

## **Reducing Fertilizer Cost Build-up in Tanzania: Policy options for increasing smallholder farmers' access**

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### **Abstract**

Fertilizer price cost build up in Tanzania limits 96.5% of the smallholder farmers access to fertilizer that deter agricultural productivity and the goal for attaining food security. The objective of the paper was to examine strategies for addressing fertilizer price build up in Tanzania that would increase fertilizer use and create demand by smallholder farmers. We use secondary data from the reviewed literature on factors for price build up in Tanzania. The study adopts the supply chain analysis from the source of origin, importation, shipping costs, port service charges, quantity procured, methods of procurement, blending and packaging, as well as means of transportation used. The key determinants in the chain include the Cost, Insurance and Freight (CIF), port charges, port handling costs, bagging, storage fees and means of transportation. The most two significant drivers for the fertilizer price build up is the procurement method and means of transportation that seem to significantly increase farm gate prices. It has been established that price build up is a function of quantity imported due to economies of scale; that is to say importing small quantities pushes buyers to pay high prices for the product and shipping expenses. The infrastructural factors for fertilizer price build up are associated with the mode of transportation as either road haulage or railways use. It has been established that transporting bulky fertilizers to various destinations by road is more expensive when relatively compared with railway transportation. The paper, therefore recommends for policy change that emphasize bulky fertilizer transportation by railways and monitor its implementation.

**Key words: Strategies, policy options, fertilizer price build-up, increasing fertilizer use.**

### **Introduction**

The Ministry of Agriculture Food Security and Cooperatives (MAFC) commissioned a research on strategies for reducing fertilizer cost buildup to enhance demand and increase fertilizer use by smallholder farmers under AGRA supported project: "Promoting Enabling Soil Health Policy Environment in Tanzania". Previous studies (Bumb, 2009; IFDC, 2012; Thapa, 2012) examined the cost distribution of fertilizer and found that about 35% of the fertilizer price is a result of transaction costs incurred from the port of entry along the supply chain through to the final consumer. Such high costs arise from inefficiencies in handling including port bagging, stitching, loading and off-loading at various transit points. Other studies (Match Maker Associates, 2007; Benson, *et al.*, 2012) determined factors such as offloading delay at Dar es Salaam port hampered by poor port facilities and the charges paid by importers and found that they bring about additional costs that are ultimately shifted to farmers. Others argue that road transportation which is mainly used to transport fertilizers from Dar es Salaam to up country regions costs more than railway/sea transportation which were the main means in the past. Furthermore, inadequate fertilizer distribution points in the villages force farmers to travel to district headquarters to buy fertilizers resulting to overhead costs to farmers. Also in the list of drivers of fertilizer price build up, are high rates of inspection fees, making fertilizer prices in the country unaffordable by smallholder farmers.

Based on existing research evidence on best practice from Africa and the rest of the World in dealing with fertilizer cost build-up, we develop strategies for reducing price build up in Tanzania and advocate for

measures to reduce fertilizer costs for increasing smallholder farmer access and use of fertilizer to increase productivity and food security.

The agricultural sector plays a crucial role in economic growth in Africa in general and Tanzania in particular. Among other things, it provides a relatively large share of Gross Domestic Product (GDP) and employs an average of 65% of Africa's labour force.<sup>1</sup> The sector is the main source of food and industrial raw materials for all agro-based production. It is also a market for producers of goods and services needed in the production process in the sector. Agriculture is also a source of foreign currency through exports of agro-products. It also plays key roles in both backward and forward inter-sectoral linkages.

Despite the important role that the agriculture plays, agricultural productivity is still low due to soil fertility problems. This is due to many factors, but mainly it is linked with low fertilizer use by smallholder farmers.

The liberalized fertilizer market allows the participation of the private sector in the fertilizer supply chain. While fertilizer prices at the origin source (i.e. international market) is relatively low, the end-users (i.e. smallholders) pay high prices. Although fertilizer use in Tanzania has been increasing from 70 thousand tons in 2000/2001 to over 149 thousand tons in 2007/2008, the average fertilizer use is very low, partly due to the high price limiting factor (EAC, 2014).

The overall objective of the study was to examine and document evidence for potential strategies for reducing fertilizer price build in Tanzania and create demand and use of fertilizer by smallholder farmers. The collected information was used as a benchmark for policy decisions on increasing fertilizer access to farmers for increasing productivity and food security.

## **Methodology**

### Research questions

1. What are the drivers of fertilizer price build-up in Tanzania?
2. What are options for reducing fertilizer price-build up to benefit smallholder farmers?

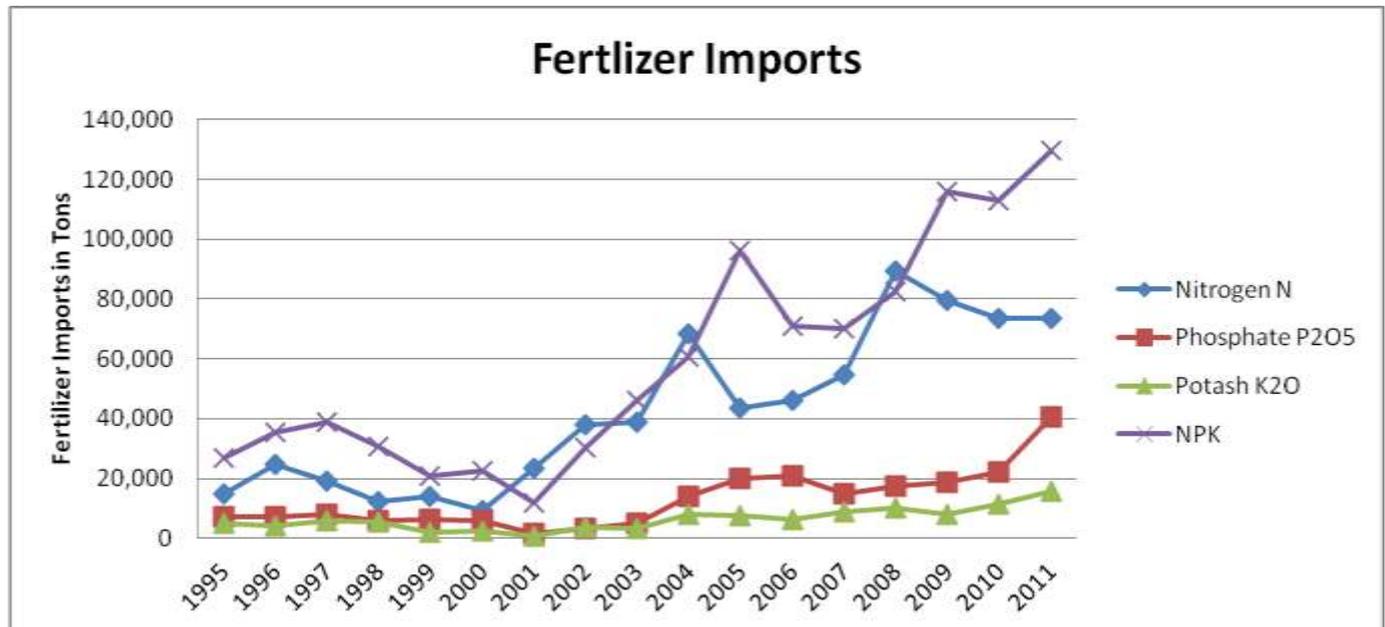
Data for this study were obtained using qualitative techniques including documentary reviews of secondary data and interviews that was triangulated with quantitative data. Therefore the study applied mixed methods by undertaking comprehensive literature review on relevant studies based on country studies and around the world to give a global perspective of fertilizer cost build-up. The mixed methods research is defined as "the third wave research whereby the researcher mixes or combines quantitative and qualitative research techniques in a single study" (Johnson and Onwuegbuzie, 2009). Mixed research methods contribute greatly to progressive theorizing (Bennett and Braumoeller, 2006) and deepening data complimentarily. Combining quantitative and qualitative measurements provides more credible integrity studies, because quantitative assessments provide descriptive statistics on the levels of unethical or ethical behaviours, whereas qualitative assessments contribute to an in-depth understanding of the unethical or ethical behaviours in the public service. This is also known as the triangulation technique for data collection and enriched analysis.

The collected data were analyzed using the qualitative methods of content synthesis and analysis whereby the major thematic areas were categorized to establish the constraints and strategies for reducing fertilizer price build-up. Where interview information was available, the data were triangulated with documentary reviews. Increasing fertilizer use is among the 2006 African Union (AU) Abuja declaration and Tanzania agricultural policy (URT, 2013) strategies for promoting agricultural productivity by increasing nutrients from 8 kgs of fertilizer per hectare to 50 kg per hectare by 2015. Currently, Tanzania imports 90% of the used fertilizer (Fig.1). While other countries in the SADC region on average use 16 kg per hectare, Tanzania fertilizer use is low at 9 kg/ ha (MAFAP). One of the limiting factors for small farmers' access to fertilizer is high price caused by multiple factors including importation costs. Thapa (2012) observed that fertilizer price cost build up in Tanzania limits 96.5% of the rural households' access to fertilizer due to high prices.

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<sup>1</sup> As stated in the Africa Agriculture Status Report, AGRA, 2013

**Figure 1: Tanzania Fertilizer Imports in Tones**



**Source: AMITSA (2007)**

He established that retail fertilizer prices equal CIF price plus 41% of additional in-country costs built on transportation, credit, and distribution. Several policy interventions including market liberalization have been undertaken to increase fertilizer use. However, high prices of the input are among the major limiting factors to smallholder farmers' access to fertilizer. We examine the strategies for addressing fertilizer price build up in Tanzania that would increase fertilizer use by smallholder farmers.

The Tanzania Agricultural Policy 2013 covers a number of policy issues and objectives, which, if properly addressed, are likely to reduce the fertilizer price build up. As the policy statements focus on actions to be undertaken, it impliedly informs the perceived cause for fertilizer price build up in the country.

### **Drivers for fertilizer price-build-up**

Many studies (Bumb, 2009; Thapa, 2012) theorize fertilizer price build up in Sub-Saharan Africa including Tanzania that having various points in the supply chain increases chances of price build up. Since Tanzania imports 90% of the fertilizer used in the country, prices are likely to increase at every point along the value chain. For a comprehensive understanding of the fertilizer price build-up, the International Fertilizer Development Center (IFDC, 2012) suggests for the analysis of the entire value chain including source of origin, importation, shipping costs, port service charges, quantity procured and methods of procurement, blending and packaging, as well as means of transportation.

It has been established that fertilizer used in Tanzania is mainly imported from USA, Europe, Middle East and South Africa. The distance from the port of origin measured as nautical miles (Fig.3) has a direct implication on the price build-up to the final consumer. It has been established that it costs more when fertilizer is imported from the US or Europe than from the Middle East or South Africa

The major importers include Tanzania Fertilizer Company (TFC), YARA, Export Trading and Premium Agro, Shivland Tank and Company (STACO), Balton (T) Ltd, Mohamed Enterprises Ltd, M-Dewji & Co, Tanzania Leaf Tobacco Company, and Dimon (T) Ltd. Since freight charges are among the determinants of price build up from areas of origin to Dar Es Salam port of discharge, and Table 1 indicates port of origins for imported fertilizers in Tanzania, implying that prices build-up varies according to area of origin and destinations, it is cheaper purchasing and shipping fertilizer from South Africa than elsewhere (Table 1). However, studies have proved some limiting factors for importing fertilizer from the closest African sources, such as production volume and nutrients contents variations compared to the US and European sources (Marine Logistics, 2007).

**Table 1: Tanzania Fertilizer Imports and Voyage Costs**

Port of Origin	Vessel Costs US \$	Total Voyage Cost US \$	Voyage Cost / ton US \$
USA Tampa via Sues	501,643	876,743	35
USA Tampa via Cap of Good Hope	501,161	756,335	30
Europe- Finland	398,304	720,786	29
Europe-Netherlands	350,571	648,751	26
North Africa- Morocco	277,714	538,797	22
North Africa- Egypt	180,750	92,032	16
Middle East	163,179	246,264	10
South Africa	82,714	124,830	5

Source: Marine Logistics. 2007

The most common used fertilizers are Urea (46%), NPK, Phosphorous Rock (Minjingu), and CAN which are used according to agricultural zonal differences.

The significant determinant for the fertilizer price build up in Tanzania is the procurement method that significantly increases farm gate prices (IFC, 2012). It is argued that price build up is a function of i) imported quantity due to economies of scale; that is to say countries importing small quantities pay high prices for the product and shipping expenses (*Ibid*). The study established that, due to small quantity imported in Tanzania, only handy size vessels were able to carry fertilizer to Dar Es Salaam port, and this has cost increase implication. Marine Logistics (2007) evaluated the unit freight costs using handy size vessels and found that “price increases to approximately US\$82 and US\$71 per tone when routing from Tampa USA via Suez and Cape of Good Hope respectively” (Table.1). The case of Uganda demonstrates that while urea was sold at \$100 per ton at the international market, it costed the Ugandan farmers to pay \$600 per ton when imported 500-1000 metric tons but when large imports were effected, prices dropped down to \$300 per ton (IFC, 2012). The EAC study (2014) observes that fertilizer importation is done by individual companies in small quantities; given the principles of economies of scale, bulk procurement is though as a feasible strategy for reducing price-build up.

There are various determinants of fertilizer price at various points in terms of transaction costs incurred from the port of entry along the supply chain through to the final consumer.

Generally, among the key determinants of fertilizer price in Tanzania are transport cost from the export port (Cost, Insurance and Freight - CIF), port charges, transport from the port to godowns (e.g. port handling costs, bagging, transport, storage, fees ) (Table.1), transport from godowns to whole sellers to the regions including the following routes; Morogoro, Iringa, Mbeya, Ruvuma, Tanga, Kilimanjaro, Arusha route, Dodoma, Singida, Shinyanga, Mwanza, Kagera, Kigoma and Lindi, Mtwara route.

Infrastructural factors for fertilizer price build up are associated with the mode of transportation as either road haulage or railways. It has been observed that, because feeder roads are not regularly maintained, they cause high vehicle maintenance costs that are transferred to fertilizers end-users. Guo, Koo and Woods (2006) refer to transportation costs as the major contributor to fertilizer price build up. They argue that domestic transport costs determined by road conditions and distance do increase fertilizer prices in Africa. Other scholars (Minot, 2009; Zorya et al., 2009) had similar observations that domestic as well as international transportation costs are the contributing factors for price build up in Sub-Saharan Africa, including Tanzania.

In-land transportation is a major critical factor contributing to fertilizer price-build up in Tanzania. Moving bulky goods like fertilizers to various destinations requires quality and reliable transportation network of roads and railways. Tanzania had 27,550 km of earth and gravel roads by 2000 and only 20% were in good passable condition, meaning that poor road conditions (80%) add on fertilizer costs as transportation expenses increase relatively.

Tanzania has two main railway networks: the central line running from Dar Es Salaam to Kigoma and Mwanza; and the Tanzania Zambia Railway (TAZARA) running from Dar Es Salaam through Coast,

Morogoro, Iringa, Njombe and Mbeya regions. The literature review indicates that railway transportation is cheaper than road transportation (Table 3). It costs 69.6% less transporting fertilizer by Tanzania Railway to Tabora compared to road transportation costs; whereas for Mbeya it costs 62% less transporting fertilizer by TAZARA railway compared to road transportation costs (Table 3). A similar study conducted in Kenya shows that transporting fertilizer by railway reduces costs by 20-30 percent from the road transportation (IFDC, 2012). Despite the railway network availability in Tanzania, fertilizer distribution is largely by road.

**Table 2: Railway Vs Road Transportation Costs**

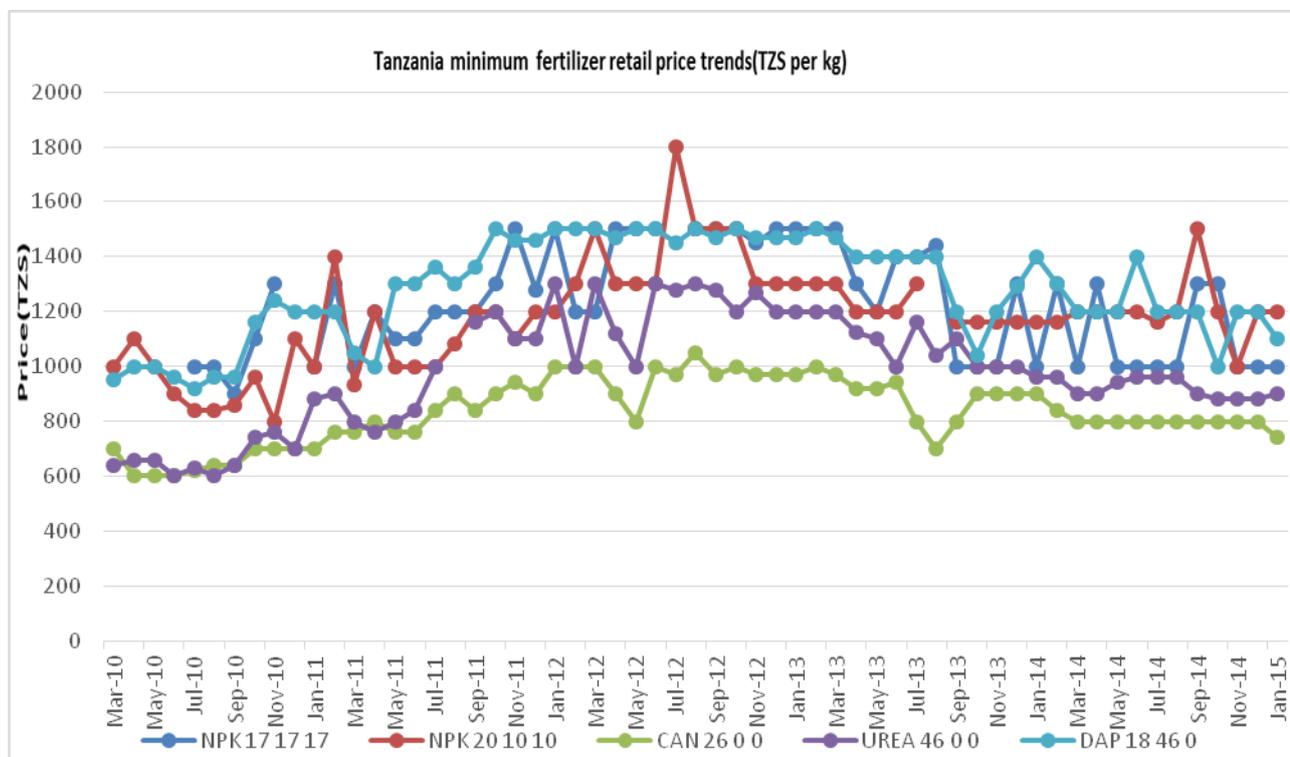
Destination region	Distance from D'Salaam Port		Transportation Costs US\$/ton	
	Rail	Road	Rail	Road
Arusha	640	616	33.80	71.09
Morogoro	220	193	24	23.30
Tabora	840	1028	41.42	136.38
Kigoma	1260	1521	53.20	n.a
Iringa	n.a	495	n.a	56.76
Makambako	612	644	31.00	77.34
Mbeya	797	833	37	98.11
Sumbawanga	n.a	1166	n.a	156.76
Songea	n.a	950	n.a	99.07

Source: Marine Logistics (2007).

Variations of in-land transportation costs as well as the volume of used fertilizers determine price build up at different locations. For example the Southern highland regions use 42% of the total annual used fertilizers; Mwanza region takes 17%; Shinyanga and Tabora use 10%; Morogoro use 12%; Kilimanjaro and Arusha use 5%; Kagera uses 14% and the rest of the country take 14%. This entails that fertilizers are transported to different destinations and the associated transportation costs build up according to the distance covered from the port of Dar Es Salaam based on the type of transport (Table 3).

### **Policy related drivers for fertilizer price-build up**

Policy decisions have the potential to influence fertilizer prices and increase demand by smallholder farmers. Following the global food crisis of 2007/08 the Government of the United Republic of Tanzania implemented fertilizer subsidy under the National Agricultural Input Voucher System (NAIVS). The Government of Tanzania realized the importance of increasing farmers' access to fertilizer as a way for increasing productivity, and therefore subsidized fertilizer prices by 50% to smallholder farmers by giving them input vouchers at the market price. The effect of the subsidy was noted by having stabilized fertilizer prices in the country (Fig 5). In the absence of input subsidy, fertilizer prices invariably increase.



Source: AMITSA (2015)

During the 2014/15 budget, the government removed the subsidy. Following the government decision to remove the input subsidy during the 2014/15 budget, fertilizer prices at different locations have changed (Table 3).

Table 3: Fertilizer Retail Prices in Tsh for January 2015

Reported towns (TZS)		Fertilizer Prices in January 2015										
Product	Unit	DSM	Itumba	Kiteto	Kongwa	Man'gula	Morogor	Mvomero	Rujewa	Siha	Songea	Vwawa
NPK 17 17 17	50kg	75000	n.a	50000	65000		60000	n.a	n.a	n.a	n.a	n.a
NPK 20 10 10	50kg	75000	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	60000
CAN 26 0 0	50kg	44000		45000	48000	50000	48000	48000	47000		52000	45000
UREA 46 0 0	50kg	45000	46000	70000	65000	55000	50000	52000	75000	60000	65000	47000
DAP 18 46 0	50kg	70000	66000			70000	70000	70000	85000	75000	80000	60000
MINJINGU ROCK PHOSPHATE	50kg	n.a	n.a	n.a	n.a	n.a	n.a	40000	40000	50000	n.a	n.a

Source 1: AMITSA (2015)

At the other level, non-conducive policy environments and inadequate market transparency contribute to fertilizer price build-up. Gregory and Bumb (2006) studied the policy factors contributing to fertilizer build up in Sub-Saharan Africa; they categorize them in three main types, namely; market development, technical and infrastructure. The market constraints are described in terms of lack of enabling policy environment agricultural markets and market information, and regulatory mechanism. Agricultural product markets are crucial for the development of agricultural commodities and stimulating agricultural production (MAFC, 2015). It is recognized in the new agricultural policy that infrastructure like transportation and storage is vital for enhancing agricultural marketing. The Fertilizer Act, 2009 with the associated Fertilizer

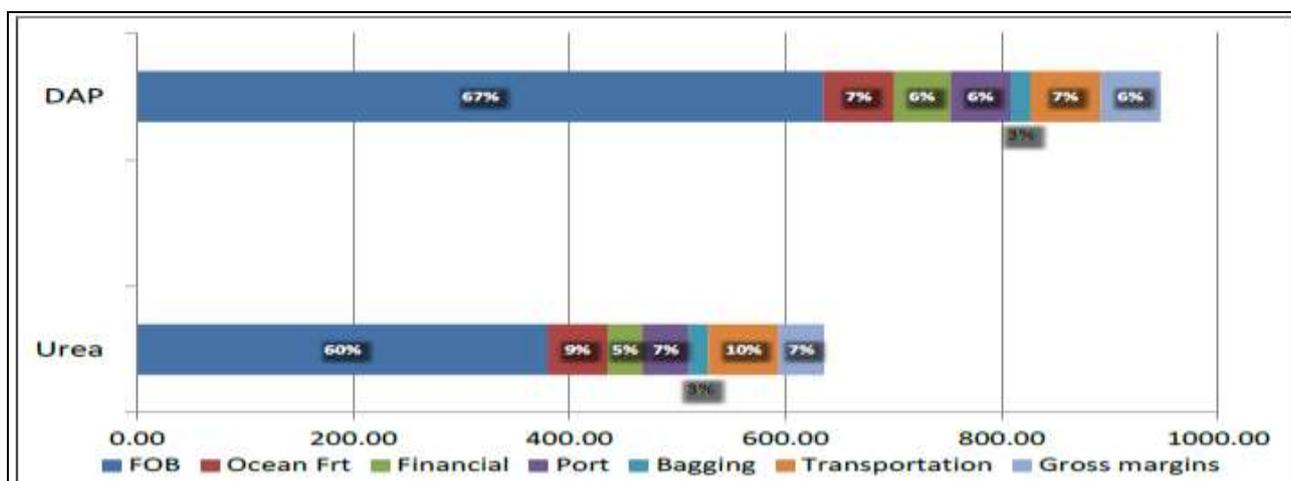
Regulations of 2009 is a policy document guiding among other things fertilizer licensing, importation and transportation. The Fertilizer Regulations, 2009; Section 11 talks about handling and transportation, but it does not specifically address the transportation of fertilizer. This is a weak point in the policy and regulations that eventually adds fertilizer prices. It is worth considering on the effect of inadequate or weak policy regulatory mechanism on price increase. In situation of market led system, the private sector may occasionally increase prices (Gregory & Bumb, 2006) as they assume market information.

### Weak quality control on fake inputs

The National agriculture policy of 2013 re-affirms that increased use of modern inputs (fertilizers, agrochemicals, seeds, 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 (MAFC, 2013). However, this is hampered by the non-availability and weak control of quality of agricultural inputs. In the absence of quality control of inputs, it adds on costs to farmers when they purchase poor quality seeds and fertilizers. When this happens, farmers would have incurred the costs of purchasing the inputs that never give them good investment returns.

Based on the presented evidence, the most critical determinants of fertilizer price build up in order of importance are freight charges (60-67%), followed by means of transportation (10%) and procurement method and port inefficiencies (Fig. 5).

**Figure 2: Contributing Factors for Fertilizer Price Build Up**



Source: International Fertilizer Development Center

### Weak agrodealers network

Insufficient and inefficient agro-dealer network for distribution is another contributing factor to fertilizer cost build-up at the farm gate prices. Tanzania has registered 3885<sup>2</sup> agro-dealers but are largely operating in urban and semi-urban areas (IFC, 2012); which entails that farmers have to travel long distances<sup>3</sup> to access fertilizers and this adds on fertilizer costs (Thapa, 2012).

Based on the findings from the reviewed literature, the strategies for reducing fertilizer price build up in Tanzania are presented in line with the key research question. What are the strategies for reducing fertilizer price build up and increasing smallholder access and use to increase productivity and food security?

### Findings

<sup>2</sup> Regional Agricultural Input Market Information system (AMITSA). Retrieved from [www.amitsa.org](http://www.amitsa.org) on 2/24/2015

<sup>3</sup> AMITSA estimates 5 kilometers on average. Retrieved from [www.amitsa.org](http://www.amitsa.org) on 2/24/2015

Increasing demand and use of fertilizer by smallholder farmers largely would depend on interventions for reducing prices and making it affordable. Demand for fertilizer is defined as the farmers' desire, ability and willingness to pay for the inputs. Informed by performance assessment of the National Agricultural Input Voucher Schem (NAIVS), there is increased farmers' desire and willingness to use fertilizer (Mwaijande, 2014). However, farmers' ability to purchase fertilizer at market prices is low that limit their use of the input, while demand for fertilizer commodity is influenced by many factors like farmers' income, prices of related goods (i.e. organic manure), tastes and preference, price commands high influence on demand.

## **Fertilizer Industry in Tanzania**

In determining the factors that affect fertilizer price in Tanzania, it is important to understand the fertilizer industry globally and the way it affects Tanzania. This is because the fertilizer sold and used in Tanzania is imported as the country lacks fertilizer manufacturing with an exception of Minjingu. Therefore the global fertilizer market dynamics need to be understood in order to understand what happens in the Tanzanian fertilizer market.

According to Tanzania Fertilizer Company (TFC)<sup>4</sup>, the level of fertilizer use in Tanzania is as low as 9 kg nutrients per ha, compared to 27 and 53 kg nutrients per ha for Malawi and South Africa respectively. However, the Abuja declaration emphasized that African fertilizer consumption should reach a minimum of 50 Kg of nutrients per annum.

## **Fertilizer Supply and Demand**

Fertilizer prices in the world are determined by the free interplay of market forces of supply and demand as is the case for many other commodities. The supply and demand and therefore prices are determined by a number of factors in the global market. These factors include supply and demand side economics. The main global suppliers and consumers of fertilizer that have impact on Tanzania include India and Pakistan which are the major importers importing in bulk (millions of tones at ones). When these giants import in bulk through floating global tenders, prices are high globally. The main suppliers of fertilizer in the world include China, East Europe, West Europe and the Middle East. When India floats its tenders, these suppliers tend to respond by supplying in this huge market in order to enjoy economies of scale. Therefore, when India is buying fertilizer, global prices including in Tanzania tend to go up because there is scarcity in the market as most of supplies are destined to India.

According to Benson *et al* (2012), components of the price for fertilizer in Tanzania include global commodity and transport prices. The common fertilizers used in Tanzania are (i) Nitrogen ( N- Straights) : UREA, SA & CAN; (ii) Phosphates; DAP, TSP & Rock Phosphate; (iii) Potassium : MOP & SOP and (iv) Mixed or Complex : NPKs – 10:18:24; 20:10:10; 25:5:5; 17:0:17 which are mainly imported.

The average cost of fertilizer to several up-country regional trading centres was US\$ 419 per MT in 2006. Of this price, the free-on-board (FOB) commodity price at the source accounted for 65% of the total price. Transport from the shipping port to Dar es Salaam and on to the trading centres accounted for 22%. Profit margins obtained by importers and traders were an estimated 6.1% of the cost, partly indicating a relatively competitive fertilizer market in Tanzania. Kirama *et al* (2012) also inform that there is a low level of direct taxes in accounting for the costs of fertilizer. Direct taxes and levies were estimated to account for only 0.5% of the delivered cost of fertilizer up-country.

They correctly note that Tanzania is a price taker for fertilizer from international markets and can therefore do very little about that element of the landed cost of fertilizer in the country. However, there is more scope for action related to transport, in particular. Improving the efficiency of operations in Dar es Salaam port and improving domestic transport infrastructure, which can reduce the costs of distributing the imported fertilizer. It is further argued that smaller gains in reducing fertilizer price can be achieved through improving access to finance by importers, reducing overhead charges incurred by agro dealers and removing indirect taxes and fees levied on fertilizer importers and dealers (Benson *et al.*, 2012).

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<sup>4</sup> [http://www.fertilizer.co.tz/index.php?option=com\\_content&view=article&id=2&Itemid=3](http://www.fertilizer.co.tz/index.php?option=com_content&view=article&id=2&Itemid=3)

According to the World Bank (2012)<sup>5</sup>, the supply and distribution of fertilizer in Tanzania is primarily in the hands of the private sector. Agro-dealers have been operating in the districts alongside a number of importers. The World Bank (*ibid*) informs also that over the years, fertilizer imports with zero rated duties have increased in Tanzania. In 2007, the country imported 169,027 metric tons of fertilizer. This increased to 318,060 tons in 2011 which is an increase of 13.5%. The World Bank notes that without subsidy, fertilizer retail price equals the Cost, Insurance, and Freight (CIF) price plus 41% of additional in-country costs.

### **The China Factor on Fertilizer Supply and Demand**

Apart from the fertilizer price dynamics that India imposes in the global market, a special attention needs to be paid to the China effect which is among the major global fertilizer suppliers. China has two major seasons in selling fertilizer. The June to October period is a tax free window for fertilizer export from China. This is the period when fertilizer demand is low in China. At this time, fertilizer from China to the world market becomes low too. Box 2-4 illustrates the China window effect.

### **Cost of distribution of fertilizer in Tanzania**

Conceptually, the cost of production of goods and services including cost of distribution of fertilizer in the context is a function of many variables. These include cost of factors of production (land, labour, capital and entrepreneurship) used to produce the goods and services; applicable taxes, fees and charges as well as profit margin. Distribution cost of fertilizer in Tanzania is influenced by a number of factors. These include but are not limited to the following:

#### ***a) Transport cost***

Road transportation attributes significantly to fertilizer price build up. Over 70 percent freight traffic in Tanzania is by road. This is partly attributed to the fact that railway infrastructure has deteriorated and are no reliable services. Delaying in road blocks increases cost of distribution also, waiting time at weigh bridges, outdated scales, that result pay bribes are another factor for increase in costs of distribution. A Study carried by the Center for Economic Prosperity shows that on average a truck is stopped six time from Dar es salaam to Mbeya, which may result to pay bribes and also time consuming contributing to high costs of distribution.

Furthermore, the increasing traffic congestion along the Dar Es Salaam-Morogoro highway increases costs of transporting fertilizer. This takes the form of extra long driving time that trucks have to be on the road to and from Dar Es Salaam Port to fertilizer destinations.

Distance from the port of entry to destinations has effect on fertilizer prices. Ngowi (2014) found variations of fertilizer average prices in selected districts in Tanzania. There is a direct relationship between prices and distances from Dar Es Salaam and also distances from regional and district headquarters to the end users. Generally, the further distance from Dar Es Salaam to regional and district headquarters the more expensive fertilizer becomes. Transport cost is seemingly the only explanatory factor for the price variations in relation to distance. From the economic theory, cost of transport increases as distance increases. This is partly due to more fuel consumption as well as time used by the transporter and tear and wear of the transport facility. Table 5 shows fertilizer average prices in selected regional and district destinations from Dar Es Salaam port.

Compared to the UREA price in Dar Es Salaam (about 54,000 Tshs), the price in Kibondo is 110,000 Tshs. This is about 2.04 times (204%) as the price in Dar Es Salaam. The explanatory factor is mainly cost of transport from Dar Es Salaam to Kibondo district in Kigoma region.

Findings in Kibondo indicate that the fertilizer sold in Kibondo is transported from Dar Es Salaam by trucks to Kibondo via Mwanza or by rail via Kigoma. The rail transport is cheaper but the railway to Kigoma is not reliable. Therefore, the use of trucks makes fertilizer more expensive than when it is transported by rail.

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<sup>5</sup> Agribusiness indicators: Tanzania

It is seen that prices in remote villages is higher than in nearby villages (Table 7-14). Certainly the explanatory factor and logic behind this is the distance travelled from regional and district head offices to the respective villages.

According to respondents who were farmers in Itaba ward in Kibondo district council, transport cost is a major problem. It costs about 5000 Tshs per bag from Mwanza (Dar – Mwanza –Kibondo– Itaba). Cost drivers include the long and bad roads (dusty in dry season and muddy in rain season). There is a tendency for fertilizer to come late (January) while planting is in November. All these contribute to low fertilizer application and as a result one sees very low agricultural productivity.

Compared to the districts located far away from Kigoma town, the prices in Kigoma District Council are relatively lower. For example, UREA costs about 75,000 Tshs in Itaba ward in Kibondo but it is 65,000 Tshs in Kibondo town and in Kigoma town, but 77,500 in Kigoma Rural. The same costs about 54,000 only in Dar Es Salaam but 110,000 Tshs in one remote ward in Kibondo district. This indicates that distance from the source to destination increases fertilizer price.

It was reported that fertilizer in Buhigwe is bought from Kasulu town centre. Transport cost per 50kg bag from Kasulu to Muhinda is between 2000 and 3000 Tanzania shillings. It was reported that fertilizer in Mwayaya is bought from Kasulu town centre. Transport cost per 50kg bag from Kasulu to Mwayaya is between 2500 and 3000 Tanzania shillings.

### **Conclusion**

Agriculture is the mainstay sector of the economy as recognized in the major Tanzania development policy frameworks of National Development Vision, 2025 and National Strategy for Growth and Reduction of Poverty (MKUKUTA-II), Agricultural Sector Development Programme, National Agriculture Policy 2013 as well as in the Big Results Now (BRN). Tanzania has shown commitment to the Comprehensive African Agriculture Development Programme (CAADP) to increase agricultural growth to 6% and endorsed its commitment at the Malabo conference to increase productivity. However, agricultural productivity in the country is very low due to low fertilizer use of 9kg per ha against the Abuja declaration targeting 50kg per ha. Since the government realizes the contributing factors to low productivity that include low fertilizer use due to high prices, improving fertilizer access to smallholder farmers becomes necessary. This study examined the feasible strategies for reducing fertilizer price build-up and increasing smallholder farmers' access to fertilizer. The proposed strategies for reducing fertilizer price build-up include, *inter alia*, introducing bulky procurement imports to offset Cost Insurance and Freight (CIF), use of railway transportation from Dar Es Salaam port to up-country regions where railway lines are available, improving port efficiency in terms of infrastructure, harmonizing tariffs and administrative functions, as well as adopting the China Factor on Fertilizer Supply and Demand. Failure to overcome fertilizer prices, will defeat the purpose of improving soil health and crop productivity for attaining food security.

Since the fertilizer import, supply and distribution is on private sector, the government has the role to provide policy guidelines, develop an operating regulatory framework, and monitor the implementation. With this assumption, the government needs to adopt the proposed strategies while the private sector will be the implementing agent of the proposed strategies. While the proposed strategy on railway transportation falls on another ministry other than the Ministry of Agriculture, Food Security and Cooperatives, there is a need for policy coherence across sectors so as to reduce the fertilizer price build up so as to make the option for fertilizer transportation by railway feasible.

### **Recommendation for reducing fertilizer price build-up**

The study identified major determinants of fertilizer price build up in Tanzania. This is important for increasing small farmers' access to fertilizer and creating more demand. Since the determinants of fertilizer price are known, it is recommended that appropriate policy options strategies should be taken for reducing prices and creating demand and increasing fertilizer use by smallholder farmers as follows:

#### **Option 1: Use Railway From Dar Es Salaam Up-Country Regions**

Improving rail capability would lessen peak demand on truck transportation, increase competition in the freight market and reduce cost. However, inland storage capacity will be required to accommodate the overall increased volume of fertilizer shipments as well as any larger rail units. A well-developed system of

storage facilities at the wholesale level as well as some enhanced capacity closer to the end user will allow the market to react more quickly to market signals and drive access deeper into the farm economy.

It may be necessary to reinforce the regulation by law to use railway for bulky transportation to up-country regions where railway network is available. About 60% of fertilizer users are in Southern highland regions of Iringa, Mbeya and Ruvuma. These regions can effectively make use of TAZARA. Other regions in the Lake zone, Tabora and Kigoma should use TRL for fertilizer transportation. However, this shall require great improvement and modernization in the railway infrastructure and operations.

### **Option 2: Introduce Bulky Procurement to overcome Cost, Insurance and Freight**

Imported fertilizer lands in Tanzania at the cost, insurance and freight (CIF) price. The cost drivers in the producing and exporting countries are exogenous variables that Tanzania as an importer cannot control. The same is the case for insurance and freight charges, by and large. However, freight costs are issues in Tanzania. Sources of fertilizer imported in Tanzania are mainly China, Middle East and former USSR. Freight costs are high in Tanzania due to a number of factors including small ships that supply the fertilizer given the rather small size of the market (compared to Brazil and India for example) and the port. These are maximum 20 metric tonnes. There is no economies of scale that would have accrued had it been that supplies were by large ships. According to the findings of this study, price of imported fertilizer at wholesale is around 47,000 Tshs per bag of 50kgs. Therefore, introducing bulky procurement of fertilizers is likely to reduce fertilizer prices.

### **Option 3: Improve on Port Efficiency**

Among the factors that affects price of fertilizer in Tanzania is inefficiency at the Dar Es Salaam Port. Due to low efficiency, ships do take longer at the port than in more efficient ports. When shipping companies consider their turn around (profitability) they are likely to increase the cost so as to adjust for the inefficiency. Improving port operations for efficient is likely to reduce fertilizer prices.

According to key informants, all imported fertilizer through Dar es Salaam seaport is discharged at berths number 7 and 8. The draft on both berths is roughly 10 meters, which is the minimum needed for vessels of around 20,000 metric ton. By contrast, berths 4, 5, and 6 have drafts of only 7 meters, which are only appropriate for coaster vessels.

Fertilizer usually arrives in bulk, with bagging performed by the port authority and not contracted out, as is the case in most other African ports. Port inefficiencies in Dar es Salaam include handling (losses estimated at over \$20 million per year due to slow unloading), bagging (inaccurate weight of bags in a range of 48 to 55 kilograms per bag rather than the standard 50 kilograms), and poor stitching (inadequate materials). Trailers and tug masters (to pull the trailers) are limited and cannot cope with the current level of demand. The Tanzania Port Authority (TPA) recently procured three new bagging units to replace old ones, but discharge performance at the port is not yet established by the time of this study. If bagging speed were to increase, the cargo could not be taken away from the quayside any faster. Among others, these may include;

#### **a) Port handling cost**

There are a number of charges on fertilizer at the port. These include transport from the to storage facilities (godowns) which is about 60 USD per tonne. This covers port handling, clearing, transport etc).

#### **b) Bagging cost**

Huge volume of fertilizer comes in bulk (unpacked). Therefore it has to be packed into 50 kilograms bags at a bagging cost of about 40 USD per tonne. Companies supply bags themselves at a cost of about 60 USD per one tonne capacity of bags. That is the cost of the product (packed fertilizer)

#### **c) Taxes in Fertilizer**

Although VAT Act of 2006 exempts tax on fertilizers, various kinds of taxes imposed on various nodes of the fertilizer value chain build up on fertilizer prices. There are taxes on the packaging bags, port handling services, clearing agents etc but not the core product (fertilizer) itself (Table 15). It is challenging to think that fertilizer price could be brought down by reducing or removing taxes that are related to fertilizer such as taxes on bags. This is because these are relatively small and some of the products are not manufactured just

for use in fertilizer value chain. It may therefore not be worth the efforts needed to have the taxes removed or reduced and administration of the same.

It is seen that the total tax for a 50kg bag of fertilizer that sales at 54,000 Tshs is some 515.03 Tshs. This is just 0.95% of the selling price. In terms of percent it is very small. In actual monetary terms, 515 Tshs is not a lot of money but for a poor person it may mean a lot. If one buys 10kg fertilizer, then one saves 5150 Tshs. However, what constitutes this total tax is addition of many various types of charges most of which cannot be avoided (for example port charges, cost of empty bags and transport.

**d) Free along ship (FAS)**

The exporter has brought material to the loading point at the port, loading onto the ship, ocean freight and other charges are on the importers' account.

**e) Free on board (FOB)**

The exporter has loaded the material to the ship, ocean freight and other costs are on the importers' account.

**f) Cost Insurance and Freight (CIF)**

This is FOB price plus insurance plus ocean freight. This is the price of materials landed in the importing country. Unloading operations and other expenses at the port of importers are on the importers' account.

**g) Storage costs for fertilizer**

Storage costs are high and need sensitivity due to nature of fertilizers as sometimes they do evaporate depending on certain conditions. Below are some issues related to storage of fertilizer in Tanzania. There is a lack of storage space for fertilizer in the port, and fertilizer is typically stored outside on verandas. The previous shade alongside berth number 8 is being converted to container space, further limiting available storage space. Removing fertilizer from the port is slow due to joint entry and exit from Gate 5. Other gates can be used under special circumstances, but this requires a waiver of port responsibility for any cargo losses. Grain supplies take precedence over fertilizer unloading. Fertilizer will not be taken out from the same gates as grain if a shipment of the latter is unloading at the same time as fertilizer. Overall bagging and storage costs are approximately \$15/metric ton higher for products bagged at Dar es Salaam compared to the bagging and storage costs for the importation of bagged urea. The price differential between bagged and bulk urea from the Arab Gulf is \$10/metric ton so it appears that the Port Authority's monopoly position erodes any cost advantage normally found in dockside bagging of bulk material.

**h) Inspection fees**

There are various fees that can be potential or actually imposed on goods and services. Similar to imposition of taxes and fines; fees add up to the cost on part of sellers. These tend to push the fees on the buyer so that he/she pays the fee which is included in the price. In this case the seller becomes an agent of the revenue authority. According to Tanganyika Farmers Association (TFA) in Tanga region and a fertilizer dealer, there are no inspection fees that affect fertilizer price.

**i) Charges paid by fertilizer importers**

Fertilizer importers pay different kinds of charges. Possibly, these costs bring about additional costs that are ultimately shifted to farmers. The study found that the following are among the charges paid by fertilizer importers in Tanzania: costs of security, insurance, costs, administrative costs, lease costs for godowns, storage costs, transport costs, trade and business support services like communicating, informing, inspecting, regulating marketing and promoting etc.

**Option 4: Improve Agro-dealers network and Fertilizer distribution points**

Farmers travel to the district headquarters to buy fertilizers due to low agro-dealers network to villages. The distance travelled has implications on the cost of fertilizer. Generally, the longer the distance travelled the more costly the price of fertilizer paid. This includes the cost of purchasing the fertilizer, transport cost and other transaction costs incurred in purchasing fertilizer at a district headquarters. These costs may include costs of food and drinks and cost of accommodation if one has to spend at least a night at the headquarters. The other type of cost is opportunity cost in terms of activities that are sacrificed by the farmers while in town purchasing fertilizer. These activities can include farm work that is foregone as well as energy spent in

the whole process of acquiring fertilizer in town. Therefore, improving agro-dealers network and distribution points in villages is likely to reduce fertilizer costs. Improving the agro-dealers network and capacity in the distribution network for reducing travel cost of farmers getting fertilizer is likely to reduce fertilizer prices. Many farmers still need to travel long distances to buy fertilizer because dealers are mainly based at district headquarters. Also not all villages have agents or stockists with adequate supply of fertilizers.

#### **Option 5: Targeting China tax free window**

Among the strategies to get relatively cheaper imported fertilizer in Tanzania is to target the Chinese lower tax export fertilizer window, assuming that it is not distorted by India's gigantic demand. This is about being strategic and importing in large scale when prices are low in China, normally between June and October.

- (i) There are various strategies to reduce fertilizer price. These include looking at the possibilities of bulky purchase and collective action (collective purchases by farmers) as well as more efficient and bulky transport such as through the use of railway<sup>6</sup> rather than trucks so as to enjoy economies of scale that will decrease per unit cost of fertilizer especially for the end user.
- (ii) There is a need to conduct a feasibility study on domestic production of fertilizer including in areas as near to consumers as possible as among the strategies of reducing the cost of imported fertilizer (CIF) and cost of transporting the imported fertilizer from Dar Es Salaam to upcountry.

#### **Option 6: Reforms intersectoral policies**

- a) Reducing trivial taxes on fertilizer is likely to reduce price. In other words, make fertilizer tax free. Therefore, farmers should advocate for reducing or removing fertilizer taxes.
- b) Re-introduce fertilizer Subsidy

Fertilizer subsidy by the government has a potential for reducing fertilizer prices and increasing small farmers' access to fertilizer. For the subsidy to be sustainable and acceptable to the government, other alternative sources of revenue to make up for 'revenue losses through more subsidies should be identified. However, improving the delivery and monitoring of the abandoned voucher system could increase smallholder access and fertilizer use in Tanzania.

#### **Option 7: Improve Quality Control of Inputs**

Improving quality control of agriculture inputs is likely to minimize smallholder farmers' costs for buying another quality seeds and fertilizers as well as the wastage of time which can never be recovered once the farming season is over.

#### **Option 8: Strengthen Monitoring and evaluation of Fertilizer Act**

As a strategy for increasing smallholder farmers' access to fertilizer and use, the Ministry of Agriculture, Food Security and Cooperatives should strengthen the implementation of fertilizer policy as it requires meeting quality, grades and standards of fertilizer. If this is well implemented, it shall facilitate farmers' access to quality fertilizer.

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<sup>6</sup> This implies that the existing railway infrastructure such as the central line, TAZARA and northern line have to be revamped so as to be reliable and viable alternative ways of bulky transport of fertilizer especially to regions far from Dar Es Salaam.

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