) are:
 - (a) Road permits at the borders charged between US\$47.6 to 107 per truck or vehicle
 - (b) Levies: (i) Council US\$18 per truck/vehicle, (ii) Carbon US\$38.7

Section 5: Factors Affecting Fertilizer regulations in Tanzania

Lack of a Fertilizer Policy

Tanzania does not have a policy specifically focusing on fertilizer. Nonetheless Policy statements on fertilizer issues are contained in the National Agricultural Policy produced in 2013 (NAP, 2013) where agricultural inputs are covered. The scope of National Agricultural Policy, 2013 is limited only to encouraging and promoting increased fertilizer use by farmers as well as private sector participation in fertilizer production, supply and distribution. Although the policy statement mention increased use of productivity enhancing technologies such as fertilizers, agrochemicals, seeds and farm machinery as a pre-requisite for achieving sufficient agricultural production and growth to meet economic development, there is silence on a number of crucial issues related to the governance and roles to be played by the different actors in the fertilizer sector. Therefore, there is a need for a standalone fertilizer policy that provide and holistic policy guidelines for the sector. The revised fertilizer policy should clarify that government's role be limited to facilitating the delivery by private firms to the farmers of the fertilizer that they can best use. In the absence of a fertilizer policy, the opportunities for local production of fertilizer have not been fully exploited. A policy on bio-fertilizer is also needed to facilitate regulation of bio-fertilizers in the country. Furthermore, the revised policy should emphasize the need to strengthen the agricultural extension services concerning fertilizers, strengthening of crop output markets, the need to improve access to agricultural finance, particularly for fertilizers.

Fertilizer Act

Tanzania has a Fertilizer Act that was inaugurated in 2009. This was followed by the fertilizer regulations of 2011 and the establishment of the Tanzania Fertilizer Regulatory Authority (TFRA) in 2012. However, with six years already elapsed, amendment to the Act are needed so as to address emerging problem areas. For example, amendments are required to enhance the power of the fertilizer inspectors with regard to disposal of substandard fertilizers. Moreover, there are concerns of significant indirect costs associated with the enforcement of the proposed regulations for the importation and marketing of fertilizer. The procedures are alleged to strenuous and that they impose costs for fertilizer importers or traders' costs that will be transmitted into the retail price of the fertilizer. The benefits in terms of public health and safety from incurring such

regulatory costs on the importation, distribution, and sale of a standardized global product like high-analysis inorganic fertilizers are likely to be small. The regulations should be applied judiciously and lightly, so that farmers benefit from lower prices benefits that are likely to exceed the value of any benefits from close and strict regulation of fertilizer in Tanzania. Moreover there are concerns that the regulatory system in Tanzania for fertilizers that are standardized global commodities as designed is excessive. Policy reform in Tanzania needs to consider reducing the regulatory burden faced by importers and dealers of these fertilizers. In addition, increasing the penalties (fine and jail terms) to persons convicted for contravening the Act. At the present, some of the penalties that are prescribed are not providing the adequate deterrence to offenders.

Proliferation of national institutions regulating fertilizer

One policy bottleneck facing the fertilizer traders is the multiplicity of institutions that are involved during the clearing of fertilizer imports. This has implication on fees charged and the time taken to complete the clearing process. During clearing process, importers are required to go through the following regulatory institutions:

- (I) Tanzania fertilizer regulatory authority (tfra)
- (ii) Tanzania bureau of standard (tbs)
- (iii) Radiation rCommission
- (iv) chief chemists
- (v) Weight & Measure Agency
- (vi) SUMATRA

Once the importer clears with the above institutions, the imported can lodge with Tanzania Revenue Authority and the Port Authority. Apart from TRA, Port Authority and SUMATRA, all other regulatory requirements overlap with TRA mandates. Government should harmonize various laws governing clearing of fertilizer and make TFRA a one stop centre or a sole body handling fertilizer legislative issues.

Limited capacity to enforce regulations

- i. The enforcement of regulations and capacity for enforcement is generally weak for a number of reasons. First there are overlapping mandates with other institutions which means that the TFRA has to work with the other agencies like the Tanzania Bureau of Standards (TBS), the National Atomic Radiation Commission, Tropical Pesticides Research Institute (TPRI), the Tanzania Revenue Authority (TRA), Weights and Measures, various laboratories, etc. before issuing import permits. This delays work due to the lack of one stop shopping centre.
- ii. Moreover, there is inadequate capacity to enforce the law which promotes adulteration at retail level when the product is sold from open bags. Moreover, the enforcement authority lacks capital and is understaffed with only three staff, the director, assistant and one officer. This constrained organizational structure clearly impacts on its ability to perform at required level and pace in regard to the various approvals the authority has to deal with. Capacity for enforcement should be strengthened, with a focus on regular checking at the retail level.

In adequate facilities for testing and analysis of fertilizer

- i. There are 4 (four) testing laboratories in the country which are in good working condition and these are at the Sokoine University of Agriculture (SUA) at Morogoro, the Tanzania Bureau of Standards, the Mlingano Agricultural Research Institute at Mlingano in Muheza, Tanga Region and the Government Chemist in Dar es Salaam. While these units are said to be doing a good job of testing, they are first and foremost soil and not fertilizer laboratories. Secondly they are distances apart and in different parts of the country hence if they all had to be involved in testing a particular item the exercise could easily take a long time.

Section 6: Conclusion and Recommendations

Conclusions

Tanzania faces a number of policy and regulatory constraints in the fertilizer sector that affect the demand and supply of fertilizer. The review revealed that Tanzania still falls short of the Abuja Declaration on Fertilizers for the Africa Green Revolution that recommended that African countries increase fertilizer usage from an average rate of 8.0 to 50.0 of nutrients per hectare by 2015. There are gaps in the fertilizer policy, as well as in the capacity for the enforcement of the legal and regulatory framework.

Tanzania has a Fertilizer Act that was enacted in 2009. In addition, it has fertilizer regulations that were enacted in 2011. However, it doesn't have a standalone fertilizer policy. In view of the fact that six years have elapsed since the enactment of the fertilizer Act, and because of the emerging new challenges such as fertilizer legislation, quality and the multiple institutions that govern the sector, there is need to amend the Act. Moreover, there is a need to develop a fertilizer standalone policy. The lack of a coherent fertilizer policy also affects the operations of government, the private sector, and other stakeholders in the fertilizer sector. In the absence of a fertilizer policy, different actors in the sector sometimes play uncoordinated and conflicting roles that eventually affect the performance of the fertilizer industry.

Private sector participation in fertilizer business is reasonably high, with seventeen private companies active in the sector according to the Fertilizer Society of Tanzania (FST). However, to enhance the competitiveness of the sector and encourage entry of more private sector participants, there is a need to improve the policy, regulatory and administrative practices around fertilizer agribusiness. Some of the bottlenecks include the multiplicity of institutions that are involved in approval of fertilizer imports, fertilizer registration, unpredictable tax policy and fake fertilizers. This should be addressed by enactment of new policies and laws to address these bottlenecks, or through amendments to the existing fertilizer Act.

The capacity for enforcing the laws and regulations is weak and the multiple regulatory institutions lack coordination in the regulation of fertilizers. The laboratories where fertilizer quality tests can be conducted to check if they meet specific quality requirements are inadequate and human capacity to manage those laboratories and utilise them effectively by conducting fertilizer quality

test is weak. Moreover the number of fertilizer inspectors is low and hence they are unable to conducted fertilizer inspections at points of sale.

Recommendations

Requirements for a Strong National Fertilizer Regulatory System

Below are six points that should be considered in strengthening fertilizer regulatory system in Tanzania.

1. Establish Offices and Laboratory. TFRA has acquired land for the purpose of constructing offices and laboratory. Soliciting funds for infrastructural development to house their staff and carry out testing and analytical results of products /fertilizers in the country
2. Capacity Building for Inspectors and Law Enforcers at district and national levels. To enable effective enforcement, regular training of inspectors and other law enforcers including legal officers in the districts have to be institute.
3. Review of the Fertilizer Act 2009 and its Regulations. The Fertilizer Act has almost seven years old. Stakeholders have registered several complains with the current law including having provisions that hinder timely registration and release of fertilizers (new products) in the country
4. Hold Extensive Media Campaigns. As part of awareness creation to stakeholders and enforcement exercise, regular media campaigns (Radio, Television, Newspapers and other written prints) are vital
5. Establish Stakeholders Forum. To allow for stakeholders to fully engage in the fertilizer business, establishment of stakeholders' forum like those in other regulated products such as seed industry is necessary
6. Support Facilities for Online Web Application (e-Portal). The ongoing project on installation of e-portal to improve ICT infrastructure in general is crucial; this intends to optimize TFRA's efficiency and provide a link to traders and other relevant stakeholders to apply for various licenses and permits from a single platform. We need computers to enable networking with inspectors in the districts.

Recommendations for an enabling National Fertilizer Policy and Regulatory Environment

Tanzania has a fertilizer Act and regulations that serve to provide for enabling policy environment. However, the Act and regulations need to be reviewed to address emerging problems such as timely registration and release of new fertilizers in Tanzania. Moreover, a standalone fertilizer policy needs to be developed.

Overall however, there is a gap between existing laws and regulations and their implementations. Sealing this gap is essential, so that there is more strident enforcement of existing laws and regulations. These will involve institution reforms of TFRA to give it more human and financial capacity to fulfil its mandate.

Fertilizer recommendations and extension support

The key policy concern about fertilizer use in Tanzania has been the fact that the country continues to use fertilizer recommendations that were developed in the 1990s and that are probably outdated. The Government of Tanzania came up with crop specific fertilizer application recommendations that are based on agro-ecological zones in 1993. It was expected that such information would be disseminated to the farmers through the government extension system at the ministry of agriculture; however, there are some constraints related to such recommendations as well as their dissemination to farmers.

First, the recommendations are based on experiments conducted in the 1990's, hence may be inaccurate and therefore, the need to be verified and updated. This would improve the accuracy/appropriateness of, and delivery of integrated soil health technology recommendations to smallholder farmers. Second, the recommendation are mainly based on Urea and DAP and this may be resulting in the current over-reliance on the use of DAP and Urea fertilizer which may in turn be limiting the yield and economic returns to fertilizer use. Third, the recommendations do not take into account the past management practices on each piece of land where fertilizer has to be applied. For example, where nutrients have not been applied in any form for some time but cultivation has continually been practiced, recommendation rates may have to be revised upwards, up to replenishment levels in some cases (Sanchez et al, 1997). There is need for additional fertilizer trials and soil testing to develop soil- and crop specific recommendations.

Capacity building for farmers

The information for fertilizer recommendation was meant to be disseminated to farmers through government extension agents. However, following the collapse of the government extension system during the structural adjustment period of the 1980's, (due to reducing funding for extension) most farmers do not have access to information on fertilizer recommendations. Kilimo Kwanza and the Ministry of agriculture's strategic plan have common objective of improving extension service delivery to farmers to help ensure that appropriate fertilizers and ISFM are used in Tanzania. Nonetheless, to achieve this policy objective government needs to allocate more funding to the delivery of fertilizer recommendations through the formal government extension service.

Soil testing and Technology transfer support

There is inadequate facility and resources for soil testing. Extension coverage is weak and smallholder farmers lack full knowledge about proper seed and fertilizer use. The knowledge constraint prevents the growth on fertilizer demand. Additional training is needed for both extension workers (*bwana shamba*) and agro-dealers

Introduction of new fertilizer product

It requires three year testing and approval by the MAFC. This creates delays in the introduction of new products and innovations. There is need for the MAFC to check the MSD (material specification data) sheet about nutrient contents and do a lab analysis if needed. For any additional claims, say slow release, by the manufacturer, the company should provide verifiable test results which could be tested in the lab.

Registration of new products

Registering a new product/fertilizer is seen as a major bottleneck by industry players. The Fertilizer Act provides for three years of testing before a new product is registered. Many investors would like the time to be shortened

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