



International Fertiliser Society

FERTILISER MARKET DEVELOPMENT IN SUB-SAHARAN AFRICA

by

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ABSTRACT.

Over the last 50 years cereal productivity per unit area in Sub-Saharan Africa (SSA) has stagnated at around 1 tonnes/ha, compared to over 4 tonnes per hectare (ha) in developing countries. Total agricultural output in SSA has kept pace with population growth (mainly because cultivated area has expanded) and per capita cereal production has remained stable. Nevertheless, 27% of Africa's population is chronically undernourished.

The low agricultural productivity is largely due to the limited use of mineral fertilisers. Average fertiliser use in SSA is 8 kg/ha compared to the global average of 107 kg/ha. Rates of soil nutrient depletion exceed 60 kg/ha. SSA accounts for more than 10% of the world's population, but less than one percent of global fertiliser demand. Africa has the natural resources needed to produce fertilisers and is a net fertiliser exporter, but SSA imports over 90% of its fertiliser needs. Several fertiliser plants are being constructed or planned – but while fertiliser production will increase, the majority of this additional production will be exported because of the low demand in SSA.

This paper analyses the reasons for low fertiliser demand in SSA, using a supply chain breakdown. The analysis explains the high cost of fertiliser in SSA and the constraints to fertiliser market development. The paper also discusses national and regional fertiliser policies, and how they can contribute to development of the fertiliser market. 'Farming as a business', where farmers produce marketable surpluses for a guaranteed market, is introduced as a major driver for future growth in fertiliser demand in SSA. Initiatives by the global fertiliser industry to increase fertiliser use are described.

In recent years there has been a resurgence of fertiliser subsidies as governments seek to increase fertiliser use, agricultural productivity and food security. Approximately 40% of the fertiliser consumed in SSA is subsidised to various degrees. These subsidies risk eroding previous achievements in private sector fertiliser market development in SSA. The paper explains how targeted subsidies can stimulate fertiliser use while allowing the private sector to develop.

Keywords: Sub-Saharan Africa, fertiliser market development, fertiliser consumption, subsidies, supply chain, fertiliser policy, output marketing.

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1. INTRODUCTION.

Africa is a low-income continent with an average per capita income of \$1,667 and high incidence of poverty and hunger. The African Development Bank estimates that 44% of Africa's population lives below the poverty line, earning less than \$1.25 per day (ADB, 2011). About 27% of the population – and more than 40% in at least a dozen countries in Sub-Saharan Africa – is undernourished, compared to the global figure of 14% (Benson, 2004). Most of the poor and malnourished live in rural areas where agriculture is the main source of livelihood. Therefore, accelerated growth in agricultural production is essential to reduce poverty and eliminate hunger and malnutrition.

In this paper, Sub-Saharan Africa (SSA) is defined as all African countries except Algeria, Egypt, Libya, Morocco, Tunisia and South Africa.

Agriculture is the main sector of the economy in SSA. However, agricultural productivity is considerably lower than in other developing regions and far below its potential. Agriculture provides employment for 65% of Africa's labour force, but only accounts for 32% of gross domestic product, which reflects the low productivity of the sector (Chauvin *et al.*, 2012). As Figure 1 illustrates, cereal yields in SSA are far lower than in Latin America, Asia and developed countries.

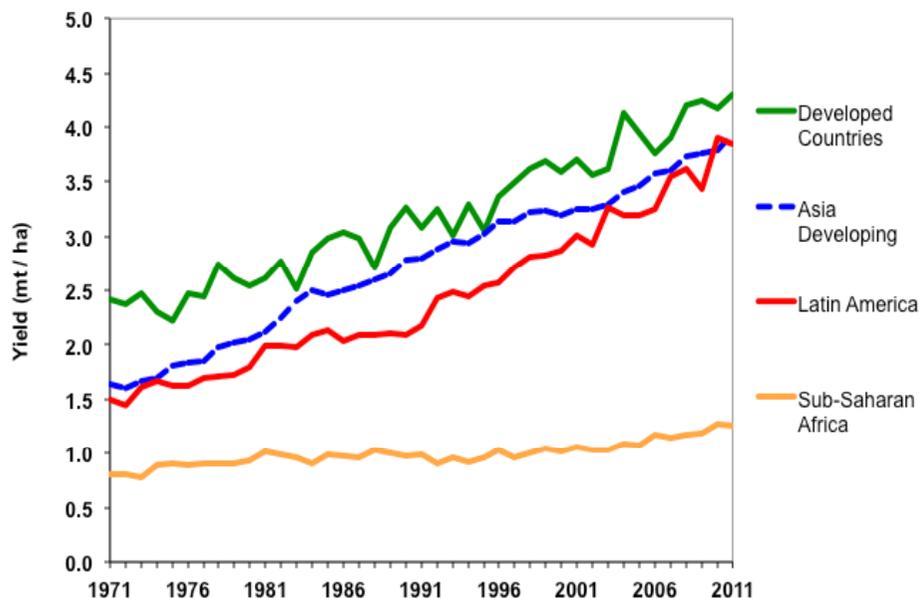


Figure 1. Cereal yields in tonnes/ha in different regions from 1971 to 2011.

Source: FAOSTAT.

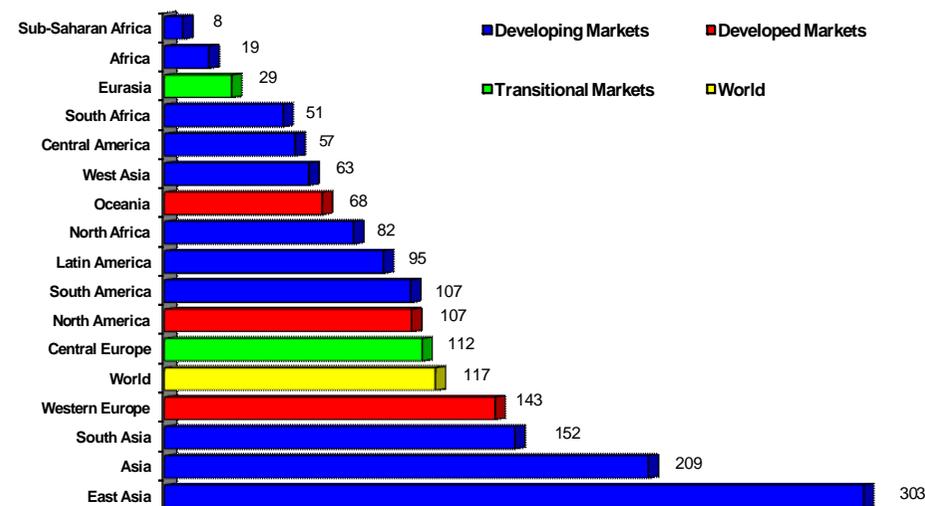


Figure 2. Average fertiliser use as kg of nutrients (NPK) per hectare by fertiliser markets in 2010.

Beginning in the 1980s, many African governments began liberalising their agricultural input and output markets. As part of the so-called Structural Adjustment Programs, price controls were eliminated, state regulation of marketing activities discontinued, and the private sector was made responsible for all aspects of production, procurement, distribution and marketing in the agricultural sector. These reforms have produced some positive results. Between 1999/2000 and 2009/2010 total cereal production in SSA increased by 34%, per-hectare cereal yields increased by 13%, and per capita cereal production increased by 3%. Although cereal production has slightly exceeded population growth, productivity remains low with yields at approximately 1 tonne/ha. One of the main reasons is the low use of mineral fertilisers. Average fertiliser use in SSA is only 8 kg/ha (Figure 2), less than one-tenth of the world average and less than 4% of the average for Asia (209 kg/ha).

Continuous cultivation and 'mining' of nutrients has resulted in high levels of soil nutrient depletion. In response to this 'fertiliser crisis', the African Union and the New Partnership for Africa's Development (NEPAD) convened at the Africa Fertiliser Summit in Abuja, Nigeria, in June 2006. The meeting sought to identify the constraints to increased fertiliser use, and delineate a plan of action to substantially improve smallholder farmers' access to affordable fertilisers. The outcome of the Summit was a political commitment by African leaders to arrest land degradation and increase crop productivity by increasing fertiliser use to at least 50 kg/ha of arable land. Since 2006, a number of countries and their development partners have implemented programs to boost fertiliser supply and demand. Many of these initiatives

have involved both input and output markets since demand for agricultural products is the key driver of fertiliser demand.

This paper examines the fertiliser sector in SSA. It analyses the constraints to the development of the fertiliser market and the actions needed to increase fertiliser use in SSA, both from a private sector perspective and from a policy perspective. Section 2 provides an overview of fertiliser consumption trends. Section 3 discusses fertiliser production. Section 4 describes the fertiliser supply chain in SSA and the constraints to its performance. Section 5 outlines recent efforts (policy reforms as well as specific programs) to stimulate fertiliser demand. Section 6 discusses the role of subsidies in fertiliser market development. Section 7 presents the conclusions and recommendations.

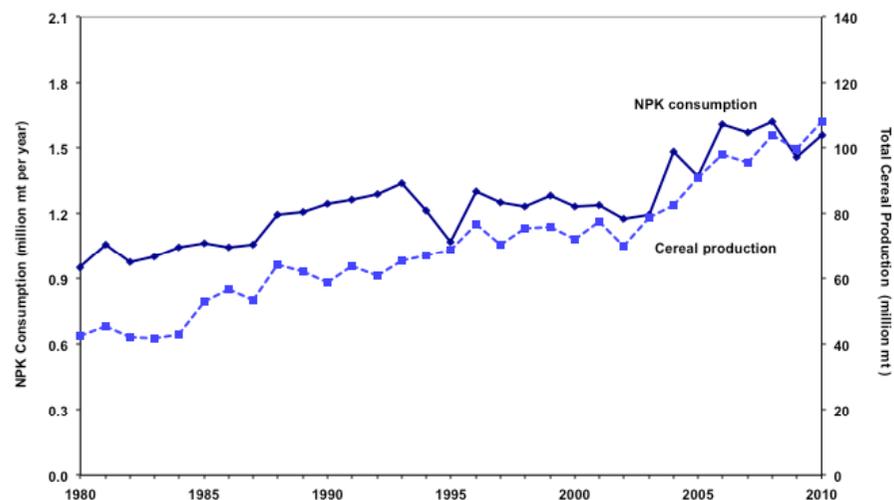


Figure 3. Total NPK consumption and total cereal production (million tonnes per year) in Sub-Saharan Africa between 1980 and 2010. Source: IFDC. *Africa Fertiliser Situation, December 2011.*

2. FERTILISER CONSUMPTION IN AFRICA.

2.1. Trends in fertiliser consumption.

Although the quality of fertiliser consumption statistics in Africa is poor, it is evident that fertiliser consumption in SSA fluctuated considerably between 1980 and 1995 but remained stagnant at approximately 1 million tonnes of nutrients per year (Figure 3). Consumption has increased since 1995 and markedly since 2003, reaching a maximum of almost 1.6 million tonnes in 2010, possibly due to the introduction of fertiliser subsidies in many countries beginning in the late 1990s. Despite these increases, overall consumption remains low. SSA, with over 10% of the global population, accounts for less than 1% of global fertiliser consumption.

Table 1. Distribution of countries in Sub-Saharan Africa by level of fertiliser use, 1999/2000 to 2009/2010 annual averages. Source: IFDC from FAO data. No data for 17 countries.

Fertiliser use (tonnes of nutrients N+P+K)	Number of Countries
Less than 10,000	12
10,000 – 30,000	4
30,000 – 50,000	2
50,000 – 100,000	5
100,000 – 150,000	1
Over 150,000	3
Total	27

SSA's limited share of global fertiliser consumption is a reflection of its small fertiliser markets. Of the 44 countries in SSA, fertiliser consumption statistics are available for 27 countries. According to 2009/2010 statistics, only nine of these countries use more than 50,000 nutrient tons and 12 countries use less than 10,000 nutrient tons (Table 1). Six countries (Nigeria, Tanzania, Ethiopia, Zimbabwe, Sudan and Kenya) account for 60-70% of SSA's fertiliser consumption (Figure 4). In each of these countries, there is considerable fluctuation in consumption between years, which is a reflection of the frequent changes in fertiliser policy.

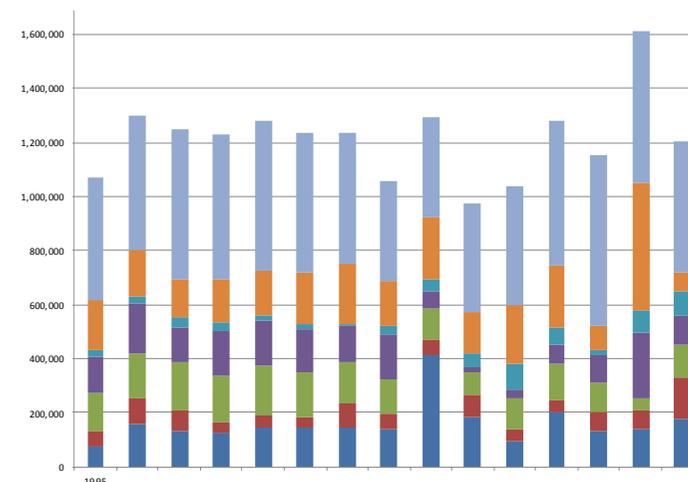
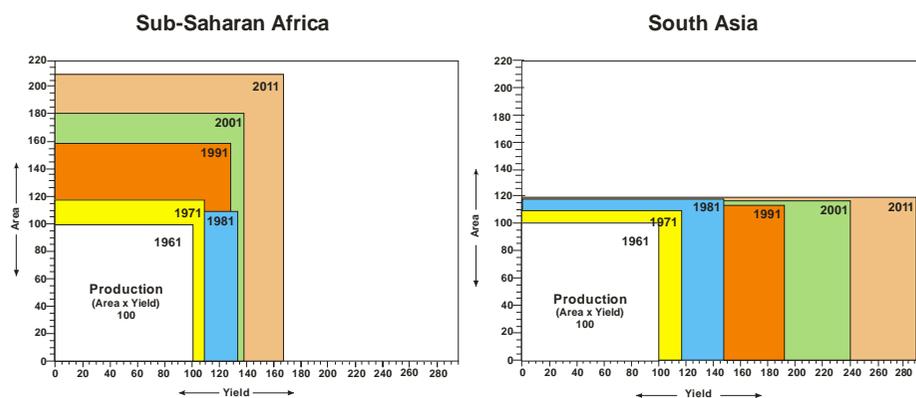


Figure 4. Distribution of fertiliser consumption among major fertiliser consuming countries in SSA between 1995 and 2009. Derived from FAOSTAT, FAO statistical database, www.fao.org.

Nearly 40% of the fertiliser consumed in SSA is used on maize, followed by other cereals (wheat, barley, teff, sorghum and millet). Fruits, vegetables and sugar cane account for 15%, and rice, tobacco, cotton and traditional tubers (cassava, yams) account for 2-3% each (Morris *et al.*, 2007).

Low fertiliser use has contributed to severe nutrient mining. Henao and Baanante (1999) estimated that in several SSA countries nutrient depletion exceeded more than 60kg/ha during the mid-1990s due to continuous cropping with little or no replenishment of nutrients.

Figure 5 uses FAO statistics to compare increases in agricultural output between South Asia and SSA. Between 1961 and 2011 in South Asia, productivity per unit area increased 2.9 times while the area under cultivation increased 1.2 times. In SSA, productivity per unit area increased by 1.65 while the area under cultivation increased by 2.1. Over the last 50 years, production growth has come mainly from area expansion in SSA, and from agricultural intensification or yield increases in South Asia. Clearly there is a need to increase fertiliser use substantially in SSA to increase agricultural productivity and to restore the soil nutrient balance.



Source: Derived from FAO data.
Figure 5. Growth of cereal yield and area under cereal production in South Asia and SSA between 1961 and 2011 (1961 = 100 for yield and area).
 Derived from FAOSTAT, FAO statistical database, www.faostat.fao.org.

3. FERTILISER PRODUCTION IN AFRICA.

3.1. Raw materials (N-P-K) for fertiliser production.

Africa is well endowed with natural resources for fertiliser production (Van Kauwenbergh, 2006, 2010). These resources include deposits of phosphate rock (Figure 6a), accumulations of natural gas and deposits of coal that can be used to produce nitrogen fertilisers, and potash deposits (Figure 6b). North Africa (Morocco, Tunisia, Algeria and Egypt) has substantial resources of phosphate rock and natural gas. Egypt, Morocco, and Tunisia account for

88% of Africa's fertiliser production, most of which is exported. South Africa, the fourth-largest producer, has significant phosphate rock deposits and produces 90% of its phosphate fertiliser requirements. Currently there is no commercial production of potassium in Africa.

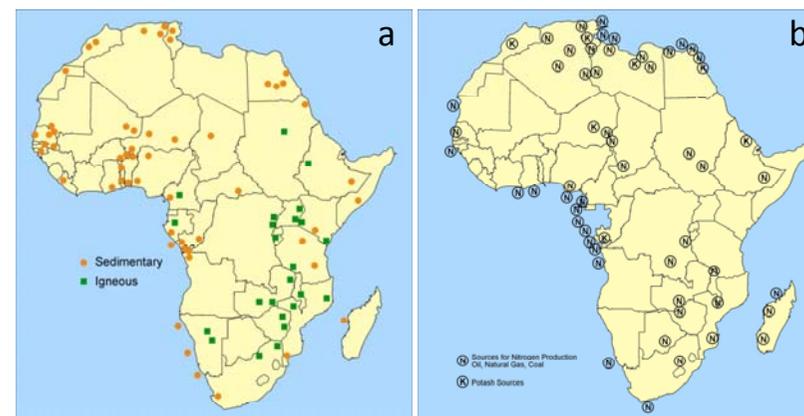


Figure 6. Significant phosphate rock deposits (a) and nitrogen and potash resources (b) in Africa. Source: van Kauwenbergh, 2006.

In many countries in SSA the deposits of raw materials are often too small to be commercially viable, or the quality of resources presents production challenges. In addition, resources are often poorly located in relation to domestic and export markets and/or markets are too small to realise economies-of-scale in production. Although there are numerous small deposits of phosphate rock throughout SSA, substantial commercial deposits are found only in Tanzania, Togo and Senegal; preliminary explorations have also indicated substantial deposits in Mozambique and off the coast of Namibia. The Democratic Republic of Congo (DRC) and Ethiopia are the only countries in SSA with commercially viable deposits of potash. Nigeria, Angola, Equatorial Guinea, Ethiopia, Ivory Coast, Ghana, Mozambique, Namibia, DRC, Madagascar and Tanzania have considerable deposits of natural gas.

The main fertiliser producers in SSA are Mauritius, Senegal and Zimbabwe, and Nigeria has recently resumed urea production. Zambia has produced nitrogen and phosphate fertilisers in the past, but production has declined substantially in recent years and current production levels are unknown. Tanzania currently produces small quantities of phosphate fertilisers (Minjingu guano deposits). Small-scale production of phosphate rock for direct application takes place in Burkina Faso, Madagascar, Mali, Senegal and Zimbabwe. Bulk blending plants have been established in all the larger fertiliser using countries: Ivory Coast, Ghana, Malawi, Mozambique, Nigeria, Tanzania, Kenya, Zambia and Zimbabwe. Ethiopia will establish blending operations in 2013.

3.2. Current production.

Fertiliser production has increased substantially in the past 20 years. In 2010 the fertiliser industry in Africa produced 7.4 million tonnes of nutrients, compared to 4.9 million tonnes produced in 1990. Reliable production statistics are unavailable, but we estimate that in 2010 the total production in SSA was between 100,000 and 200,000 tonnes of nutrients. Africa as a whole only accounted for about 4% of world production in 2010 (FAOSTAT).

3.3. Investments in fertiliser production capacity.

Several investments are planned or ongoing to expand fertiliser production in SSA.

Urea. Nigeria – currently the only urea producer in SSA – has the potential to become a manufacturing and export hub within the next five years. Currently there is one plant with a production capacity of 500,000 tonnes per year, but several companies (Nigerian and Indian investors) have advanced plans for construction of ammonia-urea plants, which could increase capacity to well over 5 million tonnes/yr. In Gabon a urea plant with a capacity of 1.3 million tonnes/yr is at an advanced stage of feasibility assessment. This is a joint investment of the Government of Gabon with Indian and Singaporean investors. In Angola a Japanese consortium is preparing to construct a 1.75 million tonnes/yr urea plant. Three companies are currently considering urea production in Mozambique, based on proven offshore gas reserves. In Ghana, preliminary plans have been developed to invest in urea production using offshore gas reserves.

Ammonium sulphate. An American company has been contracted to market 250,000 tonnes/yr of locally produced ammonium sulphate in Madagascar. This agricultural fertiliser is a by-product of the hydrometallurgical process used to recover nickel and cobalt by the mining company Ambatovy. At present the product is being packed into containers and exported by sea, but there are plans to stimulate local demand for ammonium sulphate in Madagascar.

Phosphate. In Mozambique, a Brazilian mining company will soon complete its study to estimate phosphate reserves. The original estimates are 155 million tonnes of apatite ore, making it the largest known reserve in Central and East Africa. Mining is expected to start in 2017, but the level of processing is yet unknown. In Namibia the Australian owned Sandpiper Marine Phosphate project located 60 km offshore Namibia has announced an estimated initial reserve of 133 million tonnes at 20.41% phosphate. At 1.7 billion tonnes, including the initial reserves, the Sandpiper Project is the world's largest marine phosphate resource. The project expects to produce 3 million tonnes/yr of marketable rock phosphate concentrate. Production is scheduled to begin in late 2013 or early 2014 pending the outcome of an environmental impact assessment.

Potash. In Ethiopia, Allana Potash, a Canadian investment, completed a positive feasibility study in February, outlining plans to produce 1 million tonnes/yr of muriate of potash (MOP) via solution mining/solar evaporation from the Sylvinitic Zone. Allana has secured financial support from two major investors, allowing it to start building its operations. An Australian exploration firm is considering options to fund the development of the Sintouka potash project in the DRC, which it has estimated could produce 1.8 million tonnes/yr. Production is scheduled to begin in 2015, ramping up to full output by 2017.

Currently, the majority of Africa's fertilisers are produced in North Africa and marketed globally, not within SSA. Fertiliser is a globally traded commodity; most of the investments described above do not specifically target the African market but are driven by commercial considerations including the attractiveness of the feedstock (quality and price) and the geographic position in relation to markets. However this is expected to change in the coming years, as countries have a greater say in the use of their natural resources and even take commercial positions in industrial programs that are important to their development. This will provide a competitive advantage (through reduced transport costs) for companies producing on the African continent. It will also create significant savings in foreign exchange, and industrial development opportunities through value addition to the raw material.

4. CONSTRAINTS TO FERTILISER MARKET DEVELOPMENT.

4.1. Fertiliser supply chain.

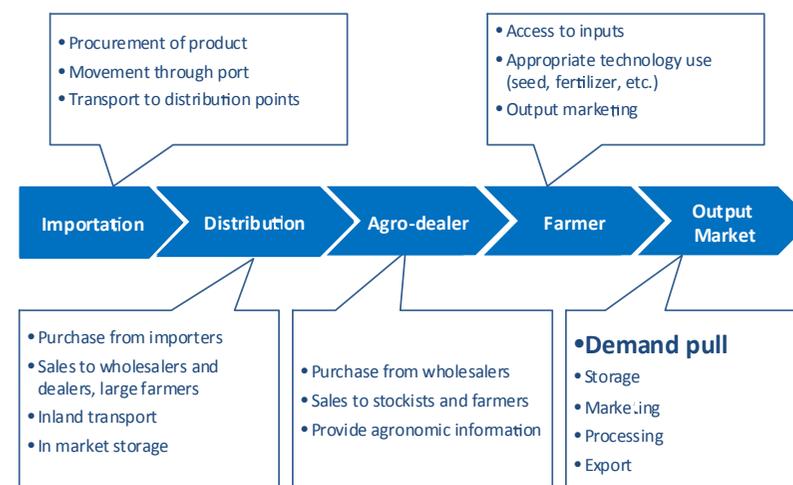


Figure 7: Schematic representation of the fertiliser supply chain.

Average fertiliser use levels in SSA are the lowest in the world due to weak national fertiliser marketing and distribution systems and high transaction costs. The transaction costs are exacerbated by supply-side and demand-side constraints, which severely hinder the development of private sector-led fertiliser markets. As a result, Africa's fertiliser sector is characterised by irregular, costly supply and low demand. The remainder of this paper examines the fertiliser market in Africa, supply- and demand-side constraints to its performance and makes recommendations for policy responses.

Figure 7 is a schematic representation of the fertiliser supply chain. Because production capacity in SSA is limited and concentrated in a few countries, the majority of fertiliser is imported and partly re-exported to land locked countries within the region. Importation into Africa is thus the starting point of the supply chain. Although importation is mainly by the private sector, in a number of countries governments still import fertiliser either directly or via private importers for their fertiliser subsidy programs. Importation is followed by distribution, which includes transportation mainly by road, from the port to the distributors and agro-dealers. Increasingly, importers and distributors are involved in fertiliser blending, tailoring nutrients to specific market segments.

The next step is actual sales by agro-dealers to farmers, either directly or through smaller 'stockists' based in the rural interior. This is followed by the use of fertiliser by the farmers. The final step is marketing of the agricultural goods produced, which generates the revenues needed for farmers to invest in fertilisers and other inputs. In order to reduce financing costs and risks related to fertiliser price fluctuations, all actors (importers, distributors, agro-dealers, farmers) tend to procure as late as realistically possible. This leads to a compressed time frame for importation, distribution and sales, and to considerable pressure on the entire value chain. The result is higher logistics cost, reduced flexibility to position fertiliser in the target market, greater risk of missed market opportunities, and the possibility of unsold stocks.

4.1.1. Importation.

Fertiliser importers in SSA face a number of constraints. They are procuring relatively small quantities compared to the size of global trade flows; and therefore have limited bargaining power and often have to pay premium prices. High financial charges associated with letters of credit and interest can limit the ability of importers to secure additional volume or larger loads and are a barrier to entry for new market participants.

Freight rates to most SSA ports are high, for various reasons. Limited port capacity dictates the use of small vessels, typically about 15,000 tonnes. There are limited opportunities for backhauls. Ports are congested; delays of 7-10 days before berthing are common. In most cases, the fertiliser consumed in Africa is in granular form. Therefore, it is either imported bagged or imported in bulk and bagged at the port. Discharge capacity at the ports is generally low. Inefficient and often inaccurate bagging equipment adds to the cost and delays. Warehousing capacity is limited in many ports.

As a result, fertiliser prices ex-port are at least \$200/tonnes higher than free on board (f.o.b.) prices in the world market. This is illustrated in Figure 8, which shows the build up of farmgate fertiliser cost in Tanzania (IFDC, 2012b).

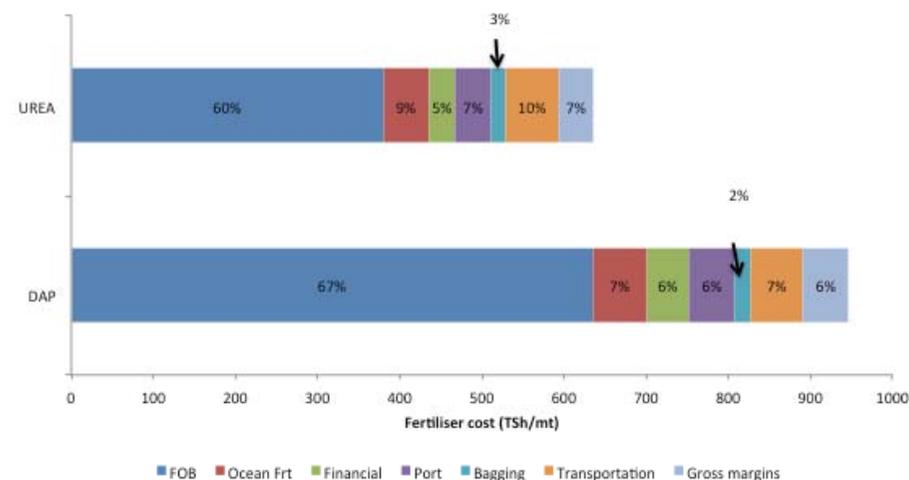


Figure 8. Cost build up for DAP fertiliser in Tanzania.

4.1.2. Distribution.

Distribution involves transport from port facilities to distributors or fertiliser blenders. The contents of each 15,000 tonnes vessel are equivalent to about 1,000 truckloads, that must be transported to port warehouses within an already congested facility, and a similar level of traffic to move the fertiliser to distributors' warehouses outside the port. Rail transport is 30% cheaper than road transport, but rail movement in most African countries is constrained by antiquated and poorly maintained lines, poor service and limited availability of rolling stock. As a result, there is heavy reliance on trucks. The small loads typical in domestic movements, excessive travel time, the seasonal nature of demand, and the limited opportunities for backhaul push tariffs up.

An effective logistics system must be efficient in allocating freight over time and across products and markets. It requires information and flexibility to react to changing conditions and market signals. Much of that flexibility depends on storage capacity. Optimal storage allows pre-positioning of products near final demand and spreading of product flows over a longer timeframe. This lowers 'peaks' in transportation demand while increasing the opportunity for backhaul and other logistics synergies. It also enhances the ability to react quickly to market signals, directing fertiliser to areas with greater demand and reducing the risk of stranded supplies at the end of a season. Storage also facilitates integration along the value chain by creating opportunities for linkages to develop across distribution and retailing activities in order to capitalise on information and functional expertise.

Storage capacity in the interior regions of SSA is severely limited, because storage requires capital to install and operate, but financing is limited by high interest rates and collateral requirements. Lack of storage is thus a major constraint along the value chain.

Transport costs are the second largest component of the retail fertiliser price, especially in landlocked countries. Transport costs are high for a number of reasons: long travel distances between the ports and the main consuming areas; poor road conditions, road blocks (for inspection and clearance), an escort system for cross-border movement (to prevent theft), lack of competition among trucking companies, taxes and levies. In 2012 IFDC assisted in the first shipment of fertilisers into South Sudan. The fertilisers were procured from a distributor in Nakuru, Kenya; the transport of 500 tonnes fertilisers over a distance of 600 miles took 11 days and cost more than \$250/tonnes. Costs for inland transport of fertiliser to landlocked countries like Mali, Zambia, Rwanda and Uganda are in the same order of magnitude and make up over 30% of the price at agro-dealer level. This is illustrated in Figure 9 which shows the build up of farmgate cost of urea for a coastal country in Asia (Thailand), a coastal country in Africa (Tanzania) and a land-locked country in Africa.

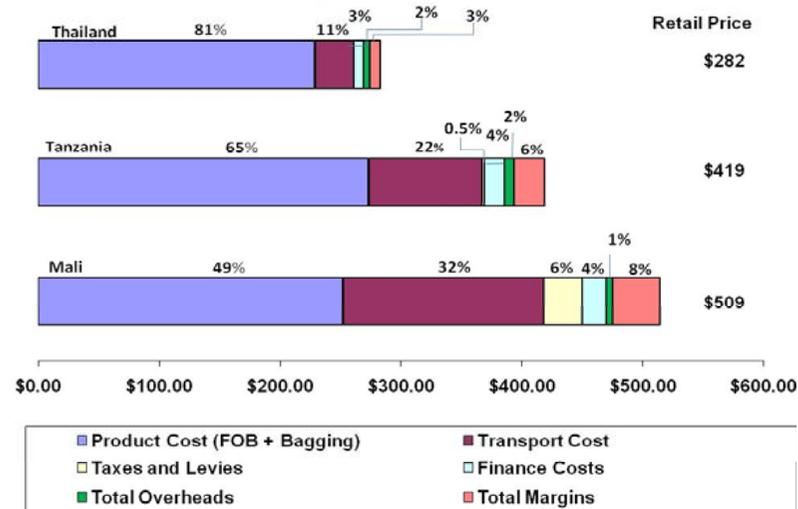


Figure 9. Fertiliser price build up of urea prices in 3 countries, 2007.

4.1.3. Retail sales by agro dealers.

Retailers (agro dealers and stockists) face many of the same constraints that distributors do. Transport costs grow as fertiliser moves deeper into the market and closer to the farmgate. The issue of small volumes becomes even more pressing with low-margin commodity products. Low margins on low

volume do not encourage investing the time and effort to develop expertise or build a business, but increased volumes could elicit greater interest in developing retail-level operations. Even small increases in storage capacity could significantly improve the effectiveness of the market, although carrying some financial risk.

Many retailers lack the technical knowledge to advise farmers on the use of inputs. Many also lack marketing and business skills, making agro-dealer training imperative. The near absence of credit for small agriculture-related business limits their ability to achieve scale and profitability or to broaden their services to meet, let alone strengthen, farmer demand. An additional risk lies in the very tight timeframe between procurement by the importers/distributors and delivery to the agro-dealer, leading to risks of fertiliser arriving too late in the season, resulting in unsold stocks and inability to repay credits.

In recent years several donor agencies have focused on 'agro-dealer development': improving the quality of agro-dealer services to farmers in an attempt to increase sales; establishing business linkages between agro-dealers, fertiliser distributor and banks; introducing credit guarantees; loan programs to increase warehousing capacity for both inputs and agricultural outputs; and improving agro-dealers' access to market information. There are some remarkable successes where entrepreneurial agro-dealers have become 'agents of change' – they have grown into professional service providers who have partly taken over the role of government extension services. However, for agro-dealer development to be successful it must be combined with improvements across the value chain and with improved linkages of farmers to output markets, providing them the purchasing power to invest in fertilisers and other inputs.

4.1.4. Farmer demand.

Few farmers are using fertiliser, improved seeds and other inputs; much of the limited quantities applied are used on cash/export crops. Having the right quality of fertiliser at the right time for an affordable price will not automatically lead to an increase fertiliser use. Most farmers are still subsistence producers with little or no knowledge of inputs. They do not produce enough marketable surpluses to invest in inputs and are not familiar with the concept of 'farming as a business' in which the use of fertiliser is a cost versus return calculation.

In many SSA countries and for most crops, fertiliser recommendations are outdated. Most are 'blanket' recommendations, not based on soil nutrient status but rather on the availability of a limited choice of fertilisers (mostly DAP, urea, NPKs) and do not take soil micro nutrient deficiencies into account. The use of inappropriate fertilisers (based on official recommendations) has led to low return on farmer investments, and reduced farmers' confidence in national extension services. Updated recommendations and farmer training on fertiliser use (timing, dosages, application methods) are essential, but national research and extension systems in SSA have been

weakened by funding cuts imposed in the 1990s as part of structural adjustment programs.

A number of governments and development partners have introduced initiatives to increase farmer access to and use of fertilisers. Many countries have introduced fertiliser subsidies, thus minimising the financial burden to invest in fertilisers (see section 5.2). Recent donor driven agro-dealer development programs include demonstration plots that clearly show the yield benefits of using improved seeds and the right fertilisers. When combined with subsidy programs these interventions have dramatically increased fertiliser adoption rates. Alternatively, micro-credit programs have made it possible for farmers to access fertilisers; a good example is the One Acre Fund (www.oneacrefund.com), which uses a successful business model to provide fertilisers and hybrid seed to resource poor smallholder farmers.

4.1.5. Output marketing.

In 2010, during a statement to the US House of Representatives Committee on Foreign Affairs, the Administrator of the United States Agency for International Development (USAID), Rajiv Shah, stated that "...agricultural productivity growth remains at the core of our food security agenda, we know that food security will take more than increasing yields. Productivity growth will not translate into increased incomes unless we help small farmers to access markets, sell their increased yields, and thereby generate the income to pull their families and communities out of poverty".

Access to fertiliser is generally not a problem for cash crops or export crops because the farmer has a guaranteed market for produce. For traditional food crops, near-farm storage would help reduce post-harvest losses, increase marketing opportunities so farmers would be less constrained to sell their output at harvest time, provide a safety buffer for food supplies, and provide the collateral necessary to participate in credit markets. 'Farming as a business', where farmers produce for a guaranteed market, will become a major driver for increased fertiliser demand in SSA. There are multiple examples of agribusiness driven approaches to address these challenges and a good analysis can be found in Maatman *et al.* (2011). Section 5.3.1 explains how investments in output marketing can stimulate fertiliser consumption.

5. STIMULATING FERTILISER DEMAND.

5.1. Introduction.

A conducive policy and institutional environment is critical to stimulate fertiliser use in Africa; national and regional policies should be in place to create the market conditions necessary to foster a competitive and sustainable private-sector led fertiliser market. The key components of such a policy framework are: a stand-alone fertiliser law that establishes a clear and efficient process for the governing and operations of the fertiliser market; enforcement of the law through a clearly-defined regulatory body; abolition or at least

minimisation of tariffs and taxes on fertiliser to allow companies to better predict the cost structure of fertiliser and keep prices low for farmers; a clearly articulated and predictable fertiliser subsidy policy (if any); provisions to improve credit availability for fertiliser suppliers and farmers; incentives to promote local fertiliser blending and/or manufacturing as appropriate and investments in road, rail and port infrastructure to support the fertiliser supply chain.

Output markets, which generate the revenues that enable farmers to invest in fertiliser, are the major driver for expansion of fertiliser consumption. The global fertiliser industry is beginning to focus on the large potential fertiliser market in Africa and is developing initiatives to support the growth of this market. This chapter reviews the role of national and regional policies, the role of the output market, and the initiatives by the fertiliser industry to increase fertiliser consumption in Africa.

5.2. National and regional policies.

The broad objectives of fertiliser policy in African countries include one or more of the following: 1) to ensure adequate and timely availability of quality fertilisers to farmers at affordable prices, 2) to ensure equitable distribution of fertilisers across the country, 3) to encourage domestic production to reduce dependence on imports and protect farmers from high and volatile international prices. Most governments in SSA have declared fertiliser as a strategic commodity and govern the importation, distribution and marketing either through formal legislation (as a stand-alone legislation or as part of a broader act for the control of agrochemicals) or by administrative decisions. Some governments have also introduced measures for quality control and are considering elimination of taxes and tariffs on fertilisers. Nevertheless, the development and implementation of a conducive policy and regulatory environment remains a challenge.

The Abuja Declaration on Fertilisers was issued in 2006 (IFDC, 2007), to monitor progress in implementing the Declaration, the NEPAD agency conducts annual surveys in individual countries. The 2011 progress report shows that Mali increased the numbers of fertiliser inspectors from 12 to 31; Uganda increased it from 35 to 70. Burundi has removed the value-added tax (VAT) on fertilisers. Cameroon removed the common external tariff (CET); Seychelles removed the import tariff. Mali removed the VAT on fertilisers but introduced a withholding tax on fertiliser. Kenya has no tariffs or taxes on fertilisers, but importers pay an Importer Declaration Fee at the port.

These interventions are steps in the right direction but are often taken on an ad-hoc basis. There is a need for governments to take additional steps to develop a consistent, comprehensive strategy. According to the latest Abuja progress report, only 49% of the respondents to the survey have a formal legal and regulatory framework in place to govern their fertiliser subsector. About 84% carry out fertiliser inspections at the point of sale. While there is progress in some countries in terms of increasing the number of inspectors, the majority of countries have either none or an unrealistically small number of inspectors.

Tariffs and taxes in many countries add significant costs to fertiliser trade; 21% of the respondents in the latest Abuja progress report had taxes on fertilisers. Some countries charged numerous small levies such as the "shipper and council" tax in Ghana and Mali. In the ECOWAS region (Economic Community Of West African States), although fertiliser is exempt from the Common External Tariff, some countries still charge import duty. Moreover, in some countries non-tariff trade barriers such as state-issued trading licenses limit competition by making it difficult for new firms to enter the market. For example in Zimbabwe, a permit must be obtained from the Ministry of Agriculture to import or export fertiliser, and the government is currently not issuing export permits under the Control of Goods Act as a means of implementing a general export ban on fertiliser (USAID-EGAT, 2012).

With increasing liberalisation of agricultural markets in Africa, the private sector is increasingly free to engage in fertiliser procurement, marketing and distribution. However, in many countries the government is still involved to some degree, particularly through government fertiliser subsidy programs. Currently over 10 African countries have subsidy programs. These programs were introduced at different times and for different reasons, and the governments in these countries are likely to continue providing subsidies for the foreseeable future. The design and mode of implementation of the subsidies varies considerably across the countries (Table 2).

In the past, removal of subsidies had mixed impacts, but generally resulted in a decrease in fertiliser use. Therefore, a key expectation of subsidy programs is increased agricultural production. A study by the International Food Policy Research Institute (IFPRI) (Minot, 2009) compared fertiliser use (five-year average) before and after subsidy elimination, in nine countries that had distinct periods of phasing out subsidies. The study revealed that fertiliser use declined by 40% in Nigeria and Ghana and 25-29% in Cameroon, Senegal and Tanzania. However, in some countries, namely Benin, Togo and Mali, fertiliser use increased in spite of the removal of the subsidy. In Benin and Togo, the increase was due to the expansion of the cotton sector, and increased fertiliser use on rice and horticultural crops. In Mali, fertiliser consumption increased from an annual average of 17,582 tonnes during 1980-89 (before subsidy removal) to 44,560 tonnes during 1996-2000 (after subsidy removal) due to the expansion in cultivated area (Janey *et al.*, 2003).

A recent study by NEPAD, IFDC, the Food and Agricultural Organisation of the United Nations (FAO) and the Alliance for a Green Revolution in Africa (AGRA) (Wanzala *et al.*, 2013, in press) analysed fertiliser subsidies in eight SSA countries. The study reveals that the eight subsidy programs have improved smallholder access to fertilisers and increased yields and production. However, they also have their drawbacks: poor targeting of needy families, delays in delivery of fertiliser leading to late application and hence effectiveness, lack of an exit strategy, high budgetary costs, and crowding out the private sector.

Table 2. Fertiliser subsidy programs in sub-Saharan Africa: key characteristics.

Key characteristics		Modalities of implementation by country			
Country (year current subsidy program introduced)	Government justification for subsidy program	Procurement	Distribution	Targeted beneficiaries (input voucher or universal subsidy)	Subsidy rate (% of market price for 50-kg bag of fertiliser)
Burkina Faso (2008/2009)	Provide financial support to the 3 cotton companies to purchase fertiliser Boost the production of staple foods, mainly maize and rice by 17%	Direct procurement by the government	Exclusive distribution by government	No targeted beneficiaries Universal subsidy paid at source	26%
Ghana (2009)	Facilitate access and encourage fertiliser use by small-scale farmers to increase food production	Government procurement through private sector importers with a pre-negotiated price No tender issued	Distribution by private sector distribution network (registered agents and independent retailers)	Self-selection, i.e., if farmer can raise 60% of market price of fertiliser As long as stocks last No targeted beneficiaries Universal subsidy paid at source	40%
Malawi (2005)	Safeguard food security for poor households (i.e. enable poor farmers to produce larger share of own food requirement) Reduce food import bill	Government procurement via private sector tender	Distribution by state-owned enterprises (SFFRM, ADMARC)	Input vouchers distributed by government to designated households	92%
Nigeria (1999)	Make fertiliser accessible to small farmers at reasonable price and increase food production	Procurement by government under contracts with private sector, based on a tender-bid to supply subsidised fertiliser	Distribution through public outlets at the state and local levels	Not targeted	25% subsidy from FGN and 40-60% additional and optional from state and local authorities, for a potential max subsidy of 85%

Table 2. Fertiliser subsidy programs in sub-Saharan Africa: key characteristics (cont.).

Key characteristics		Modalities of implementation by country			
Country/year current subsidy program introduced)	Government justification for subsidy program	Procurement	Distribution	Targeted beneficiaries (input voucher or universal subsidy)	Subsidy rate (% of market price for 50-kg bag of fertiliser)
Rwanda (2007)	Phase out government involvement in retail fertiliser distribution and increase private sector involvement Shield farmers from high global fertiliser prices	Bulk procurement by government	Auction to qualified private sector bidding companies by MINAGRI	Input vouchers distributed by government to selected farmers	Voucher provides 50% discount on 50 kg bag of urea and 100 kg bag of DAP (enough for 1 hectare)
Senegal (2000)	To reactivate the agriculture sector to supply domestically the food demanded by the increasingly urbanised population Increase fertiliser use and food security	Procurement by government under contracts with private sector, based on a tender-bid to supply lots of subsidised fertiliser	Distributed by local committees at community level, who assign fertiliser to farmers in the most equitable way and on a first-come, first-served basis	Vouchers assigned by local community committees with quantity (number of bags assigned) per farmer, to be purchased at a subsidised price at a local warehouse	Coupon is expected to cover up to 50%
Tanzania (2008)	To develop the private input supply system, reduce poverty and attain national or household food security	Procurement through private sector importers	Distribution by private distribution network (registered and trained agro-dealers)	Input vouchers distributed by government to selected farmers	50%
Zambia (2002)	Improve access to and use of fertiliser among smallholder farmers to increase production and national food supply	Procurement by government under contracts with private sector, based on a tender-bid to supply lots of subsidised fertiliser	Cooperatives and farmer associations	Smallholder farmers	50%

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Most countries in SSA import their fertilisers rather than producing them locally. This is likely to continue for the foreseeable future because domestic production is limited by quantity or quality of raw material, geography and logistics, economies-of-scale and other factors. For example, a modern ammonia/urea plant requires an investment of up to 1 billion US\$ and produces 1,500-3,500 tonnes per day (modified after Gregory and Bumb, 2006). In comparison, over 50% of the countries in SSA consume less than 50,000 tonnes per year.

Nevertheless, there are countries in Africa where the fertiliser industry is making strides with blending and/or manufacturing activities and governments are providing the requisite policy support. For example, efforts to expand fertiliser production in Tanzania have received strong support from the government. The Minjingu Phosphate Fertiliser Manufacturing Company recently began granulating its fertiliser to produce a Nitrogen-Phosphate-Sulphur (NPS) micronutrient enriched formulation that can be used as basal dressing and is cheaper than DAP on a per nutrient basis. The government has contracted Minjingu to supply 64,000 tonnes of this fertiliser for the government's fertiliser subsidy program. As a result, Minjingu has increased capacity from 20,000 to 65,000 tonnes, established a countrywide distribution network, and now aims to contribute to the regional market.

Fertiliser companies have difficulty accessing credit due to high interest rates and stiff collateral requirements. Governments and/or development partners can collaborate with local commercial banks to create credit guarantee funds. In this arrangement, the importer raises a portion of the funds needed for a letter of credit (20-30%) and the local bank provides the remainder as a loan. The government or development partner then provides a guarantee for a portion of the loan in case of default, which lowers the interest charged to the importer. Such a scheme is already operating in Kenya and Ghana through partnership between AGRA and Standard Bank, as well as with four other local banks in Kenya. To date, AGRA's financing programs have established credit-guarantee funds in five African countries and leveraged \$150 million in low-interest loans for smallholder farmers and agribusinesses (see <http://www.agra-alliance.org/content/story/detail/1002>).

5.3. Regional policy.

There have been some developments at the regional level to improve fertiliser use. However, the Common Market for Eastern and Southern Africa (COMESA) is the only regional grouping that has made progress towards developing a regional fertiliser policy, and this has been a lengthy and cumbersome process. In 2010 the ECOWAS and UEMOA (Union Economique et Monétaire Ouest Africaine) Commissions embarked on the development of a regional legal framework to harmonise national fertiliser quality control regulations. As part of this process, two studies were commissioned. The first study assessed the physical and chemical quality of fertiliser products traded in West Africa. The second study was on the development and adoption of a regional legal framework for fertiliser quality control. It evaluated the existing

analytical laboratory capacity and the inspection capacity of nine of the 15 ECOWAS member states. In member countries with legal frameworks governing the import/production and distribution of fertilisers, this framework was evaluated. On this basis a regional legal framework was developed to coordinate quality control of marketed fertilisers within the region. The study was validated at a technical regional workshop held in Togo in December 2010. Subsequently, this regional regulatory framework was recommended for adoption by the ECOWAS Council of Ministers, at a meeting of the ECOWAS Technical Specialized Committee for Agriculture, held in Ivory Coast in September 2012. The Committee is composed of Ministers of Agriculture of the ECOWAS member states. The next steps are to develop legal instruments for fertiliser inspection and analysis and a strategy for capacity building at the national level to ensure effective implementation. With these legal instruments in place, the region will be equipped with the tools for fertiliser quality control and the process of setting up a regional regulatory body will commence.

Other regional fertiliser initiatives include a study commissioned by the ECOWAS Commission in Benin, Ghana, Nigeria, Senegal, and Togo to assess the challenges and opportunities for domestic fertiliser production in West Africa. The study will recommend priority interventions to promote fertiliser production and trade. There has also been some movement within the Southern African Development Community (SADC). A study on fertiliser production opportunities in the region (Malawi, Mauritius, Mozambique, South Africa, Tanzania, Zambia, and Zimbabwe) was conducted in 2009 and a key recommendation was that the region consider harmonising fertiliser labelling in all member states. The SADC Secretariat is in the process of developing a simple harmonised labelling system.

In June 2009 the Alliance for Commodity Trade in Eastern and Southern Africa (ACTESA) was formally established as a specialised agency of COMESA. ACTESA aims to increase the productivity of smallholders in the region by building market information systems, providing services, and increasing commercialisation in various commodities. The COMESA/ACTESA Regional Agro-Inputs Program (COMRAP), funded by the European Union, was designed to respond to rising food prices by increasing agricultural productivity. It focused on improved financial services (capacity building at banks and the development of weather-indexed insurance for smallholders); strengthening agro-dealer networks to improve the supply of agro-inputs to smallholders; and harmonisation of seed regulations and standards. The program ended in 2012 and there has been no follow up due to lack of funding.

5.4. Output markets as driver for fertiliser demand.

Improved access to output markets can enable farmers to access the financial resources required to purchase fertilisers and other agro-inputs. For globally traded cash crops, commodity boards or commercial companies normally pre-finance input purchases, recovering the loans through a reduction in output

price. The same applies for high-value horticultural products for export. On large commercial farms the input cost is just a fraction of the value of the product and can easily be covered through cash flow or credit. For specialised smallholder horticultural producers the exporting companies either pre-finance the required fertilisers and seeds, or the growers can access credit based on a delivery contract with the exporter.

Similar arrangements exist for food commodities where large-scale commercial farming is combined with 'out-growers'. Smallholders (the out-growers) near the commercial holding are producing the same commodities as the 'lead farm' and enter into contractual delivery arrangements with the lead farm. The lead farm pre-finances the inputs and procures and stores the outputs from the smallholders. Out-grower schemes address several smallholder constraints: access to credit, timely access to quality inputs, availability of warehousing capacity and access to markets.

For traditional food commodities, near-farm storage of crop output can provide collateral, allowing farmers to obtain credit. The attractiveness of warehousing stems from the generally low prices prevailing just after harvest. This 'inventory credit' (or warehouse receipt) system provides several benefits; it helps reduce post-harvest losses, increases marketing opportunities so farmers are less constrained to sell off their output at harvest, provides a safety buffer for food supplies and provides the collateral necessary to obtain credit for input purchase. Inventory credit systems require a certain degree of farmer organisation, availability of (costly) storage facilities and sometimes the need for a credit guarantee by a third party (normally a donor or a government) before banks are willing to release credit.

Agro-dealer development has recently received considerable attention from governments, donors and the fertiliser industry. Agro-dealers play a key role in 'last mile delivery' of inputs. Improving the quality of agro-dealers' services to farmers could increase the volumes of fertilisers reaching farmers. For a comprehensive overview, see the end-of-project report of the IFAD-funded project 'Extending Agro Dealer Networks' in Kenya, Tanzania and Uganda (IFDC, 2012a – report available on www.ifdc.org). The report shows that it is possible to professionalise agro-dealers and increase their sales through a combination of activities; 1) strengthening technical and commercial capacities of agro-dealers and government extension staff, so they can offer farmers technical advice on input use, 2) technology transfer through farmer field days, visits to crop demonstrations showing the benefits of fertilisers, improved seeds and other good agricultural practices, 3) agro-dealer study tours and exchange visits to successful agro-dealers in other regions or countries, 4) training on how to establish business linkages between agro-dealers and banks, fertiliser distributors and seed producers, producer groups and business associations.

Micro-credit programs can allow farmers to access fertilisers. A good example is the One Acre Fund (www.oneacrefund.com), which has a successful business model to provide fertilisers and hybrid seed to resource-poor

smallholder farmers. One Acre Fund – a not for profit NGO – uses its own capital base, mainly originating from donations. It provides loans for seeds and fertilisers to small (10-15) farmer groups. The interest on the loans is used to cover the Fund's operational costs, mainly the cost of extension agents. These agents focus on the most essential crop management practices through frequent (weekly) interactions with each farmer group. Because of the frequent interactions with the farmers and social controls within the farmer groups, repayment of loans is 99% and farmer retention (farmers joining again in the next season) is 90%. One Acre Fund currently provides inputs to 130,000 small farmers in Kenya, Rwanda and Burundi and is expanding its operations into Tanzania and Ghana. The Fund recovers 75% of operational costs; the other 25% is covered through donor funding. It aims for 100% recovery in the next 5 years, making this a 'no-cost' alternative for fertiliser subsidies and donor driven technology transfer programs.

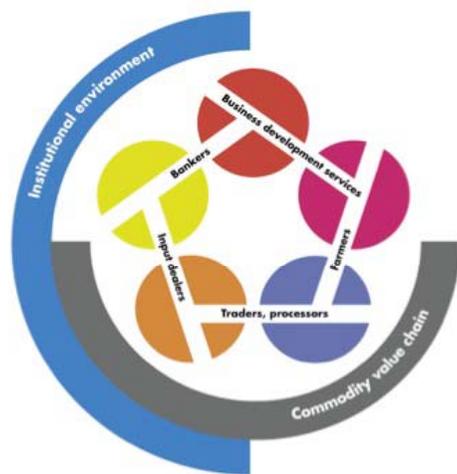


Figure 10. Schematic representation of the CASE approach.

'Farming as a business' will be a key concept in the development of agri-input markets. In their book 'Competitive Agricultural Systems and Enterprises (CASE): a grassroots approach to agribusiness development in Sub-Saharan Africa', Maatman *et al.* (2011) explain how 'agribusiness clusters' can integrate smallholder farmers in local, national and even global value chains, thus establishing effective linkages between input markets, farmers and output markets. An agribusiness cluster (see Figure 10) is defined as a group of value chain operators, supporters and enablers that have identified a common agenda to implement a business idea. They endeavour to learn and work together to innovate and to implement coordinated action around a specific commodity, but may operate in one or more value chains. Typically cluster actors operate in close physical proximity to each other. Cluster members may include agro-dealers, financial institutions, public and private business support service providers, producers (and/or producer organisations, or

POs), traders and processors. Each cluster is considered a unique public-private partnership. Using this approach, during the period 2006-2011 IFDC reached over 700,000 smallholder farmers, and more than doubled their productivity. At a conservative estimate, fertiliser demand by these farmers increased by 70,000 tonnes .

5.5. Market development initiatives by industry.

The International Fertiliser Industry Association (IFA) represents the global fertiliser industry. For the last 20 years IFA has provided funding to IFDC to work on Integrated Soil Fertility Management and on linking smallholder farmers to input and output markets. These investments have contributed greatly to the development of the Agribusiness Cluster Approach (Maatman *et al.*, 2011) which has attracted considerable attention from the donor community and has become a mainstream model to increase agricultural productivity through improved linkages between farmer groups, input dealers, output markets, credit providers and local business service providers. Recently IFA has changed the focus of its development activities in Africa and provides support to www.africafertiliser.org, a global internet forum to share information on various aspects of fertiliser, soil fertility and related agricultural issues that impact Africa. IFA's support to this web-based forum illustrates the increasing industry interest in the African market.

In November 2007, IFA established an IFA Africa Forum. This IFA regional body is composed of IFA members with a long-term interest in increasing fertiliser use to improve soil fertility, agricultural production, human nutrition and alleviate poverty in Africa. The Forum provides a platform to exchange views and expertise, and to communicate the interests and positions of the fertiliser industry to key interlocutors. It contributes to greater awareness of the positive role fertilisers can play in Africa's development, and increased fertiliser use by African farmers, in line with agronomic recommendations. Since its creation, participation of the fertiliser industry in this Forum has increased rapidly, with many global players increasingly looking at Africa as an interesting market.

Several global fertiliser companies are playing a role in GrowAfrica, a partnership platform that seeks to accelerate investments and transformative change in African agriculture based on national agricultural priorities and in support of NEPAD's Comprehensive African Agricultural Development Program (CAADP), established by the African Union in 2003. We also notice increased fertiliser industry interest in the Trade Corridor concept, where the key actors in a trade corridor join forces to assess product flows. It is evident that infrastructure development in African trade corridors (port facilities, road infrastructure, railways for mining purposes etc) will improve market access to landlocked countries. Examples are the Beira Agricultural Growth Corridor (www.beiracorridor.com) and the Southern Agricultural Growth Corridor of Tanzania (www.sagcot.com).

Several global fertiliser companies now produce micronutrient enriched granulated fertiliser for specific African markets as part of their long-term

strategy to increase market share in SSA. Similarly, several blending companies have aggressively and successfully began marketing crop and soil specific micro nutrient enriched blends.

We are also seeing investment in warehouse facilities in ports that are entry points to the major African growth corridors (e.g. Beira-Mozambique, Tema-Ghana, Dar es Salaam-Tanzania, Mombasa-Kenya). These investments are being made by both global and African companies to better respond to market demand and/or to develop their own distribution channels in Africa. The only urea producer in Nigeria has invested in the development of a local distribution network and is looking into possibilities to employ the same approach in other countries.

5.6. Increasing private sector participation in fertiliser market development: the Africa Fertiliser and Agribusiness Partnership (AFAP).

Initiatives by African governments and their development partners to increase agricultural productivity and food security generally focus on capacity strengthening and improved market linkages for 'vulnerable groups' including smallholder farmers, agro-dealers and stockists. However, analysis of the supply chain indicates that various constraints in fertiliser market development are at the level of import and distribution, including small-scale local fertiliser production and fertiliser blending. Opportunities to obtain support for these activities are either limited or non-existent. Most actors in this part of the supply chain are too small or lack the collateral to access credit on the international credit market, while their size disqualifies them from donor or government supported credit guarantee facilities. One of the objectives of the African Fertiliser and Agribusiness Partnership (AFAP), which was created in 2011, is to provide targeted support to this part of the supply chain.

AFAP is an independent non-profit organisation, founded by a partnership of Africa focused development organisations: the NEPAD, AGRA, IFDC, the African Development Bank (ADB) and the Agricultural Market Development Trust - Africa (AGMARK). These partners are working together to promote the development of sustainable fertiliser markets in Africa and have designed AFAP to specifically increase *Private Sector Development and Participation* to accelerate the implementation of the Abuja Declaration on Fertilisers and ultimately to help catalyse an African green revolution. AFAP is designed to complement and further empower its partners – all of which all have impressive track records in supporting smallholder farmers to increase productivity and reduce poverty and food insecurity.

AFAP's work aims to improve market access, which is a goal set by African leaders as part of CAADP. The private sector can play an important role in bolstering markets, and AFAP provides a mechanism to establish more competitive and sustainable fertiliser markets. The principle operating mechanism for AFAP is the Agribusiness Partnership Contract (APC). Through APCs, AFAP grants assistance to eligible international, regional and local agribusinesses so they can participate in African fertiliser markets. In

return for this assistance, agribusinesses commit to making significant development commitments. AFAP assistance includes supplier payment guarantees, financial products, matching grants, identification and training of local entrepreneurs, capacity development on fertiliser use and Market Information Systems on fertiliser use, pricing and availability.

5.7. Fertiliser demand development for specific countries.

In 2012, the United States Agency for International Development (USAID) requested that IFDC support AFAP with assessments of fertiliser markets in 12 African countries that are part of USAID's Feed the Future (FtF) initiative. FtF engages the private sector to meet its objectives of increasing agricultural production and farm incomes and a well functioning fertiliser sector is considered essential. IFDC's assessments provide a description of the country's fertiliser market, a fertiliser policy analysis and a simulation-based calculation of the country's fertiliser requirements to meet agricultural productivity objectives as formulated in the CAADP country plans. Simulations were done with the DSSAT¹ model and by calculating fertiliser requirements to sustain production systems. The country assessments identify the fertiliser sector constraints that must be resolved to meet agricultural growth targets for each country. Fertiliser Assessment Reports are available for Ethiopia, Ghana, Kenya, Mozambique and Tanzania (IFDC 2012b, 2012c, 2012d, 2012e, 2012f) while reports for Malawi, Rwanda, Uganda and Zambia are in press. Table 3 shows the estimated actual fertiliser consumption and the estimated required fertiliser use to meet national agricultural growth targets.

Table 3. *Estimated current fertiliser consumption and estimated required fertiliser consumption to reach national agricultural productivity objectives in selected countries in Sub-Saharan Africa.*

Country	Policy Target year	Est. Current consumption (tonnes/yr)	Est. Required consumption (tonnes/yr)	Increase factor
Ethiopia	2015	550,500	1,200,000	2.2
Ghana	2015	200,000	520,000	2.6
Kenya	2015	488,803	910,000	1.9
Mozambique	2020	51,600	312,000	6.0
Tanzania	2015	263,000	528,000	2.0

¹DSSAT was developed through collaboration between the Universities of Florida, Georgia, Guelph and Hawaii, IFDC, USDA Research Service, Universidad Politecnica de Madrid, Washington State University and other partners in the International consortium for Agricultural Systems Applications (ICASA) (Hoogenboom *et al.*, 2010; Jones *et al.*, 2003).

Table 3 shows that according to the simulations, fertiliser consumption must at least to double in order to meet national productivity goals. Mozambique is an exception; because actual fertiliser consumption is negligible, according to simulations it has to increase 6-fold. The simulations highlight the steep hill these countries must climb to increase fertiliser consumption to the required level during the planned period.

Challenges to develop the fertiliser market in these countries can be summarised as follows:

- *Ethiopia.*
Diversify the range of fertilisers available from only Urea and DAP to more appropriate fertilisers, improve agro-dealer and farmer knowledge of fertilisers, improve road infrastructure, in-country transport capacity and warehouse capacity for fertilisers and outputs, increase the role of the private sector in procurement and distribution.
- *Ghana.*
Improve port efficiency, improve fertiliser (subsidy) policy to make it private sector friendly, promote public-private partnerships for fertiliser technology dissemination, take a lead in harmonising regional fertiliser trade policies, improve rural road infrastructure and input-output storage capacity .
- *Kenya.*
Improve port efficiency, expand transport capacity, train agro-dealers and farmers in input-output marketing, improve output marketing systems through additional warehouse capacity and warehouse receipt systems, improve fertiliser (subsidy) policy to increase the role of the private sector and take a lead role in developing regional fertiliser policies, being the entry point of the supply chain for several countries.
- *Mozambique.*
Improve port and port storage capacity, reduce post harvest losses, increase output storage capacity, improve capacity of national research and extension services, improve agro-dealer and farmer knowledge of fertilisers, strengthen the agro-dealer network to improve distribution, finalise fertiliser legislation, facilitate access to credit at various levels in the supply chain.
- *Tanzania.*
Expand the procurement time frame for subsidised fertilisers, invest in transportation and storage infrastructure, strengthen agro-dealer capacity and improve agro-dealer and farmer knowledge of fertilisers, enhance farmer purchasing power through improved output marketing.

The fertiliser market assessments for these countries indicate that key challenges are port capacity, road and transportation infrastructure, storage, human capacity development, diversification of fertilisers, encouraging private sector participation and fertiliser subsidies.

6. ROLE OF FERTILISER SUBSIDIES IN INPUT MARKET DEVELOPMENT.

6.1. Introduction.

Fertiliser is costly and often beyond the reach of smallholder farmers in SSA, given their poor access to output markets. An increasingly common policy response by governments has been to provide price support to farmers through fertiliser subsidy programs. Approximately 40% of the fertiliser consumed in SSA is subsidised to various degrees. However, subsidies may erode past achievements in private sector fertiliser market development in SSA, while government expenditure on subsidies reduces the funds available for other important development programs such as extension, research, and rural infrastructure. An important policy question is: when and under what conditions do subsidy programs present a viable option for linking farmers to fertiliser markets and helping to establish private-sector-led input distribution systems?

Linking smallholder farmers in Africa to markets is challenging because individual farmers produce very small quantities, their produce is of variable quality, they have little or no bargaining power, they have poor access to reliable market information, their product value-addition is often minimal and they rely on middlemen to link them to markets. A number of issues must be addressed in order to link farmers to input markets.

First: how can farmers identify reliable input distributors and enter mutually beneficial relationships with the private sector? In the context of subsidy programs the issue is, does the subsidy program involve the private sector in the distribution of the subsidised fertiliser, or is the fertiliser distributed through government channels?

Second: how can farmers negotiate good prices? In the context of fertiliser subsidies, the issue is that the subsidy rate (the price of subsidised fertiliser as a percentage of the market price) must be sufficient that farmers will have the ability to "top-up" or pay the difference.

Third: how can farmers obtain timely delivery of the fertiliser? Timeliness refers to the availability of subsidised fertiliser in the market and the distribution of input vouchers to farmers, if such a mechanism is used. Availability of the subsidised fertiliser in the market will depend on timely budget approval for the purchase of fertiliser. The government will need to issue tenders to importers or place their own orders on the international market early enough that the fertiliser will arrive in time for the planting season. Timely distribution of input vouchers to farmers depends on how quickly and beneficiaries are selected and vouchers printed and distributed.

Fourth: how do farmers know which inputs to use and when to use them? Here the question is whether the subsidy program includes

complementary measures (extension support for farmers, technical training for input dealers).

Fifth: how can farmers who need assistance to access markets be helped? This refers to farmers who are typically excluded completely from the market due to a total lack of purchasing power. The conventional wisdom is to use a targeted subsidy, with a targeting mechanism to ensure that only this group receives subsidised fertilisers. In a non-targeted subsidy the subsidised fertiliser is distributed to all farmers on a first-come, first-served basis. The preferred targeting mechanism is an input voucher which is a certificate entitling farmers to buy inputs at a subsidised price (the voucher may also be for the full value of the fertiliser in which case the farmer receives a 100% subsidy). The input vendor can redeem the voucher for cash from the government. The typical targeting criteria used to select eligible beneficiary farmers are, by region (high potential in terms of agroecology and infrastructure), by crop (staple crops), by farm size (typically less than one hectare), farmer willingness to pay for the unsubsidised portion of the voucher and farmer willingness to use the subsidised fertiliser on particular crops and apply good agricultural practices.

Input vouchers are the most common mechanism used to deliver fertiliser subsidies. Table 4 shows that subsidy programs in Africa can be divided into four categories. Each of these categories will be addressed in the following sections.

Table 4. *Four categories of subsidy programs in Africa.*

	Government distribution	Private sector distribution
Non-targeted subsidy	1. Government importation and distribution (e.g. Burkina Faso)	2. Private sector importation and distribution (e.g. Ghana 2008/2009, Senegal)
Targeted subsidy	3. Private sector importation, government distribution (Malawi)	4. Private sector importation and distribution (Ghana 2009/2010)

6.2. Non-targeted subsidy with government importation and distribution.

Under this scheme there is no targeting of the subsidised fertilisers to specific crops or types of beneficiaries. All farmers (large, medium, small) who are willing to pay for the unsubsidised portion of the market price can access the fertiliser. Importation of the fertiliser for the subsidy program is directly by the government or by the private sector on behalf of the government, based on the estimated national requirement and the available budget. The government or private sector delivers the fertiliser to warehouses in rural areas owned by the Ministry of Agriculture or a government parastatal (ie: owned or controlled wholly or partly by the government). Distribution of the subsidised fertiliser is by the Ministry of Agriculture through its warehouses located in

rural areas. Farmers come and purchase the fertilisers at the subsidised price on a first-come, first-served basis.

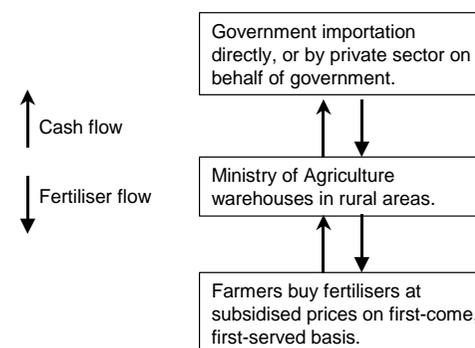


Figure 11. *Non-targeted subsidy: government importation and distribution (first category).*

6.3. Non-targeted subsidy with private sector importation and distribution

Private companies import the fertiliser for the subsidy program based on the government's stated requirements and deliver it to their distributors at district level. Distributors take delivery of fertiliser from importers, pay full market price, and arrange for their own transport to the districts. Fertiliser is sold to retailers at district level at the full market price. Farmers then buy the fertiliser from retailers at the subsidised price, and retailers submit the requisite documentation to the government for reimbursement.

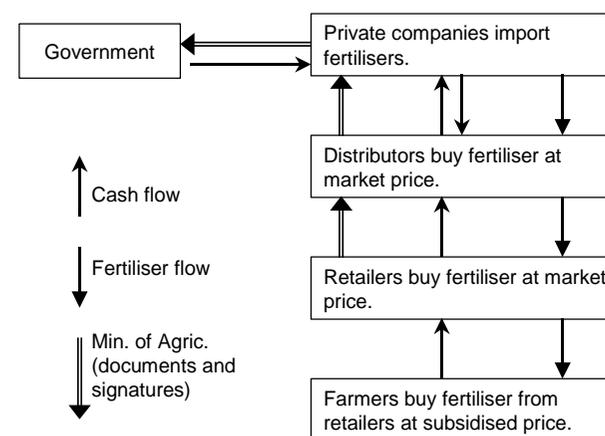


Figure 12. *Non-targeted subsidy: private sector importation and distribution (second category).*

The previous two categories of subsidy programs have similar advantages and disadvantages despite the inclusion of the private sector in the second category. This is because of the non-targeted nature of the subsidy. The advantages of the non-targeted approach is that such subsidy programs reduce the price of fertiliser to the farmer (by 50% on average). However, the disadvantages for input market development are numerous.

First, with non-targeted subsidies with government importation and distribution, farmers are not directly linked to the market since they obtain the fertiliser via government networks. There is no opportunity for farmers to establish business relationships with agro-dealers which could continue beyond the life of the subsidy program.

Second, non-targeted subsidies are available to farmers who would normally purchase fertilisers at market price. These farmers naturally opt to purchase the subsidised fertilisers thus reducing the customer base for the private sector by reducing the amount of effective demand for commercial fertilisers.

Third, subsidised fertiliser is often delivered late, whether via government channels or by the private sector, due to delays in budgetary approval and tendering. Consequently, farmers apply the fertiliser late, reducing the yield benefits. This could weaken the development of fertiliser markets as farmers will be reluctant to invest in fertilisers the next season even at subsidised prices. With private importation and distribution of fertilisers, there is an expectation of timely delivery since the private sector has an incentive to provide fertiliser on time. However, private importing companies tend to wait for government approval of their tender bids before they procure and distribute fertiliser and this delay is transmitted down the supply chain.

Therefore, the disadvantages of the non-targeted approach clearly outweigh the advantages. That is, despite the involvement of the private sector in importation and distribution, the non-targeted nature of this category of subsidy programs reduces its suitability for input market development.

6.4. Targeted subsidy with importation and distribution by private sector.

Private companies import fertilisers based on information from the government about the amount of purchasing power farmers will have in the form of vouchers. Importers deliver the fertiliser to the regions, and distributors and retailers purchase it at market price. Retailers sell the fertiliser to farmers in exchange for a voucher plus the "top-up" amount (unsubsidised portion of the market price). The vouchers are distributed ahead of time by district officers and extension agents, based on a list of target beneficiaries generated at the district and village level. The retailers then submit the voucher to the importers or a participating bank for payment of the value of the voucher. The importer or bank submits an invoice for the value of the voucher to the government for reimbursement.

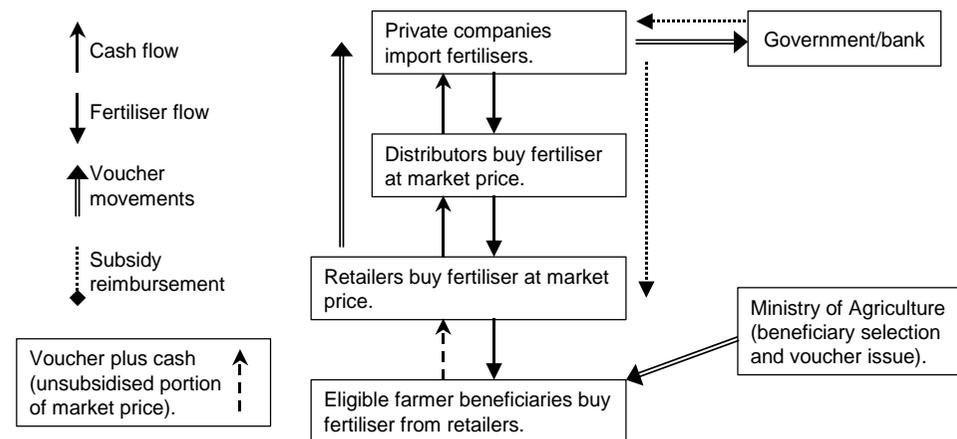


Figure 13. Targeted subsidy: private sector importation and distribution (third category).

6.5. Targeted subsidy with importation by private sector and distribution by government.

The private sector imports the fertiliser on behalf of the government and sells it to the government at an agreed price. The government then distributes the fertiliser using its own networks, typically via the Ministry of Agriculture or a government parastatal. The fertiliser is sold from the government rural warehouses to farmers in exchange for vouchers plus the 'top-up' cash payment of the unsubsidised portion of the market price. The vouchers will have been previously printed by the Ministry of Agriculture and distributed to eligible beneficiaries who have been selected by using criteria developed by district officers, the local community and village committees.

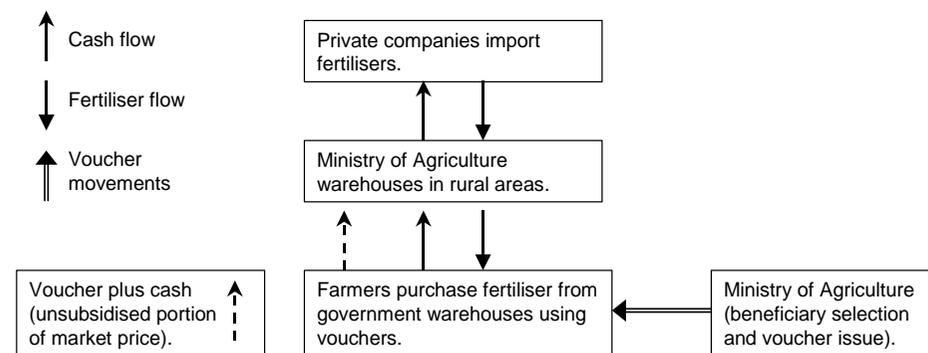


Figure 14. Targeted subsidy: private sector importation and government distribution (fourth category).

The advantages of targeted subsidies go beyond a reduced price for farmers. There is also improved access to fertiliser for resource-poor farmers previously excluded from the market, resulting in an expansion of the customer base for the private sector. Because the subsidies are targeted, farmers that have access to the subsidised fertilisers have to meet specific criteria that are not based only on willingness to pay. The input vouchers are only given to farmers who meet these criteria and crucially, did not previously purchase fertilisers due to lack of purchasing power. This improved direct access for poor farmers increases the customer base and hence, total sales by the private sector.

Another advantage of this third category is that targeted subsidy programs typically provide complementary services to assist farmers, such as access to microfinance and extension services. Access to finance can be critical to the success of any market development program since it enables farmers to pay the unsubsidised portion of the input voucher. The extension services show farmers the correct way to use fertilisers; farmers realise the economic and agronomic benefits of fertiliser use for themselves and are more likely to purchase fertilisers in subsequent years. The disadvantages of this third category are related to the targeting mechanism. Farmers need to present a voucher in order to access fertilisers; in some cases the process of redemption is too cumbersome. This is typically the case where farmers have to track down extension agents and district officials to obtain signatures. In addition to creating high transaction costs, this system also creates opportunities for rent-seeking. Further, in the third category retailers may refuse to accept the voucher if they will have difficulty redeeming it; this will negatively impact market development. Moreover, timeliness of delivery is still a problem for both types of subsidy programs due to delays caused by government bureaucracy.

An additional disadvantage of the fourth category of subsidy programs is there is no linkage to the market. Farmers redeem their vouchers from government designated distribution points, not from private retailers. Therefore, although private sector sales may increase, the impact is primarily felt at the importer level, sales at the retail point may not be affected. Moreover, there is no opportunity for the farmer to develop relationships with retailers in their area. This is important since once trust is established, retailers may offer farmers credit for the unsubsidised portion. Thereafter, even if the subsidy is discontinued, these relationships can facilitate the continued development of the fertiliser market.

In summary, subsidies can help build input markets provided certain conditions are met. All four subsidy models have in common the fact that the subsidies make inputs available to farmers at lower prices, but this factor alone is not sufficient for market development. The involvement of the private sector is also not sufficient to ensure market development - if the subsidy is not targeted to resource-poor farmers who were previously excluded from the market due to low purchasing power, private sector sales will not increase,

and may even decrease. The key feature that ensures market development is a targeting mechanism that puts input vouchers in the hands of farmers who were not previously purchasing fertiliser, thus expanding the customer base and increasing the opportunity for private sector sales. Another important characteristic of targeted subsidy programs is they tend to provide complementary services such as access to credit to enable farmers to pay the 'top-up' amount. Without this feature, access to the market is effectively still denied. Although using the private sector to distribute subsidised fertiliser is not sufficient for market development it is the key to linking farmers with reliable input suppliers during and beyond the life of the subsidy, and also avoids "crowding out" the private sector.

Fertiliser subsidy programs can be an effective way to support the development of fertiliser markets in Africa if they are targeted and use the private sector for distribution. Their purpose should be to overcome the temporary market constraint of low purchasing power at the farm-level. Their objective should be to stimulate new demand without displacing existing commercial sales. Their positive impact in the form of increased sales by the private sector is likely to be enhanced if these programs include complementary services. However, given their heavy budgetary requirements (on average these subsidy programs account for 30% of a country's agricultural budget) and high potential for leakages and rent-seeking, subsidies should be designed as temporary measures, with a clear schedule for phasing them out once they have achieved their purpose.

7. CONCLUSIONS AND RECOMMENDATIONS.

A major reason for low agricultural productivity in SSA is the extremely low use of mineral fertilisers. Africa as a whole is a net fertiliser exporter; the majority of its fertilisers are produced in North Africa and marketed globally, not within SSA. Ongoing investments will significantly expand production capacity, but these investments are not necessarily targeting African markets. However, the expected future growth of fertiliser demand in SSA will provide a competitive advantage (through reduced transport costs) for companies producing on the African continent. This will save foreign exchange and create industrial development opportunities through value addition to the raw material.

To increase fertiliser consumption, parallel public and private investments are needed along the entire value chain. Ports are the starting point of the supply chain. Better port infrastructure would allow for larger vessels and quicker off-loading. Improvements in warehouse capacity are essential for improving port logistics. To improve fertiliser distribution, the entire port-roads-rail infrastructure needs to be improved. This requires a regional strategy with multiple countries working together. Private sector investments at importer/distributor level in fertiliser blending capacity would help address specific nutrient requirements and increase farmer's returns on their fertiliser

investments. Additional in-country warehouse capacity is essential to increase the efficiency of fertiliser distribution.

Effective last-mile delivery requires skilled agro-dealers, able to provide inputs as well as technical advice to farmers. This is an area where both donor support and investments by fertiliser companies are required. Farmer knowledge of the benefits of fertiliser is still limited, and agro-dealers and extension agents should play a role in increasing awareness. 'Farming as a business' emphasising access to output markets, is expected to become the major driver to increase fertiliser demand. If combined with efficient logistics systems, it can provide opportunities for better service and prices.

Finance is a constraint across every link in the fertiliser value chain: farmer groups, commodity traders, agro-dealers, distributors and importers. Governments, donors and global fertiliser companies can provide incentives (e.g. credit guarantees, supplier payment guarantees, matching grants) to reduce the risk of agricultural lending. It is also important to scale out alternative credit options such as inventory credit, micro-loans and out-grower schemes.

Fertiliser subsidy programs can be an effective way to support the development of fertiliser markets in SSA if they are targeted and use the private sector for distribution. Their purpose should be to overcome the temporary constraint of low purchasing power at the farm-level and to stimulate new demand without displacing existing commercial sales.

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