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The U.S. Government's Global Hunger & Food Security Initiative

Ghana Fertilizer Value Chain Optimization Study

Revised August 2019

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List of Acronyms

ADB	Agricultural Development Bank
AEZ	Agroecological Zone
AFAP	Africa Fertilizer and Agribusiness Partnership
AFFM	African Fertilizer Financing Mechanism
AfSIS	Africa Soil Information Service
AGR	Annual Growth Rate
AGRA	Alliance for a Green Revolution in Africa
AGRIS	Agriculture and Rural Integrated Survey
B	Boron
Ca	Calcium
CAN	Calcium Ammonium Nitrate
CAPEX	Capital Expenditure
CIF	Cost, Insurance, and Freight
COCOBOD	Ghana Cocoa Board
CSIR	Council for Scientific and Industrial Research
DAP	Diammonium Phosphate
DCS	Directorate of Crop Services (MoFA)
DDA	District Department of Agriculture
DSSAT	Decision Support System for Agrotechnology Transfer
ECOWAS	Economic Community of West African States
EDIF	Export Development and Investment Fund
EnGRAIS	Feed the Future Enhancing Growth through Regional Agricultural Input Systems in West Africa
FAO	Food and Agriculture Organization of the United Nations
FBO	Farmer-Based Organization
FOB	Free on Board
FOT	Free on Truck
FSP	Fertilizer Subsidy Program
GA	Greater Accra
GAIDA	Ghana Agro-Input Dealers Association
GCNet	Ghana Community Network
GCX	Ghana Commodity Exchange
GFAC	Ghana Fertilizer Advisory Committee
GFEP	Ghana Fertilizer Expansion Program
GHS	Ghana Cedi
GoG	Government of Ghana
GPHA	Ghana Ports and Harbours Authority
GRA	Ghana Revenue Authority

GSARS	Global Strategy to improve Agricultural and Rural Statistics
GSFP	Ghana School Feeding Programme
GSS	Ghana Statistical Services
ha	hectare
HDP	High-Density Poly
ICT	Information and Communications Technology
IFA	International Fertilizer Association
IFDC	International Fertilizer Development Center
IFPRI	International Food Policy Research Institute
ISFM	Integrated Soil Fertility Management
IT	Information Technology
K	Potassium
KeFERT	Kenya Fertilizer Platform
kg	kilogram
MAP	Monoammonium Phosphate
METASIP	Medium-Term Agriculture Sector Investment Plan
Mg	Magnesium
MoFA	Ministry of Food and Agriculture
MOP	Muriate of Potash
mt	metric ton
mtpd	metric tons per day
N	Nitrogen
NAFCO	National Buffer Stock
NAIP	National Agriculture Investment Plan
NFP	National Fertilizer Platform
NHIL	National Health Insurance Levy
NTT	National Task Team
OFRA	Optimized Fertilizer Recommendations in Africa
P	Phosphorus
PFJ	Planting for Food and Jobs Presidential Initiative
PFRD	Pesticide and Fertilizer Regulatory Division
PPRSD	Plant Protection and Regulatory Services Directorate (MoFA)
RDA	Regional Department of Agriculture
S	Sulfur
SARI	Savanna Agricultural Research Institute
SMaRT	Soil testing, Mapping, Recommendations development, and Transfer to farmers
SME	Small and Medium Enterprises
SoA	Sulfate of Ammonia
SOP	Sulfate of Potash
SRI	Soil Research Institute (CSIR)

SRID	Statistics Research Information Directorate (MoFA)
SSA	Sub-Saharan Africa
SSP	Single Superphosphate
TSP	Triple Superphosphate
USAID	United States Agency for International Development
VAT	Value-Added Tax
WAFA	West Africa Fertilizer Association
Zn	Zinc

Executive Summary

The following Fertilizer Value Chain Optimization Study was commissioned by the Government of Ghana (GoG), represented by the Ministry of Food and Agriculture (MoFA) under the GoG's Ghana Fertilizer Expansion Programme (GFEP). This study includes extensive data and a thorough analysis of cost buildups, blending, and subsidies for fertilizer in Ghana and provides guidance on how these and other aspects of the fertilizer value chain could be optimized to greatly expand the availability and use of appropriate and affordable fertilizers across the country, particularly by smallholders for food crops, which is the stated purpose of the MoFA fertilizer subsidy program (FSP).

However, to analyze and recommend proper changes to the Ghana fertilizer value chain, it is important to understand the current international and regional fertilizer context. The first aspect to understand is that, in general, international free-on-board (FOB) prices were rising (+10-30% year-to-year increase for feedstock, +18% for NPK 15-15-15) at the time of data collection for this study in September 2018, and 2019 prices were affected. There has been a boon in the development of manufacturing and blending capacity across sub-Saharan Africa (SSA), particularly in West Africa. An additional 4.7 million metric tons (mt) or more of (granular) urea will be available soon from Nigeria; the majority will be exported, primarily outside the continent. Ghana enjoys competitive open market prices, but has the highest fertilizer subsidy rate (50%) in West Africa, which has created incentives for smuggling to neighboring countries, where prices are generally higher and subsidy rates are lower.

In terms of the Ghanaian market, 2017 apparent consumption was estimated at 440,000 mt, a record high. However, 2017 real consumption was much lower at approximately 350,000-380,000 mt. Official exports are minimal, but a great deal of anecdotal evidence supports claims of large-scale smuggling of subsidized fertilizer from Ghana to neighboring countries, especially Burkina Faso, as well as substantial carryover stocks. Half of imports are NPK fertilizers, mainly compounds, and 20% are urea and raw materials for blending. The GoG Planting for Food and Jobs (PFJ) Program/MoFA FSP and the Ghana Cocoa Board (COCOBOD) control 80% of the fertilizer market to serve smallholder farmers who cultivate food crops/vegetables and cocoa, respectively. The Ghanaian market is mainly served by 10 private importers, most of them well-skilled and financially capable, who blend and/or distribute through a dense network of 3,500 small, licensed agro-dealers.

In terms of fertilizer cost buildup and procurement processes in Ghana, almost all fertilizers are imported through the Port of Tema, where the main importers, largest warehouses, and most blending units are located. No duties or value-added taxes (VAT) are levied on fertilizers, except for a 5% duty on compounds. Urea arriving at the Port of Tema at a free-on-board (FOB) price of U.S. $280/mt reaches Greater Accra (GA) warehouses at U.S. $395/mt bagged, a port cost of U.S. $115/mt, or +41%. This is comparable to port costs at Dar es Salaam, Tanzania, and cheaper than those for Mombasa. Domestic distribution costs add 40-45% to free-on-truck (FOT) costs for imported and locally blended fertilizers. Financial costs are 38% on average and operational costs are 42%, accounting for 80% of the cost from Greater Accra storage to retail. Analysis shows that FOB price increases of raw materials increase competitiveness of local blends over imported compounds. Investing in general (roads and railways) and dedicated infrastructure (priority berths and warehouses) and fast-tracking import procedures (permits, etc.) would ensure reduced in-country costs for fertilizers.

In terms of developing the fertilizer (blending) market, depending on which model is used, the total fertilizer market potential in the next five years ranges between 500,000 and 760,000 mt, unless the sector is enhanced by major policy and technical improvements. Regardless, blends are expected to represent 50-60% of the total market. Ongoing GoG efforts, including accurate soil maps, trials, and validation of fertilizer formulations and recommendations, have begun yielding results that can lead to the development of more suitable crop- and soil-specific blends. This is the first step toward fully balanced crop nutrition, which requires the inclusion of micronutrients. The 2019 PFJ introduced eight new blends for maize, rice, soybean, and cassava to be mostly blended locally. Six blending units, all located in Tema except one (GloFert), were expected to be in operation by the beginning of the 2019 planting season. All can blend new formulations in small or large batches. The current installed capacity can easily serve the current, short-, and at least medium-term market requirements in Ghana. If the market moves toward more balanced fertilization requiring more complex crop- and soil-specific formulations, a couple of additional small blending units, requiring small investments, could have a comparative advantage if located closer to crop production belts (e.g., Brong-Ahafo and Northern regions).

However, improvements in fertilizer recommendations and the increase in blended products will have little impact on smallholder farmers growing food crops, unless there are major changes to improve the effectiveness of the PFJ/MoFA FSP. As noted above, its 50% subsidy is by far the highest among neighboring countries, and indications are that many smallholder farmers are either unable to access or unable or unwilling to pay the remaining cost for subsidized fertilizer. Problems with the administration of the 2015-2018 FSPs included late solicitations, contracts, and payments to suppliers and deliveries to farmers, poor productivity/results from commodity standard formula fertilizers, smuggling, limited and inefficient/ineffective use of the private sector suppliers, difficult GoG requirements for accessing subsidized fertilizers, poor accounting/voucher/coupons systems, and fake coupons. Indications are that some of these problems were reduced in the 2019 FSP, but comprehensive changes are required if the next FSP is to be more successful.

The following actions are recommended to optimize the fertilizer value chain in Ghana. Almost half the cost of retail fertilizer prices is derived from high, in-country costs, primarily due to the lack of priority given to fertilizer imports and poor port and transportation infrastructure. Reasonable priorities and targeted investments in infrastructure important to fertilizer importation, blending, and local deliveries would lower retail prices. This could start with improving capacity at the ports for fertilizer berthing and unloading and improving roads or rail to warehouses and blending operations. Blending capacity in Ghana is already more than twice what is required, and current blending operations are operating at only 20-25% of capacity. Therefore, expansion of blending capacity is not needed and doing so would inevitably drive current local operations out of business, deterring other blenders and eliminating current employment for hundreds of Ghanaian workers. The issues with the current MoFA FSP could be eliminated by modifying it to adhere to the validated Regional Fertilizer Subsidy Program Guide, which will soon be issued by the Economic Community of West African States (ECOWAS) as a directive. The Guide is built on 13 key principles, including inclusive participation, specialization, fair competition, efficiency, better targeting, transparency, timeliness, appropriate and quality products, incentives, complementary inputs, exit strategy, sustainability, and accountability, with 36 associated activities. Adhering to these principles and combining them with the associated activities would make the Ghana FSP a “smart” program that effectively accomplishes its purpose – improving the availability and use of fertilizers by smallholder farmers in Ghana to ensure greater productivity and food security.

1. Background

The GoG, represented by MoFA, requested IFDC to complete a Fertilizer Value Chain Optimization Study under the GFEP. The findings of this study, which includes an update of the IFDC 2016 Ghana Cost Buildup Study, will help inform the development and implementation of GFEP by adding key information on a host of elements in the fertilizer value chain. This will, in turn, help MoFA make better decisions on logistics, procurement, and pricing under the National Fertilizer Subsidy Program, which was absorbed by the PFJ. Aspects of this study will also inform the redesign of the subsidy program going forward.

2. Objectives

The objectives of this study are to:

- Describe structure and functioning of the current fertilizer market;
- Assess costs of procuring, blending, and distributing fertilizers to farmers;
- Define the current potential for market growth for fertilizers in general and for new blends or formulations in particular; and
- Analyze Ghana's subsidy scheme and offer policy and program changes that will make it more effective and efficient.

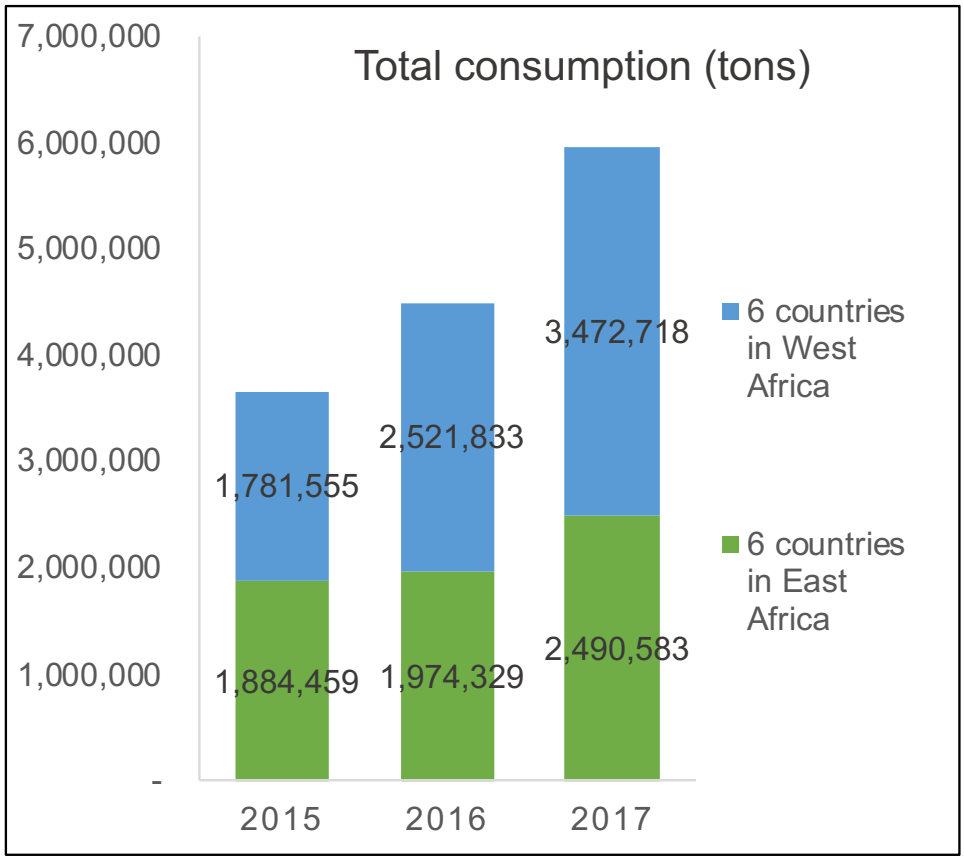
Methodologies and approaches used to address these objectives and conduct this study are described in the annex.

3. Fertilizer Trade and Consumption in Ghana

3.1 Summary of International and West African Fertilizer Contexts

In SSA, the six main fertilizer markets have recorded a steep increase in fertilizer consumption, reaching close to 6 million mt in 2017, a record increase of 63% in just two years. This exceptional growth was sustained by: (i) favorable commodity and fertilizer prices in the global market; (ii) massive private sector investments in fertilizer production (especially urea production in Nigeria); installation and refurbishment of blending plants (over 50 blending units are now operational); extension/outreach programs for smallholder farmers; and (iii) unprecedented government plans and programs aimed at supplying balanced fertilizers to more smallholder farmers through more targeted subsidized/public programs (Ethiopia is on the forefront of this new strategy).

According to the International Fertilizer Association (IFA), the average fertilizer application rate in SSA is up by an average of 1 kilogram (kg) of nutrient per hectare (ha) per year and will reach 20 kg/ha by 2021. This translates into 32% relative regional growth, making SSA the fastest-growing market in the world. Area planted has expanded as well but at a slower pace than fertilizer application rates. However, SSA represents only 2% of the world demand, with Ethiopia, South Africa, Nigeria, and Kenya accounting for 50% of the total.



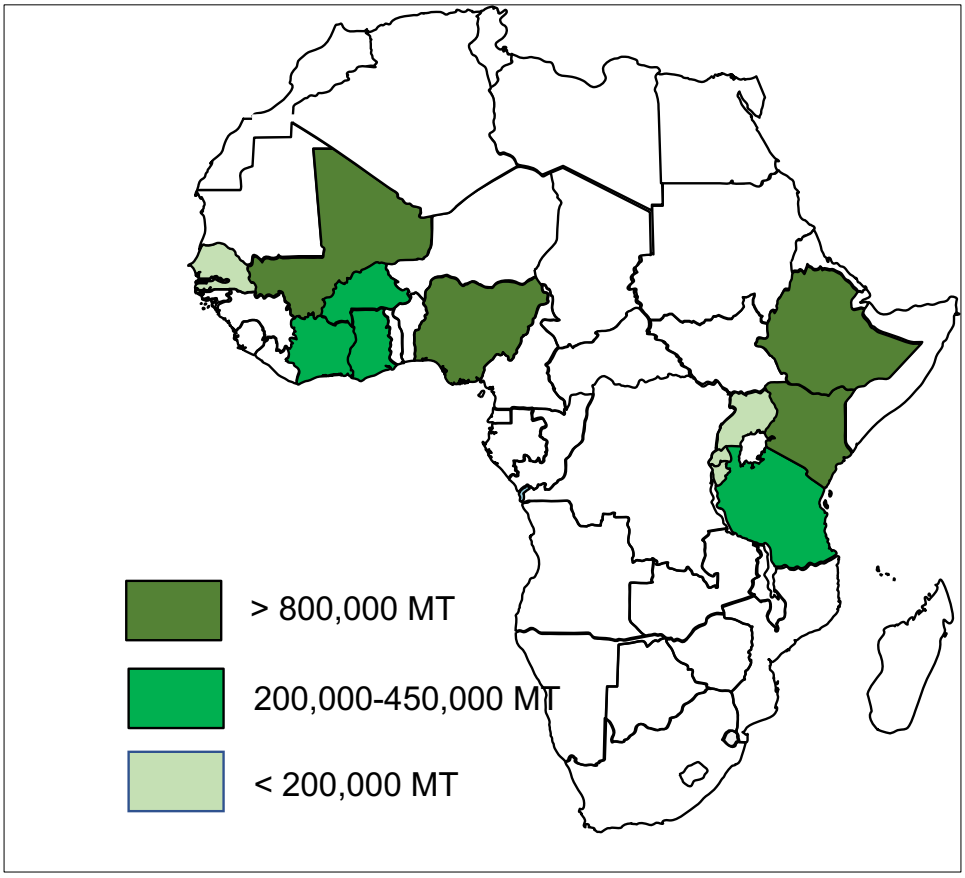
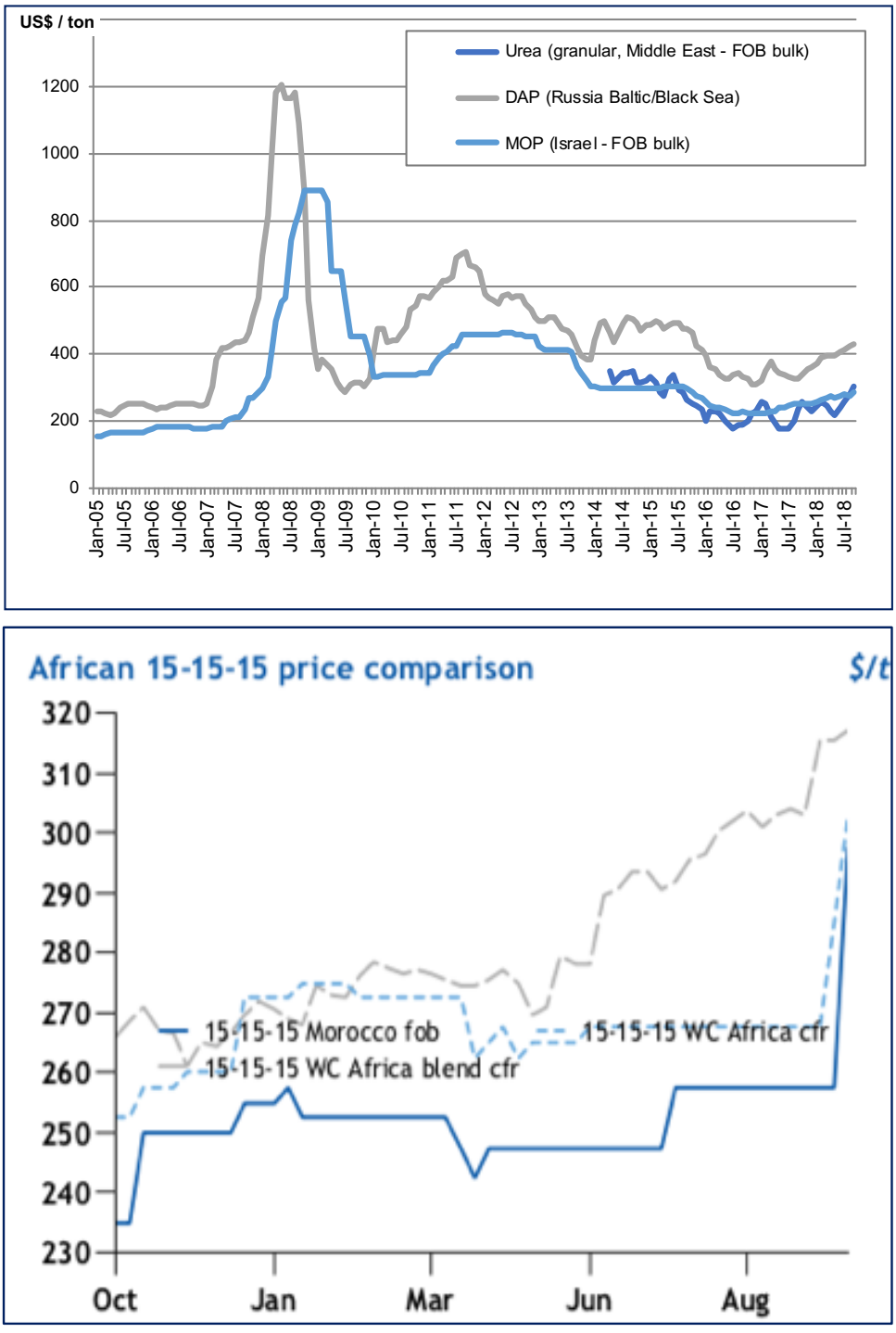


Figure 1. Strong Growth of Major Fertilizer Markets in Sub-Saharan Africa

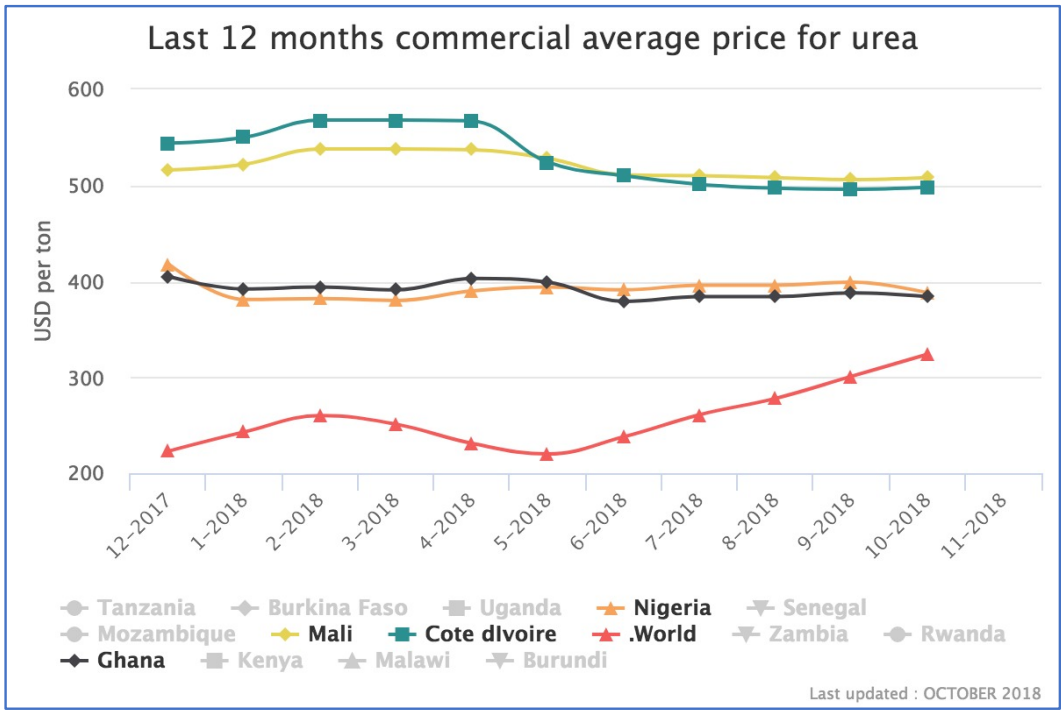
This impressive picture has been clouded by a sharp increase in the price of most fertilizer products since the second half of 2018 (urea +17%; diammonium phosphate [DAP] +30%; TSP +15%; and MOP +10% over the past 12 months), which continues well into 2019.

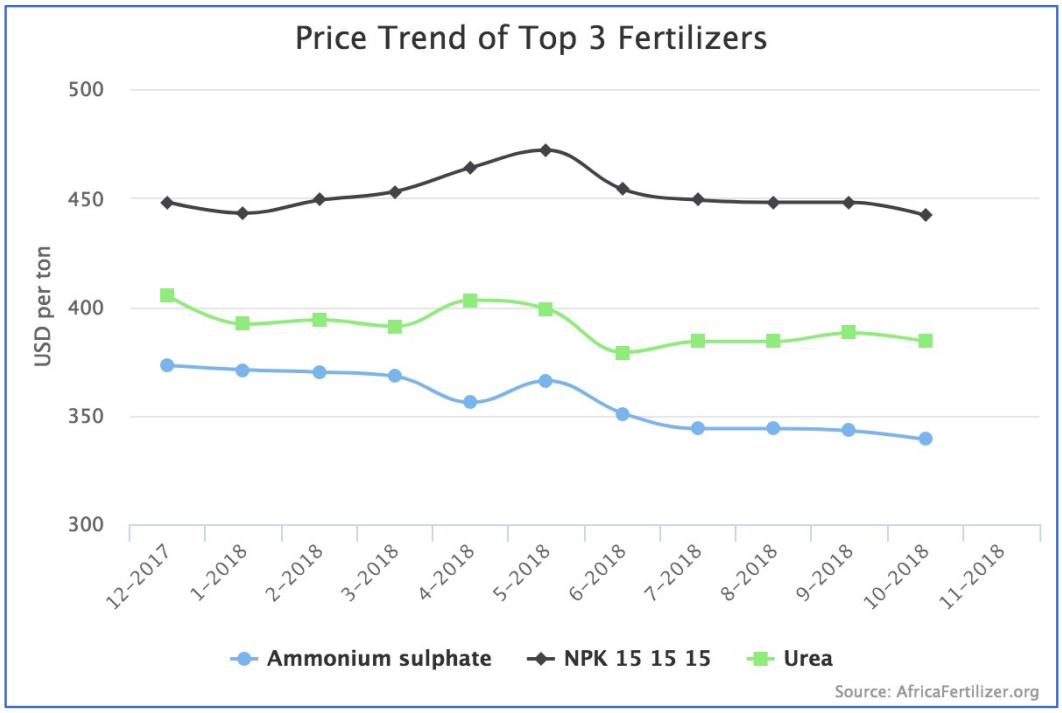


Source: Argus

Figure 2. FOB Fertilizer Prices – Increasing Steadily Since Mid-2017

Although this price increase was not reflected in 2018 retail prices in West Africa, it eventually will have a significant impact on fertilizer costs and prices, whether fertilizers are used directly or as feedstock to produce blends locally.

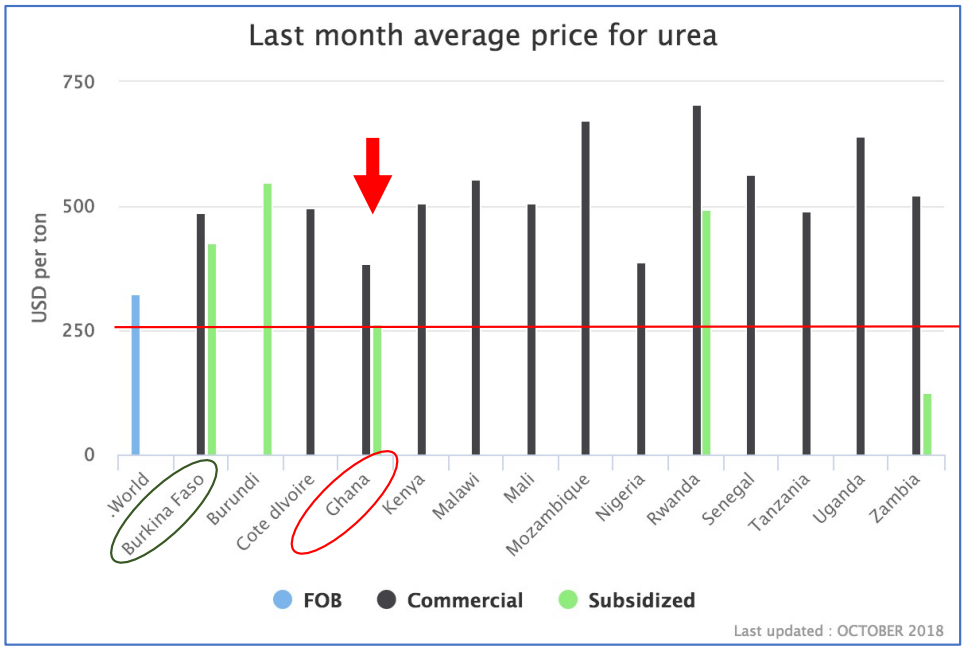


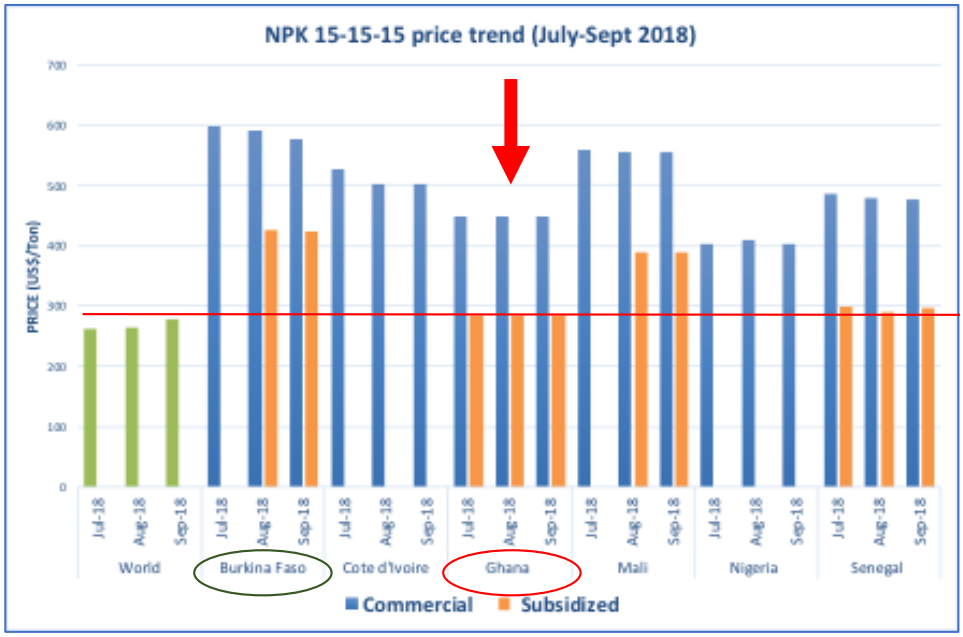


Source: AfricaFertilizer.org

Figure 3. Retail Fertilizer Prices – Not Yet Impacted by the FOB Price Increase

Finally, Ghana has implemented one of the many FSPs in West Africa (Nigeria, Togo, Burkina Faso, Senegal, Niger, Mali, etc.), with the highest subsidy rate (50%). Consequently, the program offers farmers the cheapest urea and NPK 15-15-15 in the region, although rent-seekers and smugglers see an opportunity to supply neighboring countries.



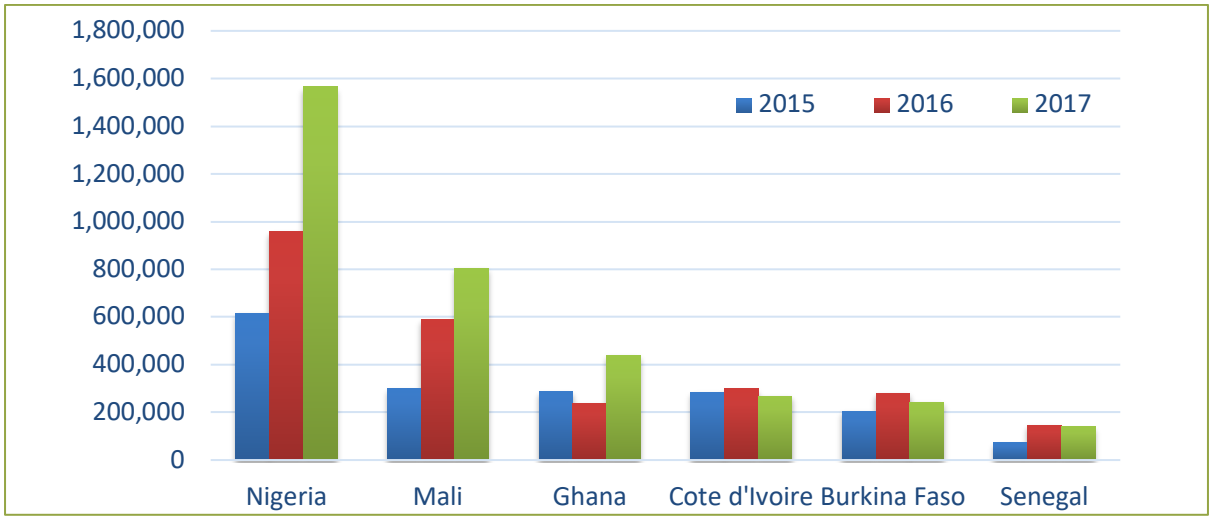


Source: AfricaFertilizer.org

Figure 4. Commercial and Subsidized Urea and NPK 15-15-15 Prices (October 2018)

3.2 Fertilizer Trade and Consumption in Ghana

Over the 2015-2017 period, fertilizer consumption substantially increased in most of the main fertilizer markets in West Africa, driven by three main factors: (i) favorable international commodity and fertilizer prices; (ii) government interventions, including subsidy programs; and (iii) private sector investments in production, distribution, and marketing of fertilizers. Although fertilizer imports and use in Ghana have increased substantially since the global oil and food crisis of 2008, its market is considerably smaller than some other countries in the region, including Nigeria and Mali.



Source: AfricaFertilizer.org, 2018

Figure 5. Evolution of Apparent Fertilizer Consumption in Selected Countries in West Africa

Most fertilizer importation in Ghana is in response to government FSP requirements (MoFA for food crops and COCOBOD for cocoa), commercial plantations, and other private farmers.

The reintroduction of government subsidies on fertilizer in 2008 has resulted in at least a perceived corresponding increase in fertilizer use in Ghana. According to MoFA statistics, the estimated average annual fertilizer demand in Ghana was previously between 250,000 and 350,000 mt per year. Subsidized fertilizer sponsored by MoFA in support of the food crops sector has recently absorbed a larger proportion of imported fertilizer; this is attributed to the simultaneous implementation of two FSPs since 2017: the ongoing MoFA FSP and the subsidy on fertilizer under the PFJ Presidential Initiative. However, these general figures do not factor in large quantities of subsidized fertilizer smuggled to mostly contiguous countries.

3.2.1 Apparent Consumption Increased by 50% from 2013 to 2017

According to AfricaFertilizer.org, mainly based on Ghana Statistical Services (GSS) and customs data,[1] apparent consumption[2] of fertilizers in Ghana increased from 239,900 mt in 2016 to 440,700 mt in 2017, or about 84% within one year.

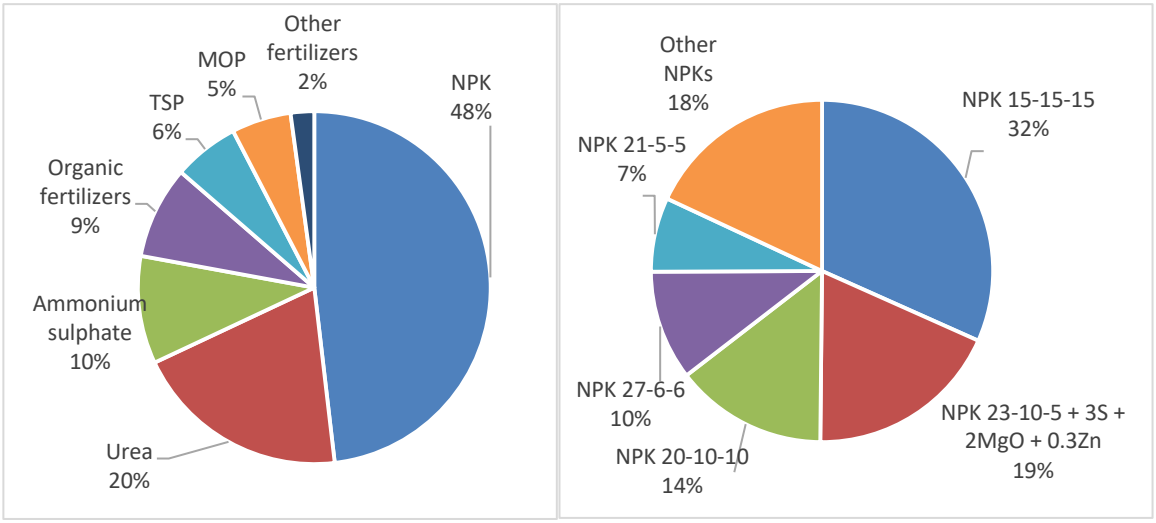
Table 1. Apparent Fertilizer Consumption in Ghana 2013-2017

Fertilizer	2013	2014	2015	2016	2017
	(mt)				
NPK	113,812	39,344	137,902	132,632	210,387
Urea	36,104	–	18,253	39,035	88,259
Ammonium sulfate	54,863	6,282	64,015	23,268	43,865
Organic fertilizers	6,465	5,523	7,818	8,747	37,568
TSP	47,173	19,613	32,052	13,802	26,766
MOP	19,801	22,702	18,707	13,842	24,235
Other fertilizers	16,287	10,223	11,077	8,532	9,582
Total	**294,505**	**103,688**	**289,822**	**239,858**	**440,661**

Source: AfricaFertilizer.org, 2018.

[1] See https://africafertilizer.org/blog-post/2017-fertilizer-statistics-validation-workshop-report-ghana-nigeria/.
[2] Apparent consumption = local production + imports – exports – non-fertilizer uses (mainly mining and chemical industries).

Of the 2017 apparent consumption, 48% were NPK products (mainly compounds), 20% urea, 10% ammonium sulfate, 6% TSP, and 5% MOP, according to AfricaFertilizer.org. The remaining 11% were other fertilizer products used in blending, including organic fertilizer products.



Source: AfricaFertilizer.org, 2018

Figure 6. 2017 Fertilizer Imports in Ghana and Breakdown by Type of NPK

Ten countries accounted for 85% of the fertilizer imported into Ghana in 2017. Morocco is the most important supplier of fertilizers to Ghana, accounting for 17% of the total supply, 100% of TSP, and 22% of the NPKs imported.

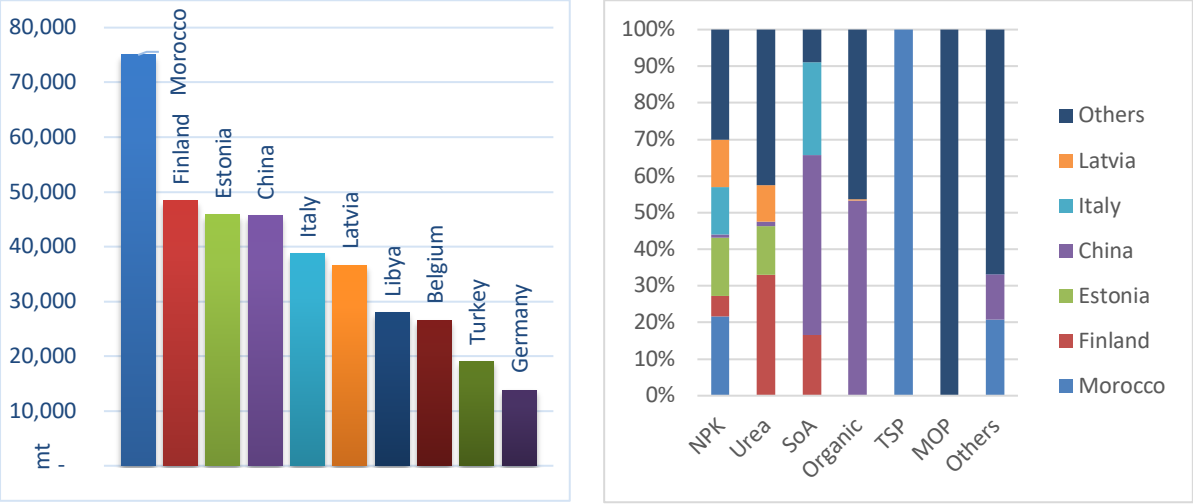


Figure 7. Country of Origin of Fertilizers Imported in 2017 and Breakdown by Product Type

According to official statistics, only 3,575 mt of fertilizers were officially exported from Ghana to neighboring countries, mainly Burkina Faso and Togo.

Table 2. Fertilizer Export Trends from 2013-2017

Fertilizer	2013	2014	2015	2016	2017
	(mt)				
NPK	3,235	5,536	238	–	3,500
Urea	–	339	95	–	–
TSP	–	1,645	–	–	–
Other fertilizers	248	–	–	25	75
Total	**3,483**	**7,520**	**333**	**25**	**3,575**

Source: AfricaFertilizer.org, 2018.

3.2.2 Improvement in Timing of Imports

Most fertilizers imported to Ghana reach the port between the first and third quarters. Fertilizers imported in the last quarter are mostly used in the following year.

In 2017, 87% of the total quantity of fertilizers was imported into Ghana by the end of the second quarter, i.e., in time for the main planting season (see crop calendar below), with a peak in June of over 129,000 mt imported (vs. 81% in 2016, 57% in 2015, 60% in 2014, and 55% in 2013).

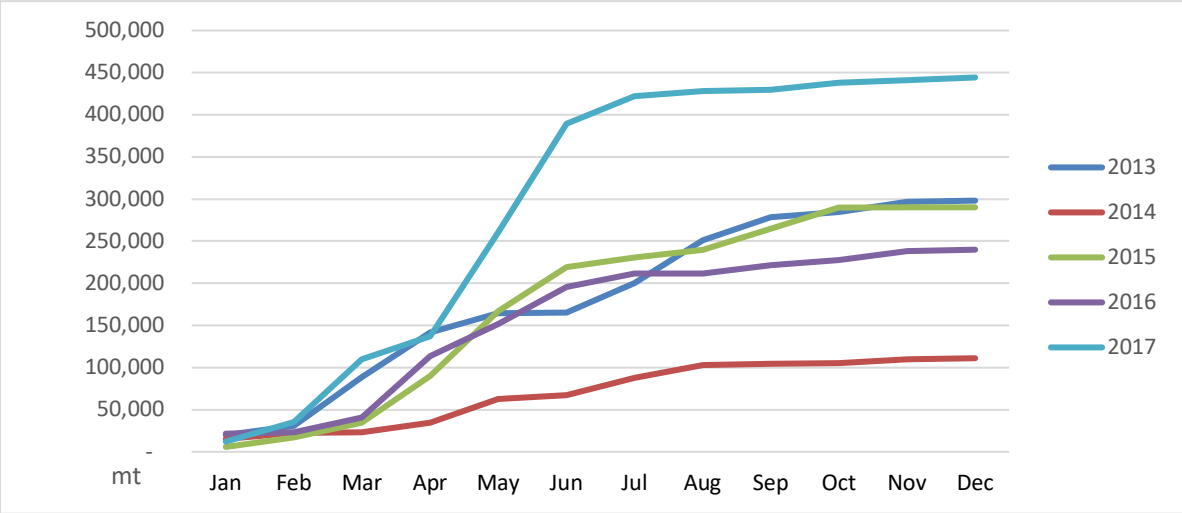


Figure 8. Ghana Fertilizer Monthly Cumulative Imports (2013-2017)

SEASON	CROPS	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Major Season (Long Rains)	Cassava(1st year)				◆	◆	◆						
	Cassava(2nd year)												
	Maize(North main*)						◆	◆	◆				
	Maize(South main*)			◆	◆	◆							
	Sorghum & Millet					◆	◆	◆	◆				
	Rice(North)					◆	◆	◆	◆				
	Rice(South)				◆	◆	◆						
	Yams	◆	◆	◆	◆								
Minor Season (Short Rains)	Cassava, Maize, Millet, Sorghum, Rice, Yams							◆	◆	◆			

Source: IFDC, adapted from FAO/GIEWS Key: ◆ Fertilizer Peak Demand Sowing Growing Harvesting

Figure 9. Crop Calendar for Food Crops

3.2.3 Structure of Fertilizer Distribution in Ghana

Figure 10 illustrates the flow of fertilizer from importers to farmers. This structure is partially influenced by the setup that resulted from the private-public partnerships for both of the government subsidy programs.

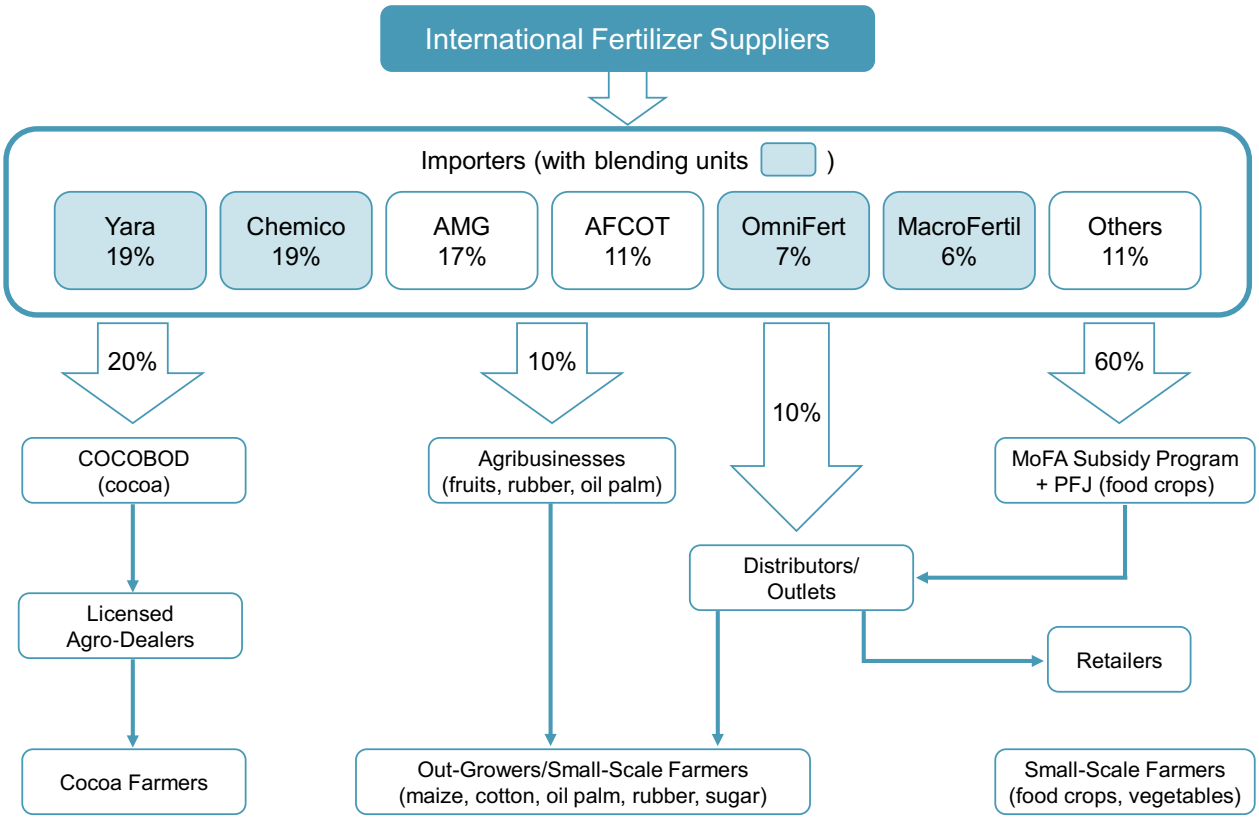


Figure 10. Illustration of the Fertilizer Distribution in Ghana

In 2017, 10 importers accounted for almost all of the fertilizers imported into Ghana (98%), supplying 35 to 50 large distributors and a dense network of more than 3,500 retail shops

across the country. A more detailed description of the various players in the supply chain can be found in the annex.

Table 3. Main Fertilizer Importers in 2017

Importers	Main Types of Fertilizers	Volume (mt)	%
Chemico	SoA, DAP, MOP, NPK, SOP, TSP, urea	84,219	19%
Yara Ghana	SoA, CAN, MAP, MOP, NPK, P rock, SOP, TSP, urea	84,195	19%
AMG	SoA, NPK	74,313	17%
Afcott	SoA, NPK, urea	48,844	11%
Ghana COCOBOD	SoA, NPK, organic fertilizers	45,126	10%
Omnifert	SoA, DAP, MAP, MOP, SOP, urea	32,190	7%
Macrofertil	SoA, CAN, MAP, MOP, NPK, P nitrate, SOP, urea	24,838	6%
Agricult Ghana	NPK, organic fertilizers, urea	20,130	5%
RMG	NPK, urea	16,671	4%
ETC Agro	Urea	2,935	1%
Jubaili Agrotec	MOP	2,896	1%
Other		7,878	2%
Total		**444,236**	**100%**

Source: AfricaFertilizer.org, 2018.

3.3 Fertilizer Consumption per Crop

The lack of detailed data from official sources, such as GSS or the Statistics Research Information Directorate (SRID), and the lack of sales records at the retail level make it very difficult to assess the actual fertilizer use by crop and by product at the national level.

As a reference, the Food and Agriculture Organization of the United Nations (FAO) published a report[3] in 2005 on fertilizer use by crop in Ghana. The report was prepared in collaboration with the Land and Plant Nutrition Management Service's Land and Water Development Division. Table 4 provides estimates of fertilizer use by region in the late 1990s, which can be used as an indication of today's geographical distribution.

Table 4. Estimated Distribution of Fertilizer Sales by Regions (1997-2001)

Region	1997	1998	1999	2000	2001
	(mt)				
Ashanti	5,167	3,893	2,023	4,046	7,438
Brong-Ahafo	7,582	5,712	2,969	5,937	10,914
Central	1,629	1,229	638	1,275	2,345
Eastern	1,011	762	396	792	1,455
Greater Accra	1,236	931	484	967	1,779
Northern	15,220	11,467	5,960	11,917	21,910
Upper Regions	15,501	11,679	6,070	12,137	22,314
Volta	8,481	6,390	3,321	6,640	12,208
Western	337	254	132	264	483
Total	**56,164**	**42,317**	**16,593**	**43,975**	**80,846**

In 2014, IFDC commissioned a study with SRID, GSS, and the Ghana Agro-Input Dealers' Association (GAIDA) to reassess fertilizer consumption and fertilizer use by crop in Ghana,

[3] See http://www.fao.org/tempref/agl/agll/docs/fertuseghana.pdf.

but the team could not accomplish this objective due to the unavailability of reliable data. Key recommendations from the study included the addition of fertilizers to the Multi-Round Annual Crop and Livestock Surveys conducted by SRID and investment in financial and human resources by MoFA in SRID and in District Agricultural and Extension Offices.

In the absence of detailed data, the team used available fertilizer consumption statistics, allocated by product and region by the MoFA subsidy programs, and sales estimates for other crop segments (cocoa, agribusiness) to estimate the current fertilizer use by crop as shown in Figure 11.

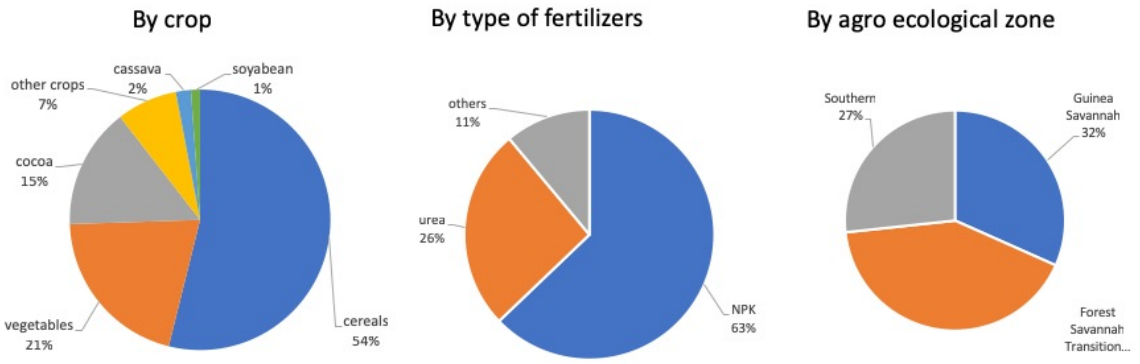


Figure 11. Estimated Fertilizer Use by Crop and by Product

The pilot Agriculture and Rural Integrated Survey (AGRIS) in Ghana was launched in January 2018 as part of the FAO Global Strategy to improve Agricultural and Rural Statistics (GSARS). The pilot was conducted in four selected districts of the Ashanti Region in Ghana, in collaboration with GSS and MoFA. If and when the pilot is extended to the entire country, it should provide accurate and reliable data needed to estimate fertilizer use by crop. Meanwhile, IFDC recommends that a standalone study on fertilizer use by crop be conducted as soon as possible, ahead of the 2020 planting season (ideally before September 2019).

4. Fertilizer Procurement Processes and Cost Buildup in Ghana

4.1 Fertilizer Import Procedures

4.1.1 Import Clearance Process

Customs Act 2015, Act 891, Section 43 directs all importers, except "Self-Declarants," to engage the services of licensed Customs House Agents (freight forwarders) for the clearance of cargo at any freight station in Ghana.

The importation clearance process[4] comprises the following:

- Declaration of cargo onto the Ghana Community Network (GCNet);[5]
- Customs document verification, system validation, cargo classification and valuation, risk assessment and quality assurance, payment of duty, and cargo verification;

[4] See https://www.ghanaports.gov.gh/page/25/Port-Processes.
[5] GCNet: https://giccs.gcnetghana.com/giccs/jsf/login/GICCSLoginpage.jsf.

- Release of cargo by the shipping agent;
  - Delivery by the port and other receipt delivery service providers; and
  - Customs physical examination or scanning of cargo before it can exit the port.

A detailed port clearance flow/roadmap is available online.[6] The process follows existing GoG and port authority rules and regulations. The annex provides more details on the import processes.

4.1.2 Duties and VAT

Although most imported fertilizer does not incur VAT, it does incur other levies. Single nutrient products, such as urea, TSP, and MOP, typically used for blended formulations demanded for certain crops and climatic conditions (e.g., blended fertilizer formula for the cocoa sector), do not incur VAT or import duties. However, NPK compound products, such as NPK 15-15-15, incur an import duty of 5%.

4.2 Fertilizer Supply Cost Buildup

This section presents the fertilizer supply cost buildup in Ghana, based largely on data and information gathered during field work in the country. Tables 5 and 6 and Figures 12 and 13 present the fertilizer supply cost buildup estimations from procurement to storage facilities within the Tema and Greater Accra areas for six fertilizer products:

1. Urea;
2. TSP;
3. MOP;
4. NPK compounds (NPK 15-15-15); and
5. NPK blended formulations (NPK 15-15-15 and NPK 23-10-5).

The reason for differentiating NPK products as formulations and blended products is to compare the costs of imported compound formulations versus the same blended formulations manufactured from imported straight nutrient products.

4.2.1 Costs of Importing Fertilizers through the Port of Tema

Although Ghana has two ports (Tema and Takoradi) with good connections to the road network and other logistics, the vast majority of fertilizer is imported through Tema. Table 5 illustrates the cost of urea importation, FOT at port (Tema). Considering that fertilizer importation experiences economies of scale, import estimations per metric ton are based on a 15,000-mt vessel and four-month average international market FOB prices and international freight, according to Argus Media, assuming the nearest source for procuring the products in relation to Ghana.

[6] See https://www.ghanaports.gov.gh/Files/TEMAPORT/PaperlessRoadMap.pdf.

Table 5. FOT Cost of Importing Urea in Ghana

	Importer Costs and Charges	U.S. $/mt	GHS/mt	FOT Bulk	FOT Bagged
A	**FOB**	**279.40**	**1,341.10**	**74.8%**	**70.5%**
1	Vessel freight	24.00	115.20		
2	Freight insurance	1.70	8.00		
B	**Cost, insurance, and freight (CIF)**	**305.10**	**1,464.30**	**81.7%**	**77.0%**
3	Import duty	–	–		
4	Value-added tax (VAT)	–	–		
5	Customs processing fee	3.10	14.60		
6	NHIL	7.60	36.60		
7	EDIF	1.50	7.30		
8	ECOWAS levy	1.50	7.30		
9	GCNet	1.30	6.30		
10	EXIM levy	2.30	11.00		
11	African Union levy	0.60	2.90		
12	IRS charges	–	–		
13	Inspection fee (PPRSD)	3.10	14.60		
C	**Total taxes, tariffs, and levies**	**21.00**	**100.80**	**5.6%**	**5.3%**
14	Port dues per vessel	1.20	5.90		
15	Plant quarantine	0.10	0.50		
16	Stevedoring	34.00	163.20		
17	Port dues per mt	4.00	19.20		
D	**Total port charges**	**39.30**	**188.70**	**10.5%**	**9.9%**
18	Shipping admin and handling charges	1.00	1.00		
E	**Shipping charges**	**1.00**	**1.00**	**0.1%**	**0.1%**
19	Documentation	0.10	0.50		
20	Forwarder admin charges	1.00	4.80		
21	Forwarder clearing charges	3.50	16.80		
22	Other contingencies	0.50	2.20		
F	**Total forwarder charges**	**5.10**	**23.80**	**1.3%**	**1.3%**
G	**FOT cost Tema in bulk**	**371.40**	**1,793.30**	**100.0%**	**94.2%**
23	Bagging operations per mt	12.00	57.60		
24	Poly-sacks	10.80	51.80		
H	**Bagging charges**	**22.80**	**109.40**		**5.8%**
I	**Total FOT bagged at port**	**394.20**	**1,902.70**		**100.0%**

Note: GHS to U.S. $ assumed exchange rate is GHS 4.8/U.S. $, three-month average, up to September 2018.

Table Notes

A FOB price is a four-month (June through September 2018) average international bulk price of urea, at Baltic/Morocco/Black Sea in U.S. $/mt (Argus).

1 International freight was estimated based on Argus freight reports for the months of September 2018 between Baltic/Morocco/Black Sea-Tema in U.S. $/mt for a vessel between 15,000 to 30,000 mt.

2 Freight insurance is estimated at 0.6% of FOB value of the good plus shipping charges, according to: http://www.priorityworldwide.com/resources/cargo_insurance_guidelines.aspx.

3-4 There is no import duty or VAT for single nutrient products, such as urea.

5 Customs processing fee.

6 National Health Insurance Levy (NHIL) is imposed on all imports at a rate of 2.5% of CIF.

7 Export Development and Investment Fund (EDIF) is a levy charged to all imports at a rate of 0.5% of CIF.

8 The ECOWAS levy charge is imposed on all imports at a rate of 0.5% of CIF.

9 GCNet Services Limited is a duty on imports at a rate of 0.4% of FOB, to support a public-private partnership investment in electronic infrastructure and development of an electronic "one-stop shop/single window" to facilitate trade. This tax includes 15% VAT + 2.5% NHIL on the GCNet 0.4% of FOB for a GCNet effective tax rate of 0.47%.

10 EXIM levy is at a rate of 0.75% of CIF.

11 African Union levy is imposed at 0.2% of CIF.

12 Inspection fee charges are 1% of CIF.

14 Port charge per vessel is a flat charge of U.S. $6,103/vessel (estimated), which includes berth occupancy, pilotage charges, towage, and mooring/unmooring.

15 Quarantine is another fixed charge based on product weight at a rate of 1% of CIF.

14 Stevedoring charges are labor charges estimated at $34/mt for unloading the vessel, according to the Tema Port Customers Guide. This includes crane operation for dry bulk cargo, cargo handling, bulk in-bag out (BIBO) operation, documentation, and shore handling.

16 Port charges per metric ton are estimated at $4/mt, according to the Tema Port Customers Guide.

18-22 Freight forwarder charges are self-descriptive.

23-24 Bagging operation at port is estimated considering equipment rental and poly-sacks only.

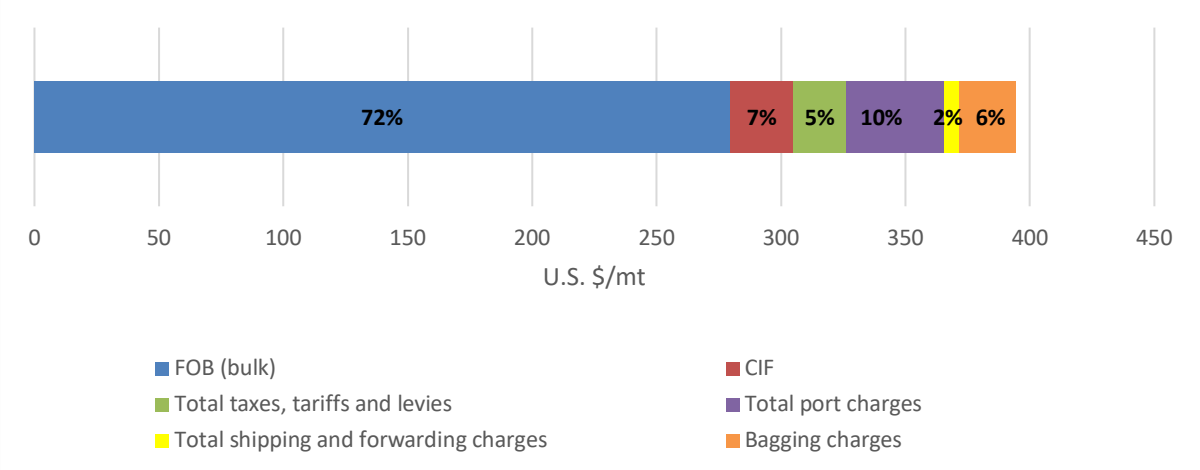


Figure 12. FOT Cost of Importing Urea in Ghana (U.S. $/mt)

The cost increase for NPK compound fertilizer formulations (15-15-15 compound in this case) relative to CIF is higher than for single nutrient fertilizers, considering that it has a 5% import duty on CIF, increasing the cost by U.S. $99.80 FOT-Tema relative to CIF (or between U.S. $10 and $14 relative to single nutrient products). Blended NPK 15-15-15 has a higher cost

since it is the result of blending imported single nutrient products and has the added cost of blending. Table 6 shows the cost of procurement and importation of various fertilizer products placed at a Greater Accra (GA) warehouse.

Table 6. Procurement and Importation Cost of Fertilizer at Greater Accra Storage

	Cost Items	Urea	TSP	MOP	Kieserite	NPK 15-15-15 Compound	NPK 15-15-15 Blend	NPK 23-10-5 Blend
		(U.S. $/mt)						
A	**FOB**	**279.40**	**342.60**	**275.90**	**70.00**	**263.90**	**280.60**	**252.40**
1	Vessel freight	24.00	21.00	28.00	21.00	36.00	23.70	23.10
2	Freight insurance	1.70	2.10	1.70	0.40	1.60	1.70	1.50
B	**CIF**	**305.10**	**365.70**	**305.60**	**91.40**	**301.50**	**306.00**	**277.00**
3	Taxes, tariffs, and levies	17.90	21.50	17.90	5.30	32.70	18.00	16.30
4	Port charges per mt (Tema)	39.30	39.30	39.30	39.30	39.30	39.30	39.30
5	Forwarder/clearing charges	5.10	5.10	5.10	5.10	5.10	5.10	5.10
6	Shipping charges	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	Customs inspection and processing fees	3.10	3.70	3.10	0.90	3.00	3.10	2.80
8	Blending						12.00	12.00
9	Bagging/bags	22.80				22.80	22.80	22.80
10	Transport charges to local warehouse (GA)	7.90	7.90	7.90	7.90	7.90	7.90	7.90
11	Storage cost in the GA region (3 months)	25.50	25.50	25.50	25.50	25.50	25.50	25.50
12	Importer financial/operational cost of capital	61.70	68.40	58.80	24.80	63.10	59.90	55.80
13	Other importation cost	14.30	15.70	13.50	5.90	14.60	14.70	13.70
C	**Total cost U.S. $/mt at Greater Accra (GA) storage**	**503.60**	**553.70**	**477.70**	**207.10**	**516.50**	**515.20**	**479.10**
	Cost per 50-kg bag in U.S. $	25.20				25.80	25.80	24.00
	Cost per 50-kg bag in GHS	120.90				124.00	123.70	115.00

Table Notes

Descriptions of rows 1 through 8 are the same as in Table 1.

9 Blending cost is estimated at U.S. $12/mt, according to interviewed importers and blenders.

10 Bags and bagging charges assume the operation takes place at port and include bagging equipment, bags, and liner. NPK compound formulation is assumed to be procured already bagged, therefore having no bagging charges, while NPK 15-15-15 is blended and bagged at a blending facility.

11 Transport charges are for moving the cargo within the GA area from port to importer main storage and include loading and unloading.

12 Cost of storage/mt in the GA area is estimated at U.S. $8.5/mt/month, according to survey, for up to three months.

13 Importers' financial cost of capital is the annualized interest rate/opportunity cost of 24% (average of 22% to 25% range) on loan for up to six months/mt and includes 4% charges on Letter of Credit.

14 Other importer costs include importer operational cost, assumed to be 10% of procurement and importation of fertilizer, for four months.

NPK blends are blended formulations based on the imported single nutrient fertilizer (urea, TSP, and MOP).

Fertilizer procurement and importation at the GA region storage increases by 35%, on average, relative to the FOT-Tema cost, or an overall average cost increase of 65% relative to CIF across all products considered in the analysis. The 35% cost increase is absorbed by the storage cost in the GA region and by the financial cost of capital for procuring and importing fertilizer

placed at the GA region storage, contributing 13.4 and 13.3%, respectively, to the 35% cost increase, with the 8.3% difference covering importer operational cost and local transportation within the GA region. Figure 13 is a graphical representation of the cost of fertilizer delivered at the GA storage, beyond FOB cost.

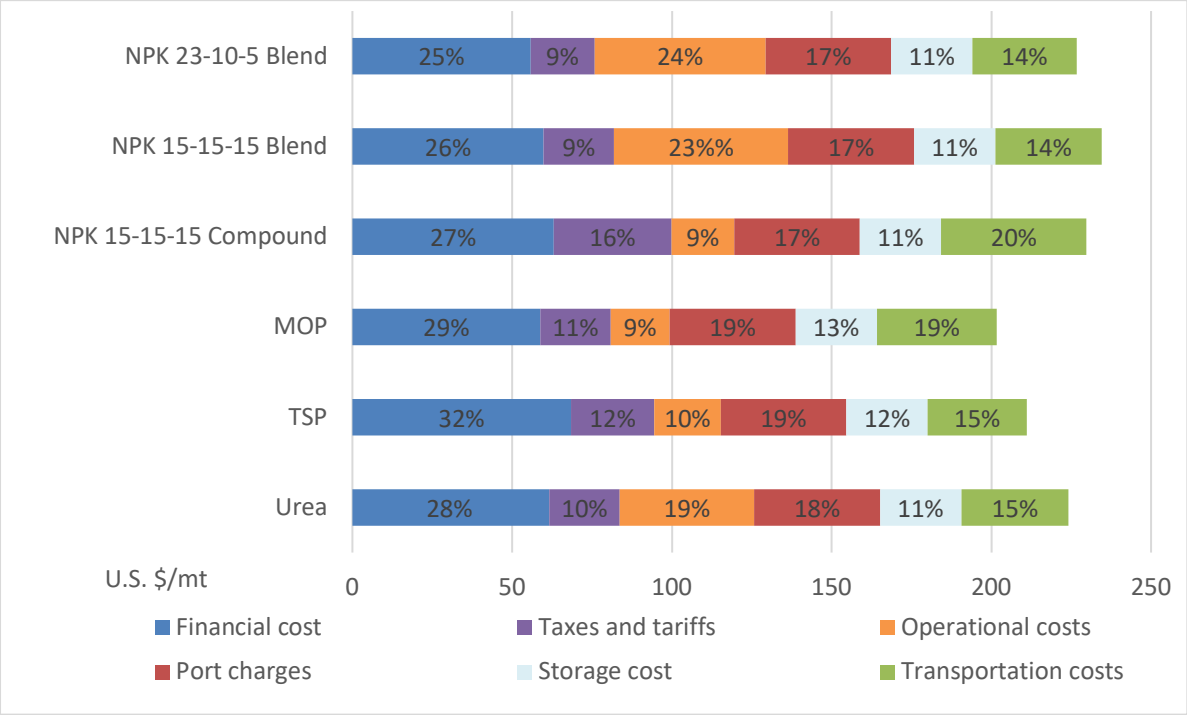


Figure 13. Cost Breakdown of GA Storage Beyond FOB Cost

Figure Notes

Port charges include port charges at destination port (Tema in this case) according to the port charges schedule, bagging, and forwarder/inspection charges.

Transportation costs are the charges for moving/transporting the products from country of origin to retail point, including international freight, freight insurance, domestic transport among different stages along the supply chain, and truck loading/unloading.

Taxes and tariffs include official tariffs, taxes, and levies from procurement to retail.

Financial costs are the cumulative costs of working capital, including other financial charges or opportunity costs of capital for importation, procurement, distribution, and retail.

Operational costs are known costs associated with the operation of supplying fertilizer, from procurement and importation to retail.

According to results of the survey, cost of storage/mt in the GA area is estimated at U.S. $8.5/mt/month, for up to three months.

4.2.2 Domestic Distribution Costs

Table 7 presents the estimated domestic distribution cost of various fertilizer products after procurement and importation at the GA storage facilities. These estimates are non-weighted averages across different regions in Ghana.

According to Table 7 and Figure 14, fertilizer supply experiences the largest cost increase through the domestic distribution chain. Of the total domestic supply cost, about 40% is absorbed by the cost of doing business at the wholesale/distributor and retail levels, which includes profit margins and the commissions paid for the distribution of fertilizer; 39% is the cost of financing working capital, 15% is absorbed by transportation cost, and 6% is absorbed by storage.

Table 7. Average Domestic Distribution Cost of Fertilizer in Ghana Across All Regions

	Cost Items	Urea	TSP	MOP	NPK 15-15-15 Compound	NPK 15-15-15 Blend	NPK 23-10-5 Blend
		(U.S. $/mt)					
A	**Cost per mt of fertilizer in GA storage facility**	**503.60**	**553.70**	**477.70**	**516.50**	**515.20**	**479.10**
1	Transport charges to regional/wholesale storage	28.00	28.00	28.00	28.00	28.00	28.00
2	Unloading truck at regional/wholesale storage	2.10	2.10	2.10	2.10	2.10	2.10
3	Regional/wholesale storage cost	6.70	6.70	6.70	6.70	6.70	6.70
4	Other costs at wholesale	27.00	29.50	25.70	27.70	27.60	25.80
B	**Cost at regional/wholesale storage**	**567.40**	**620.00**	**540.20**	**581.00**	**579.60**	**541.70**
5	Financial/opportunity cost of capital at wholesale	36.90	40.30	35.10	37.80	37.70	35.20
6	Sales commission to wholesale	18.20	18.20	18.20	18.20	18.20	18.20
C	**Total fertilizer cost at regional storage/distribution**	**622.50**	**678.60**	**593.50**	**637.00**	**635.50**	**595.10**
7	Transport charges to distribution/retail store	8.50	8.50	8.50	8.50	8.50	8.50
8	Other costs at retail	33.40	36.30	32.00	32.70	35.60	32.60
9	Financial operational cost of capital at retail	45.60	49.60	43.70	44.60	48.70	44.50
10	Sales commission to retailer	14.10	14.10	14.10	14.10	14.10	14.10
D	**Total cost U.S. $/mt at retail**	**724.20**	**787.10**	**691.80**	**736.90**	**742.40**	**694.80**
	Cost to farmers at retail point per 50-kg bag in U.S. $	36.20			36.80	37.10	34.70
	Cost to farmers at retail point per 50-kg bag in GHS	173.80			176.90	178.20	166.70

Table Notes

1 Transport charges are the average transportation cost to warehouses in the different regions in Ghana (Greater Accra, Lower and Upper Volta, Eastern, Western, Central, Ashanti, Brong-Ahafo, Northern, Upper West, and Upper East), according to survey.

2 Lift-on/lift-off (Lo/Lo) is the cost of loading and unloading (load-off) at the regional warehouses.

3 Storage cost is the cost of storage at the regional/wholesale facilities.

4 Other costs at wholesale are assumed to be 15% of the fertilizer cost to cover operational expenses at the regional/wholesale facilities.

5 Financial/opportunity cost of working capital is the cost of capital at a domestic bank (28% per year average) for three months. Importers may provide one month or 30 days of free financing to selected wholesalers.

6 Sales commission to wholesaler/distributor is GHS 4/50-kg bag sold or delivered to retailers, as allowed by the MoFA-importer retail/market price negotiations.

7 Transport charges from distributor/wholesaler storage to retailer are at a rate of about GHS 1.75/50-kg bag within a 100 km radius.

8 Other costs at retail are assumed to be 15% of the fertilizer cost to cover operational expenses at retail.

9 Financial/opportunity cost of working capital is the cost of capital at a domestic bank (28% per year average) for three months. Wholesalers may offer one month or 30 days of free financing to selected retailers, although this is not common.

10 Sales commission at retail is GHS 3/50-kg bag sold at retail to farmers, as allowed by the MoFA-importer retail/market price negotiations.

Figure 14 is a graphical representation of the average cost breakdown of fertilizer from GA storage to retail.

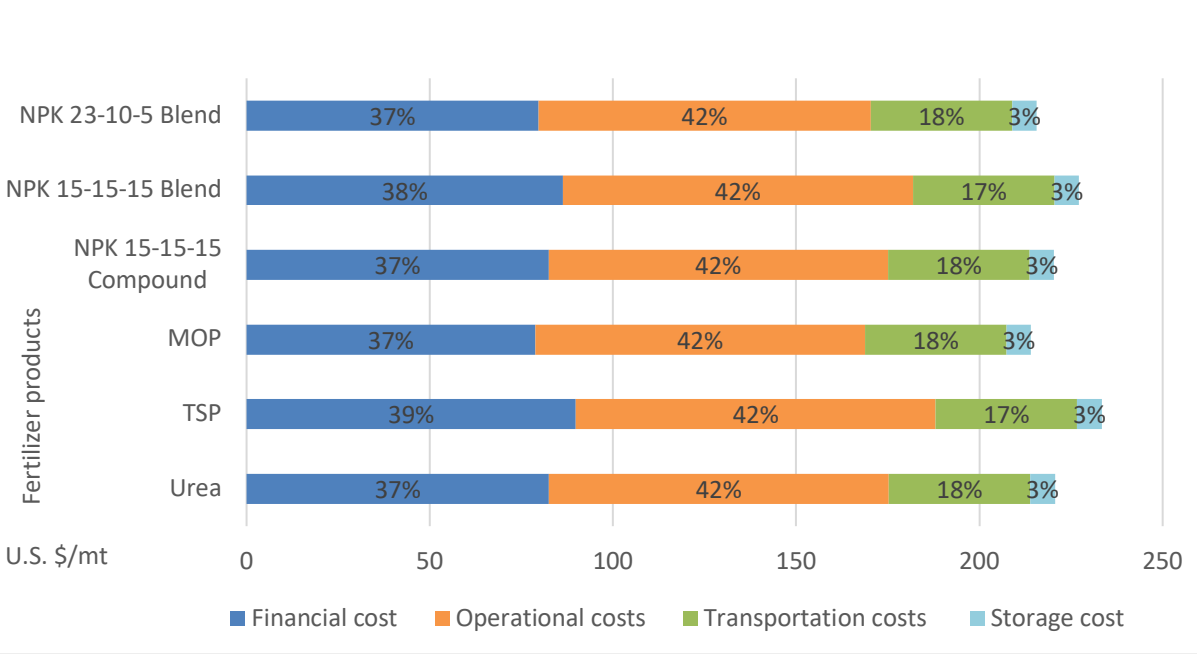


Figure 14. Cost Breakdown of Distribution to Retail, Beyond GA Storage

Figure Notes

Transportation costs are the charges for moving/transporting the products from the country of origin to the retail point, including international freight, freight insurance, domestic transport among different stages along the supply chain, and truck loading/unloading.

Financial costs are the cumulative cost of working capital, including other financial charges or opportunity costs of capital for importation, procurement, distribution, and retail.

Operational costs are known costs associated with the operation of supplying fertilizer, from procurement and importation to retail.

Within the domestic distribution network, fertilizer products experience the largest cost increase when delivered to the furthermost northern areas. These increases are due mainly to higher financial, operational, and transportation costs of distributors and retailers. Operational costs include higher sales commissions to wholesalers and retailers in an effort to incentivize the delivery of products to remote areas within the northern regions. The high transportation cost is justified based on the higher fuel cost and poor road conditions, especially in the remote areas of the northern regions, leading to frequent equipment breakdown, repairs, and spare parts costs. Furthermore, in the Tema-Tamale and other northern regional corridors, there are multiple weight bridges and police checkpoints that cause additional delays, and some of the latter may demand unofficial payments, contributing to the cost increase. Table 8 presents the estimated costs at retail in the different regions across Ghana.

Table 8. Cost of Fertilizer Delivery at Retail to All Regions in Ghana

Region	Urea		NPK 15-15-15 Compound		NPK 15-15-15 Blend		NPK 23-10-5 Blend	
Cost per 50-kg bag	**U.S. $**	**GHS**	**U.S. $**	**GHS**	**U.S. $**	**GHS**	**U.S. $**	**GHS**
Greater Accra	36.70	176	35.90	172	39.20	188	35.70	171
Ashanti, Eastern, and Central	37.40	180	36.60	176	39.90	191	36.40	175
Western	37.20	179	36.40	175	39.70	190	36.20	174
Brong-Ahafo and Lower Volta	37.90	182	37.10	178	40.30	194	36.90	177
Upper Volta	37.30	179	36.50	175	39.80	191	36.40	175
Upper Northern	39.20	188	38.40	184	41.70	200	38.30	184
Upper West	39.20	188	38.40	184	41.70	200	38.30	184
Upper East	39.70	191	38.90	187	42.20	203	38.80	186

Source: Author estimations.

* NPK Blends are blended formulations based on the imported single nutrient fertilizer (urea, TSP, and MOP).

Finally, Figure 15 illustrates the cost breakdown of fertilizer from procurement to retail in Ghana.

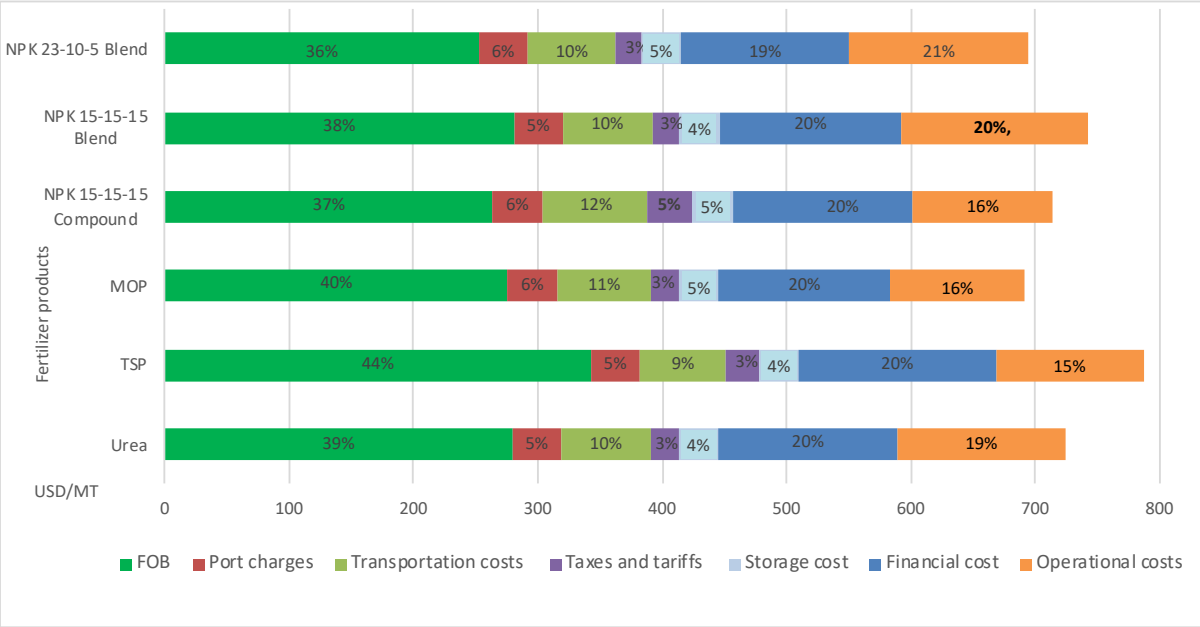


Figure 15. Average Cost of Fertilizer in Ghana Across All Regions (Non-Subsidized Costs)

4.2.3 Subsidized Fertilizer Cost Estimation

This section estimates fertilizer cost under the subsidy program. As previously explained, for the purposes of the program, retail subsidized prices are determined by MoFA by means of negotiation with importers.

The negotiated prices take into consideration the cost for importers to make fertilizer available at least to regional warehouses, but they may not take into consideration all of the transaction costs incurred by the domestic distribution network to make fertilizer available to farmers when and where it is needed, considering that, presumably, there is no representation from the domestic distribution network in the price negotiation.

This assertion is based on the fact that in the price negotiation, there is a predetermined allocation in Ghana cedis that is expected to be shared by the different players along the domestic supply chain beyond importation. This allocation may not be enough to cover all transaction costs for domestic supply, especially the cost of capital and other operational costs.

It is important to clarify that the presented cost estimation does not reflect the actual cost used by MoFA to negotiate market prices to determine the subsidy rate with importers and blenders to retail. This negotiation takes into consideration transportation costs along the supply chain to retail and a predetermined margin, which is to be shared by wholesalers, distributors, and retailers. These cost estimations do not take into consideration the cost of financing (or opportunity cost of financing if own finance is used, which is typically the case at distribution and retail) and the operational cost at each stage of the domestic supply chain. According to importers and MoFA price negotiations, these costs are expected to be covered by the predetermined margin allowance, which may not be enough for domestic suppliers to cover all financial and operational costs.

Table 9 presents the cost estimation of supplying fertilizer under the subsidy program across all regions, as negotiated by MoFA with importers and blenders, considering that not all

transaction costs incurred by the domestic distribution network to make fertilizer available to farmers are factored into the MoFA-importers negotiated price.

Table 9. Average Domestic Distribution Cost of Fertilizer in Ghana Across All Regions as Negotiated by MoFA

	Cost Items	Urea	TSP	MOP	NPK 15-15-15 Compound	NPK 15-15-15 Blend	NPK 23-10-5 Blend
		(U.S. $/mt)					
A	**Cost per mt of fertilizer in GA storage facility**	**503.60**	**553.70**	**477.70**	**516.50**	**515.20**	**479.10**
1	Transport charges to regional/wholesale storage	28.00	28.00	28.00	28.00	28.00	28.00
2	Unloading truck at regional/wholesale storage	2.10	2.10	2.10	2.10	2.10	2.10
3	Regional/wholesale storage cost	6.70	6.70	6.70	6.70	6.70	6.70
B	**Cost at distributor regional/wholesale storage**	**540.40**	**590.50**	**514.50**	**553.30**	**552.00**	**515.90**
4	Sales commission to wholesale	18.20	18.20	18.20	18.20	18.20	18.20
C	**Total fertilizer cost at regional storage/distribution**	**558.60**	**608.70**	**532.70**	**571.60**	**570.30**	**534.10**
5	Transport charges to retail store	8.50	8.50	8.50	8.50	8.50	8.50
6	Sales commission to retailer	14.10	14.10	14.10	14.10	14.10	14.10
D	**Total cost U.S. $/mt at retail**	**581.20**	**631.30**	**555.30**	**594.20**	**592.90**	**556.70**
	Cost to farmers at retail point per 50-kg bag in U.S. $	29.10	31.60	27.80	29.70	29.60	27.80
	Cost to farmers at retail point per 50-kg bag in GHS	139.50	151.50	133.30	142.60	142.30	133.60

* NPK Blends are blended formulation based on the imported single nutrient fertilizer (urea, TSP, and MOP).

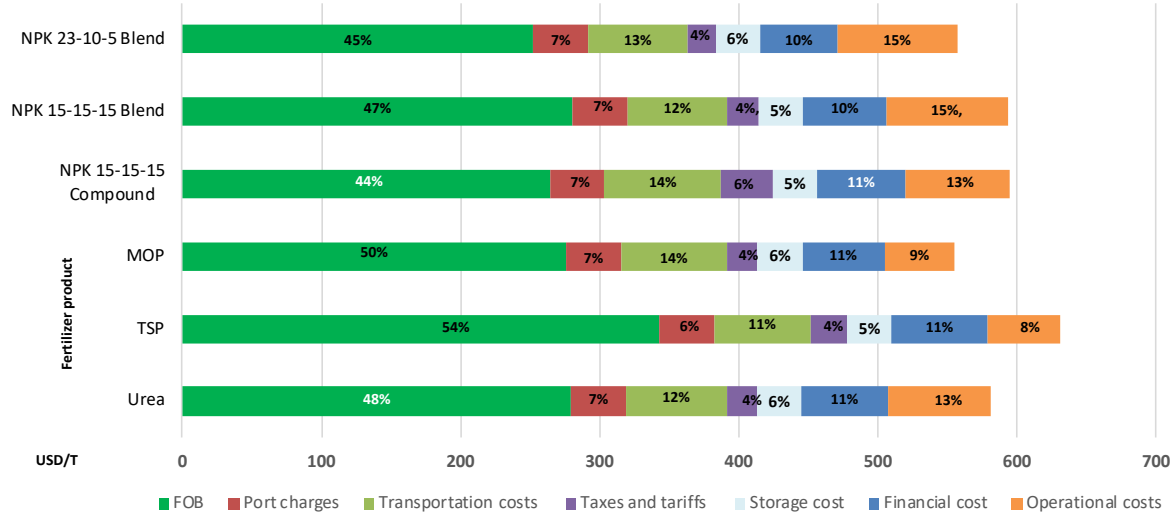


Figure 16. Average Domestic Distribution Cost of Fertilizer Across All Regions as Negotiated by MoFA Under the Subsidy Program

On average across all products and delivery regions in Ghana, the cost estimates used for price negotiation between MoFA and importers are about 20% lower than the full market cost estimates presented in this assessment, which also consider the opportunity cost of financing and operational costs.

Theoretically, there is enough margin to sustain the interest of participants in subsequent programs. The implementation of the fertilizer subsidy program helps to counterbalance the additional cost on fertilizers.[7]

4.2.4 Cost of Procuring Subsidized Fertilizer vs. Commercial Distribution

4.2.4.1 Current Cost Allocation Rules May Undermine the Local Distribution Network

Simulation results show that the cost of importing and distributing non-subsidized fertilizer is not the same as subsidized fertilizer. According to these estimations, the cost to farmers, or the MoFA-importers negotiated retail price expected to be paid by farmers for non-subsidized fertilizer, is lower than the estimated cost of supplying it and much lower to farmer beneficiaries of the fertilizer subsidy program. This implies that the MoFA-importer negotiated prices may not cover all of the costs incurred by traders along the domestic supply chain.

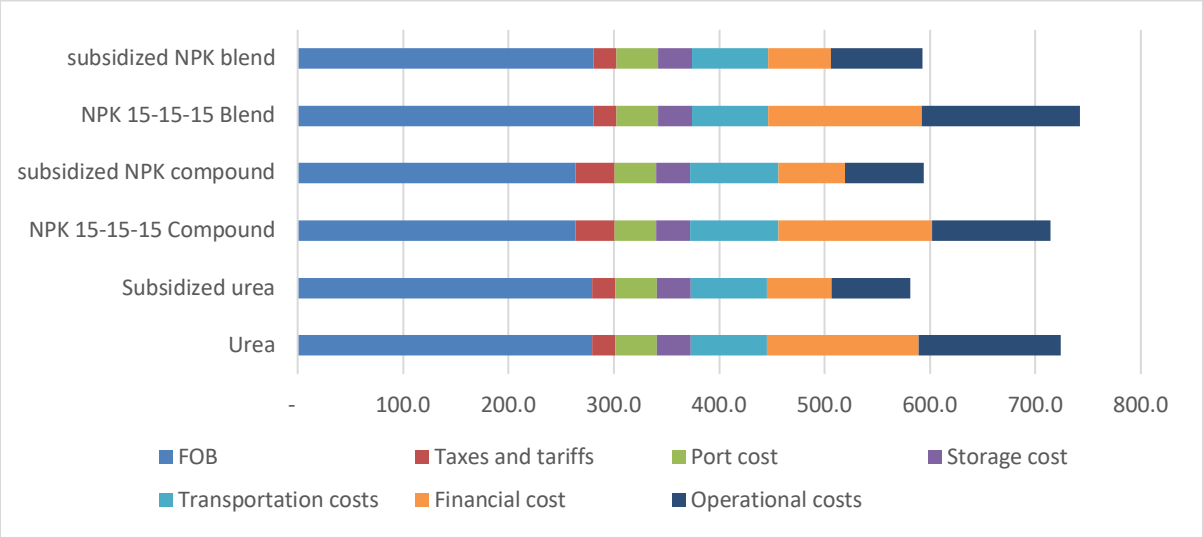


Figure 17. Cost of Procuring Subsidized Fertilizers vs. Commercial Distribution

MoFA negotiates market prices to retail with importers and blenders to determine the subsidy rate. This negotiation takes into consideration transportation costs along the supply chain to retail and a predetermined margin, which is to be shared by wholesalers, distributors, and retailers. These cost estimations do not take into consideration the cost of financing (or the opportunity cost of financing if own finance is used, which is typically the case at distribution and retail) and the operational cost at each stage of the domestic supply chain beyond GA storage. According to reports from importer/MoFA price negotiations, these costs are expected to be covered by the predetermined margin allowance of the negotiated prices, which may not be enough for domestic suppliers to cover all financial and operational costs.

When comparing the cost of supplying fertilizer under open market conditions (i.e., considering all costs along the supply chain) with the cost of supplying it under the subsidy program, the domestic cost under open market conditions was found to be higher than under

[7] Mulholland, Sean. 07 July 2017. "Is 2017 a turning point for West African fertilizer demand?" https://www.crugroup.com/knowledge-and-insights/spotlights/is-2017-a-turning-point-for-west-african-fertilizer-demand/.

the subsidized market. Under open market conditions (Figure 17), FOB absorbs a smaller proportion and domestic cost a larger proportion of the total cost at retail; however, under the subsidy program, domestic cost absorbs a larger proportion, relative to open market conditions, of the total cost at retail. That differential between the two cost estimations, according to discussions with importers and government officials, is due to MoFA-importer negotiations, which do not factor in all actual costs incurred by the players along the domestic supply chain, but they allocate a fixed margin beyond cost at the GA facilities (in Ghana cedis) to be shared among distributors/wholesalers and retailers.

The task of developing the distribution network down to the farmer has been left to the weak existing distribution network, national investors, and small rural entrepreneurs who, in addition to low profits, are facing adverse macroeconomic conditions like volatile exchange rates/devaluations, high interest rates, lack of credit, and logistics infrastructural constraints. In addition, higher competition at retail makes it harder for businesses to survive, considering the narrow margin previously set by the importers and MoFA, which is expected to cover all the retailer costs of storage, administrative costs, risks, and profits in compensation for their entrepreneurial efforts. This margin is not an incentive for retailers to expand their business or for new ones to enter the market.

4.2.4.2 FOB Price Increases May Stimulate the Local Blending Industry

Table 10 presents a simulation of the cost buildup at the GA storage facilities for blends, urea, and 15-15-15 compound under two scenarios: (1) considering three-month average FOB prices and (2) with an increase in FOB prices. Fertilizer prices in the international market are expected to continue increasing in the foreseeable future.

Table 10. Impact of FOB Price Increases on GA Costs

	Imported and Bagged in Ghana				Blended and Bagged in Ghana				
	Urea	TSP	MOP	NPK 15-15-15	NPK 15-15-15	NPK 23-10-5	NPK 25-10-10	NPK 20-10-10	NPK 17-10-10
	(U.S. $/mt)								
FOB (Jun-Aug av. 2018)	279	343	276	264	281	252	279	256	242
CIF	305	366	306	301	306	277	304	281	267
Cost Greater Accra storage facility	503	553	477	490	514	478	513	483	465
Cost GHS per 50-kg bag	**121**			**118**	**123**	**115**	**123**	**116**	**112**
FOB (Oct 2018)	301	361	285	300	296	268	296	271	256
CIF	327	384	315	338	321	293	322	296	281
Cost Greater Accra storage facility	528	575	487	533	533	496	533	500	481
Cost GHS per 50-kg bag	**127**			**128**	**128**	**119**	**128**	**120**	**115**
FOB cost variation	8%	5%	3%	14%	6%	6%	6%	6%	6%
GA storage cost variation	5%	4%	2%	9%	4%	4%	4%	4%	4%

Based on the simulations presented in Table 10, as fertilizer FOB prices increase, the cost of NPK compounds and feedstock fertilizer product for blends will continue to increase as well; however, the use of blends can serve as a buffer to prevent such cost increases from being passed on to the domestic distribution network and to farmers.

Based on estimates presented in Table 10, using NPK 15-15-15 as benchmark, a 14% increase in FOB price will result in a further cost increase of 9% at GA storage for a total cost increase of 23%. However, this 23% increase at GA storage can be reduced to 10%, on average, with blended fertilizer, depending on the formulation, which represents a reduction of 13% in cost or savings of about U.S. $30/mt, on average, at GA storage, compared to NPK 15-15-15. If part of these savings is passed on to the domestic distribution and retail network, this can result

in lower prices of fertilizer to farmers at retail points. This cost reduction, which would imply an increase in consumption at the farm level, would benefit not only farmers and the agriculture sector but all players along the supply chain, from importers to retailers, by increasing the amount of fertilizer being moved in the market.

4.3 Some Options to Reduce Domestic Costs of Supplying Fertilizers

From order to delivery to farmers, the entire procurement and importation process features a number of inefficiencies that can be improved to save time and reduce cost buildups in the fertilizer value chain.

4.3.1 Facilitating Delivery of Import Permits

To begin with, importers must apply for import waivers or permits, a process shrouded in bureaucracy. The process features several iterations between the Minister of MoFA and the Plant Protection and Regulatory Services Directorate (PPRSD) office in Pokuase, which can take three to seven days.

To save time and enhance this process, since the PPRSD has the technical capability to approve permits, they should be given the mandate to solely register and grant these permits concurrently, creating a one-stop shop or an online solution.

4.3.2 Improving Port Operations

Improving their efficiency or allowing importers to choose which stevedoring or shore handlers work on their vessels can help address any delays that may arise. The Ghana Ports and Harbours Authority (GPHA) should mandate minimum criteria for the efficiency of the cranes and other equipment used at the ports.

Though the GPHA, in partnership with private firms, is expanding the Tema port to a capacity of 16 meters to allow bigger vessels to be berthed, this expansion will not benefit the fertilizer vessels that will still have to use the existing berths for container vessels; this sometimes forces the fertilizer vessels to incur demurrage costs ranging from $8,500-$11,000 per day. GPHA is interested in engaging the fertilizer importers to build and expand dedicated berths for fertilizers.

Finally, in order to reduce the amount of time vessels spend at the ports and, thus, the charges they incur, GHPA, Ghana Revenue Authority, and Customs should ensure that the current electronic systems are compatible, with a seamless interaction and interface to address issues of network connectivity.

4.3.3 Transport

Best practice indicates that it takes two to three days to carry the products from the ports to the importers' warehouses. Sometimes, however, delays at the ports inadvertently delay the transportation of goods to their intended locations. Clearly, if the inefficiencies at the ports are resolved, then transporters are in a better position to guarantee on-time deliveries.

As demonstrated in Côte d'Ivoire, developing a rail network for fertilizer transportation from the ports to high-consuming regions, such as Northern, Ashanti, and Brong-Ahafo, will reduce haulage costs and ensure that farmers receive the products at the right time. This may also get other companies interested in setting up blending facilities in the interior of the country. The

GoG can also develop waterway transportation using the Volta River to connect to strategic locations.

4.3.4 Investing in Warehousing Capacities

The main players in the fertilizer market have warehouses to store the imported products once they have been cleared from the ports. Some companies, such as Yara, Chemico, and OmniFert, have a few warehouses located across the country to service their clients. These facilities are heavily used during the peak season, which is February to August for food crops and June to August for cocoa. Companies such as Global Haulage provide warehouses for rent across the country to distributors, importers, and the GoG to store fertilizers for farmers until they are needed.

To ensure that farmers get access to all types of fertilizers on time, the GoG can facilitate investments in warehouses along the value chain and ensure that the fertilizer can be close to the farms well before the planting season starts.

5. Developing the Fertilizer (Blending) Market

5.1 Potential Market Demand for Fertilizers

Fertilizer demand projections were estimated using an econometric model and crop nutrient removal approach used by IFDC in previous studies.

This **first approach** using an econometric model is based on a linear lagged equation, which makes a projection using a time series of fertilizer data beginning in the early 2000s. The model makes a correction for the abnormal surge of apparent fertilizer consumption during 2017, due to the concurrent implementation of two fertilizer subsidies. The time series used in the estimation is a combination of FAO and AfricaFertilizer.org data.

Results of this estimation indicate that, under the current conditions and considering the fertilizer subsidy under the PFJ Presidential Initiative, fertilizer consumption in Ghana is expected to increase at a 6% average annual growth rate (AGR) to 450,000 mt by 2023. In the longer term, and assuming the PFJ continues, fertilizer consumption and demand are expected to continue increasing at a slower 5% AGR for the following five years to 542,200 mt by 2028.

The **second approach** using nutrient removal is used to estimate the potential quantities of fertilizer required or demanded in Ghana to meet the countries' agricultural production targets, as stated in the Medium-Term Agriculture Sector Investment Plan (METASIP). This method estimates fertilizer requirements based on nutrients removed by harvested crops, adjusted to reflect fertilizer recovery efficiency. The approach also assumes good crop, soil, and fertilizer management practices by farmers and assumes that fertilizer application is for maintaining, rather than building, soil fertility levels.

Using the crop recovery efficiency factors of 50%, 35%, and 70% for N, P, and K, respectively, results show that the amount of nutrients required for the targeted crops will total approximately 104,800 mt, which is equivalent to almost 198,000 mt of urea, DAP, and MOP combined. When all other crops are considered, these figures increase to 168,600 mt of nutrients and 320,000 mt of fertilizer products.

The nutrient removal estimate, adjusted for fertilizer recovery efficiency, indicates that an additional 198,000 mt of fertilizer is required to meet the agricultural production growth targets of METASIP. When considering all other crops, the quantity of fertilizer products required to

achieve the METASIP production target increases by 320,000 mt, for a total need of 518,000 mt of additional fertilizer products.

When comparing the results of both the econometric and the nutrient removal approaches, it is apparent that they both yield similar but slightly different results. The econometric model estimates the total amount of fertilizer to be demanded and used in the next five to 10 years. The nutrient removal approach estimates the additional fertilizer needed to achieve the METASIP II agricultural production targets, which is to be added to the current amount of fertilizer use for the current level of production. If we assume a three-year average (2014-2016 as per Table 1), the total amount of fertilizer products needed would be about 760,000 mt.

If we then compare these estimates to those provided by importers and the MoFA, they are quite dissimilar. MoFA and the importers believe that fertilizer demand in Ghana should at least double, or perhaps more than double, during the next five years, from a base of about 250,000 mt estimated current demand/consumption to 500,000-650,000 mt.

5.2 The Current Blend Market Situation

The current blend market is estimated at 100,000 mt per annum, representing an estimated 40% of the total Ghanaian fertilizer market. Consumption of blended fertilizer is predominantly in the cocoa-growing regions and plantation production areas.

Cocoa production consumes approximately 80,000 mt of blended fertilizer. It is mainly planted by smallholder farmers in Western, Ashanti, Brong-Ahafo, Eastern, Central, and Volta regions of Ghana. These farms comprise 80% of the blend market. The other 20%, representing 20,000 mt, is consumed by oil palm, rubber, cotton, and larger fruit and food crop plantations. The plantation clients can be found mainly in Western, Eastern, Ashanti, Brong-Ahafo, and Volta, and minimally in the Northern regions.

Table 11. Main Fertilizer Grades Used per Crop in Ghana

Crop	Fertilizers Grades
Cocoa	Yara Asaasewura PK 0-22-18 + 9CaO + 7S + 6MgO
	Chemico Cocofeed PK 0-30-20; Chemico Cocofeed Plus NPK 2-21-17+ 9.9Ca + 4.8Mg + 4S + 0.3Zn + 0.1B
	LDC Cocoa Master NPK 1-21-19 + 9CaO + 6S + 6MgO + 1B
	OmniFert Cocoa Aduane; AMG Cocoa Nti
Maize	NPK 15-15-15; NPK 20-10-10 3S + 2MgO; NPK 25-10-10; NPK 21-10-10 + 2S
	NPK 23-10-5 + 4MgO + 2Zn (Actyva); NPK 15-15-15 + 9.6S + 1B (or other NPK depending on availability)
	Urea, SoA in topdressing- 40-0-0 + 6S (Yara Amidas)
Rice	NPK 15-15-15 basal; NPK 25-10-10
	NPK 20-10-10 + 3S + 2MgO; NPK 15-15-15 + 9.6S + 1B (or other types of NPK)
	Urea and SoA in topdressing
Oil palm	NPK 15-15-15 or NPK 15-9-20 + secondary nutrients; NPK 10-10-30+Mg+B
Oil palm IP	NPK, MOP, single superphosphate (SSP), and some TSP in basal
Groundnut	SoA, SSP, MOP
Sorghum	NPK 15-15-15 basal/urea and SoA topdressing
Soybean	TSP, NPK 4-18-13 + 3S + 3MgO + 6CaO + 0.1B (Yara Legume)
Rubber	Yara Winner 15-9-20 + micronutrients; NPK 11-11-21 + 2MgO + 0.2B
Cotton	SSP and TSP in basal
Pineapple	NPK 15-15-15 (or other NPK); urea and SOP
Mango	NPK 15-15-15 (or other NPK); Nitrabor after fructification

5.3 Potential Market Demand for Blends

5.3.1 Potential Market Demand for Different Blends

The fertilizers selected, procured, and distributed for subsidy programs are often compounds (e.g., NPK 15-15-15) lacking appropriate micronutrients and are not tailored to the appropriate agroecological zone(s) (AEZ) or crop(s). Therefore, according to IFDC studies, they have suboptimal impact on yields/productivity even if delivered to the intended beneficiaries and applied correctly. Despite the GoG's investments to encourage fertilizer use, Ghana's yields still fall far below expectations.

In discussions with stakeholders, it was clearly articulated that subsidies should be framed within the context of soil fertility and getting the right nutrients to feed the crop. This highlights the need for crop-specific fertilizer recommendations to reverse the effects of blanket recommendations that result in persistent low yields, soil degradation, and low farmer confidence.

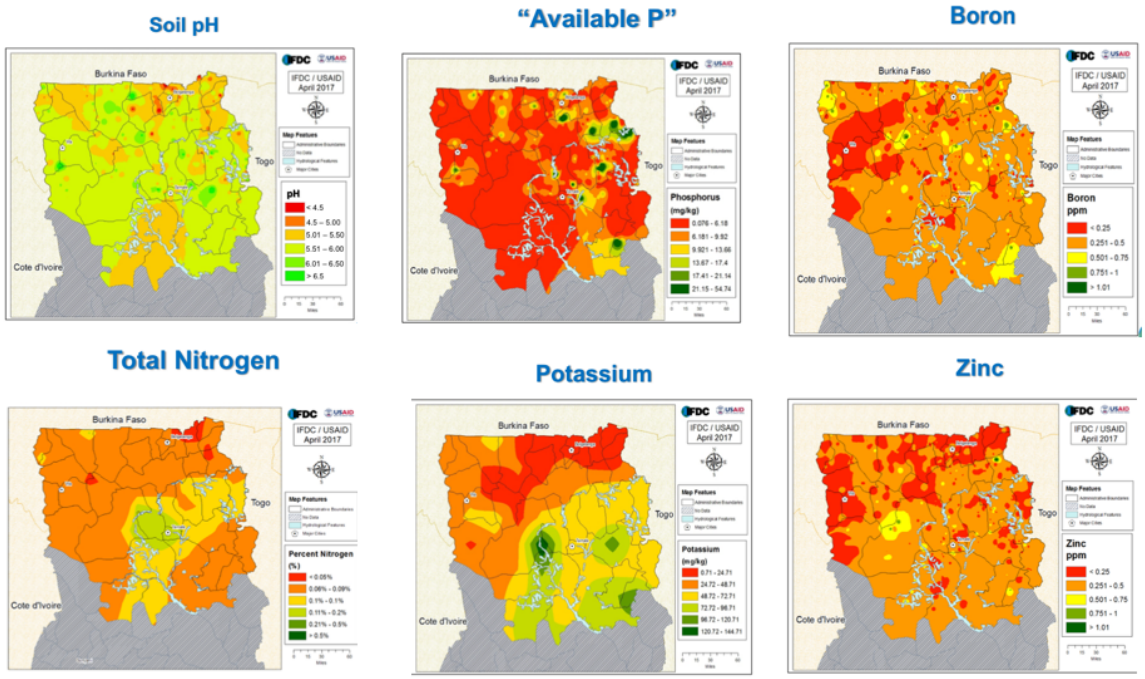
Table 12. Current and Potential Blended Fertilizer Consumption

	Food Crops	Cocoa	Plantations/ Private	Total
Current amount of fertilizer consumed (mt)	150,000	80,000	20,000	250,000
Current percentage of blend market	Negligible	80%	20%	100%
Current percentage of total fertilizer market	0%	32%	8%	40%
Potential fertilizer market consumption in 5 years (mt)	300,000	160,000	40,000	500,000
Potential amount of blend market in 5 years (mt)	60,000	160,000	40,000	260,000
Potential percentage of blend market in 5 years	23%	62%	15%	100%
Percentage of total market	60%	32%	8%	100%

Source: Author's estimates based on field discussions with blenders and key stakeholders.

5.3.2 Supplying Balanced Fertilizer Based on Ghanaian Soil Characteristics

For years, fertilizer recommendations have been the same for all farmers across the country: two bags of NPK and one bag of urea or SoA. In the past few years, the Soil Research Institute (SRI), Africa Soil Information Service (AfSIS), and IFDC have mapped and analyzed in considerable detail over 5,700 combined soil samples taken from Northern, Upper West, Upper East, and northern portions of Brong-Ahafo to determine the nutritional state of the soil. The soils are generally acidic to slightly acidic, with very few cases where the soil pH is near neutral, and with large portions deficient in P (< 10 mg/kg), S (< 6 mg/kg), Zn (< 1 mg/kg), and B (< 1 mg/kg). On the other hand, most of the soils have high potassium levels.



Source: IFDC, 2017

Figure 18. Some Results of the Soil Analysis Conducted by IFDC in Northern Ghana (2017)

SRI is working in partnership with Optimized Fertilizer Recommendations in Africa (OFRA), AfSIS, and Savanna Agricultural Research Institute (SARI)-Decision Support System for Agrotechnology Transfer (DSSAT), with funding from the Alliance for a Green Revolution in Africa (AGRA), to harmonize and validate fertilizer recommendations and formulations. This is based on five years of output using crop-based nutrient response functions; the use of soil, weather, crop, and economic indicators; and on-farm demonstration trials. The aim is to validate recommendations for four main crops being used for PFJ – maize, rice, soybean, and cassava – in order to increase production of appropriate fertilizer blends and other soil management technologies and practices.

These formulations are being tried and validated to improve the yield of the crops below:

- Maize should increase from 1.8 mt to 5 mt/ha;
- Rice from 2.2 mt to 6 mt/ha;
- Cassava from 12 mt to 40 mt/ha; and
- Soybean from 1 mt to 2.5 mt/ha.

Table 13. New Fertilizer Recommendations for Maize, Rice, Soybean, and Cassava Based on Soil Nutrient Maps

Application Rate by Crop (kg/ha)	Basal	Topdress
Maize – target yield: 5 mt/ha		
Blanket government: basal NPK 15-15-15, urea topdressing	250	125
Blanket government: basal NPK 15-15-15, SoA topdressing	250	150
Guinea savannah-specific: basal NPK 15-20-20+ 0.7Zn, urea topdressing	200	150
Forest/savannah transitional-specific: basal NPK 15-20-20+ 0.7Zn, urea topdressing	300	100
Yara Actyva Basal + topdressing NPK 23-10-5 + 2MgO + 3S + 0.3Zn	250	250
Yara Actyva Basal + Yara Bela Sulfan (NPK 24-0-0 + 6S + 10.6CaO) topdressing	250	250
Rice – target yield: 7 mt/ha		
Lowland: basal NPK 15-15-15, urea topdressing	400	100
Upland: basal NPK 15-15-15, urea topdressing	300	100
Lowland: new basal, NPK 15-20-20 + 0.7Zn, urea topdressing	300	100
Upland: new basal, NPK 15-20-20 + 0.7Zn, urea topdressing	200	125
Lowland: Yara basal, NPK 15-15-15 + 2S split + Amidas (40N + 5.6S) topdressing	375	125
Upland: Yara Actyva split NPK 23-10-5 + 2MgO + 3S + 0.3Zn + Amidas 40N + 5.6S topdressing	375	125
Soybeans – target yield: 3 mt/ha		
No government blanket recommendation		
New basal NPK 12-30-17 + 0.4Zn + 100 kg/ha TSP topdressing	200	100
Yara NPK 4-18-13 + 6CaO + 3MgO + 3S + 0.1B basal + Nitrabor topdressing	250	125
Cassava – target yield: 40 mt/ha		
Blanket government basal NPK 15-15-15, urea topdressing	200	150
New basal NPK 17-10-10 + 0.7Zn, urea topdressing	300	100
Yara NPK 10-10-30 + MgO	375	250

Source: Adapted from AGRA Assessment of Fertilizer Distribution Study, June 2018.

Although these new base formulations have adjusted the NPK concentrations according to crop requirements by ensuring that the crops get at least 90-60-60 kg of NPK nutrients per hectare, and adding appropriate levels of zinc (Zn), they may still be lacking in sulfur (S), boron (B) and magnesium (Mg), given the deficiencies identified in the maps. SRI notes that although the missing micronutrients are important, the current focus is to ensure the NPK has been corrected, and the additional Zn micronutrient is added to ensure high impact; adding other micronutrients would increase the cost to farmers.

These formulations were recently assessed by IFDC and the Africa Fertilizer and Agribusiness Partnership (AFAP) as part of the AGRA-funded activity "Assessment of Fertilizer Distribution and Opportunities for Developing Fertilizer Blends," conducted in the first half of 2018 in 11 countries, including Ghana. Two key takeaways from the recent AGRA assessment are:

1. Although it is advisable to have most nutrients applied in base fertilizer, it is imperative for farmers to use topdressing to better time nitrogen application to nitrogen crop demand later in the season; and
2. A critical element being neglected in many trials is B. The B concentration of soils is very low, while most crops are responsive to B when applied at 0.5 kg/ha (as a blend) or 0.25 kg/ha B (as a granular or coated product).

5.3.3 Potential and Feasibility for Fertilizer Formulation Shifts

Despite the GoG's keen interest in updating fertilizer formulations for crops and private sector blenders in Ghana conducting various trials with SRI to have their micronutrient-enriched products validated and registered, the current subsidy policy favors general NPK fertilizers. This inadvertently creates a disincentive for farmers to pay more for multi-nutrient fertilizers. Currently, there is little innovation in the blending market, with blenders only making slight NPK adjustments and introducing Zn into formulations.

In early 2018, AGRA commissioned SRI to develop crop- and site-specific recommendations. The Minister asked that these new fertilizer formulas be advertised. However, the scientists requested time for validation to determine which nutrients will be needed for specific crops before the recommendation could be transferred to the Ministry and blenders. MoFA hopes that once SRI completes its validation and recommendations, it can regulate which kinds of fertilizers should be formulated or imported into the country to meet crop needs. Importers and blenders will have to provide the right types of fertilizers to align with the government policy.

At the time of interviews for this study in September 2018, SRI had harvested the fields in Brong-Ahafo, was about to do the same in the Northern region, and were in the final field evaluation stages with farmers before upscaling the recommendations to MoFA in preparation for the next subsidy announcement.[8]

5.3.4 Developing Local Raw Materials to Produce Blends

Although there are limestone deposits in Ghana, they are predominantly used in the cement industry. Currently, there are no investments for limestone to develop limestone granulation for the fertilizer blending market in Ghana. Although soils that have been mapped in the Northern, Upper East, Upper West, and northern portion of Brong-Ahafo regions show there is extensive soil acidity, the fertilizer industry has opted to use dolomite to correct soil acidity.

[8] LATEST NEWS: These new recommendations were fully incorporated in the "Pre-qualification of Fertilizer Suppliers" notice issued by MoFA on November 7 for the 2019 "Planting for Food and Jobs" campaign.

A couple of the blenders have tried using the local limestone materials; however, they concluded that they would not recommend using it for the blends due to its crystalline nature, which changed the pH of the soil; it is hard, not easily soluble, and has poor granules that segregate quickly, and the cost was high. The blenders and leading scientist at SRI recommended using about 200 kg of dolomite (which contains calcium [Ca] and Mg), to be applied as a nutrient, which will aid the soil in absorbing the primary nutrients.

5.4 Producing Blends in Ghana

5.4.1 Current Blending Facilities and Capacities

There are currently four functioning blending facilities in Ghana, all located in the outskirts of Tema, with adequate storage capacities for both raw materials and finished products and good access to power supply and the road network. Before the next planting season, there will be two additional new blending sites, which will bring the total to six facilities[9] with a total blending capacity of close to 6,300 mt per day at peak season. Based on the 2017 estimated consumption of 264,000 mt of NPK, all NPK fertilizers can be produced by the current blending facilities within two months.

Table 14. Fertilizer Blending Capacity in Ghana

Company	Installed Capacity	Equipment	Estimated % Capacity Use	In Operation Since
Chemico	1,000 mtpd[10]	2 EMT shamrock	10-20%	1976
Macrofertil	300 mtpd	1 EMT shamrock	<20%	2017
OmniFert	500 mtpd	1 CMIC declining	<30%	Nov 2016
Yara (new site)	2,000 mtpd	1 EMT declining	Estimated <20%	Q4 2018
GloFert[11]	2,000 mtpd	1 EMT declining	Unknown	Q4 2018
AMG[12]	500 mtpd	1 Yargus declining	Estimated <30%	Q2 2019
Total	6,300 mtpd			

All blending units installed can produce blends in small quantities, as low as 40 mt (one truck), and can produce any type of soil- and crop-specific blend requirements the market may require now and in the foreseeable future – especially with the newest blending lines, which are designed to easily switch from one formula to the other and to incorporate any kind of secondary or micronutrients.

Therefore, Ghanaian blenders are well-positioned to take advantage of the newly developed soil maps and are capable to meet any future demands, even if those demands double in the next five years.

5.4.2 Blending Unit Investment, Economic Benefit, and Profitability

In countries like Ghana with small farms and difficult logistics (roads, security, etc.), a few larger plants are generally installed in or near the ports for logistics and economic reasons (good examples outside Africa are Central America or Sri Lanka). The blending plants

[9] The Yara blending site, which operated two shamrock lines, was closed and dismantled, and the new site is functional.
[10] mtpd – metric tons per day.
[11] The GloFert site is uniquely located on Nsawam road, 40 km from Accra. All other blending sites are located in or close to Tema.
[12] Project is in its final stages.

produce quality products in larger quantities that are then distributed to inland distribution centers close to the farmers to meet soil requirements. Agronomical and other farmer support needs are supplied by the distribution centers, which let the production facility near the port know what products are required. Final blends are then moved in bags via trucks to farm centers.

Running at 20-30% of the name plate capacity is common, even in developed markets, such as the United States or Brazil, or in mature markets like South Africa. Large blending units should be able to store 30,000 mt or more in bulk, allowing for the flexibility to purchase raw materials in the off season at substantial savings, as there are significant swings in fertilizer prices. A successful blending unit should also be able to handle changes of blends, equipment maintenance, plant stoppages due to various reasons, lack of storage space if transport is not reliable, and many other issues that can and will affect production.

Standard costs for automated blending systems will run from U.S. $250,000 to U.S. $800,000, depending on the size of the system and various options (bagging lines, automation, quality of the building materials, etc.). Recent investments in Ghana are in the range of U.S. $500,000 for such systems, with total investments in terms of capital expenditure (CAPEX; land, building, and machines) conservatively over U.S. $4 million.

Typical costs for such blending units, based on an output of 50,000 mt per year, are U.S. $10-12[13] per ton for running the blending plant, and U.S. $2.5 per mt for unloading raw and finished products. These costs include manpower (management, maintenance, and shifts), forklifts, and insurance, but do not include warehouse, rental, or transport costs into or out of the facility or bags and utilities (electricity or diesel if running on generators). It is estimated that an annual minimum of 35,000 mt of blends will need to be produced for blending units that manufacture 50-120 mt per hour to break even.

Being mainly a tender market, the fertilizer market in Ghana is not equally split between the blending companies. Blending companies therefore need to have enough capacity to fulfil tenders they might win, leading to more capacity per company required. If the market becomes a normal and competitive market, the best companies can build up market share in a normal competitive business and commit to long-term investments in technology (blender, bagging) and also in technical advice and sales – and survive!

5.4.3 The Small Blending Plant Option

Smaller plants are more affordable if they are competing in the market, especially when soil testing services are available, and policies promote crop- and soil-specific fertilizers. Such units may bring in 50-kg standard bags, or 600-kg or 1000-kg large bags, and possibly bulk containers as raw materials. They use existing warehouses that they are using for storing fertilizers or a High-Density Poly (HDP) building (such a building has been in place in Mali for over eight years and is in excellent condition).

Such units should be able to store around 2,000 mt of raw and 2,000 mt of finished product, which would require about U.S. $2 million for inventories at peak production periods. If the location does not require a building, equipment is in the range of U.S. $150,000 to U.S. $250,000, with forklifts.

5.4.4 Deploying Additional Blending Units and/or Optimizing Current Blending Capacity?

With six large blending units with installed blending capacity that can easily produce all types of blends within the peak period (March to June), the common feeling among industry players

[13] U.S. $12/mt was used in this study's cost buildup estimates.

and equipment manufacturers is that adding any additional blending units is not currently an economically viable idea and would lead to huge machine and staff redundancies for existing blenders, resulting in losses for all.

The new blending lines that are coming into operation are state-of-the-art and will, without any doubt, fulfill any specific requirements to produce customized blends for their customers, whether large plantations, distributors, aggregators, or the GoG. Adding fertilizer quality control and soil and plant testing capabilities as in-house or outsourced services will further enhance their capabilities to respond to new market demand.

However, if the market is liberalized, more competitive, and geared toward the use of soil- and crop-specific blends across the country, smaller units closer to food production centers will have a competitive advantage over the Tema-based larger plants given the lower CAPEX required and lower production costs. Given the number of small farms operating within a 100-150 km radius of Brong-Ahafo (Techiman or Kumasi) and Tamale, these locations would appear to be options for locations of smaller blending facilities to be further explored in the medium term.

5.5 Needed Changes to Unlock the Potential of the Blend Market

With the progressive development of soil and nutrient maps in the country, Ghana is primed to see the development of soil- and crop-specific fertilizer formulations. These maps provide blenders with much of the information they require to develop blends that are not only adjusted NPK formulations but contain micronutrients like S, B, Zn, and Mg in the right quantities to suit different crops growing in various AEZs.

The development of the blends market rests on two primary activities: (i) changes in the GoG's subsidy program and (ii) education of farmers on the use and long-term benefits of fertilizer blends.

5.5.1 Introducing Blends into the Subsidy Program

It is estimated that approximately 80% (121,000 mt for MoFA and 80,000 mt for COCOBOD) of the fertilizer consumed in 2017 was subsidized, which indicates that the demand for fertilizer in Ghana is defined by subsidies.

If the GoG mandates that these blends are to be used in the subsidy program or increases the subsidy quota on these blends, farmers will be encouraged to use the appropriate fertilizers and the private sector will have the market needed and the economies of scale to produce these formulas at competitive rates. These recommendations were incorporated in the "Pre-qualification of Fertilizer Suppliers" notice issued by MoFA on November 7, 2018, for the 2019 "Planting for Food and Jobs" campaign (see Section 7.3).

5.5.2 Investing in Education

This move from commodity fertilizers to blends should be done in tandem with a massive and sustained education drive for farmers. By using demonstration plots, building the capacity of extension officers, and instituting innovations like OCP's school labs, farmers should be educated on soil testing to discover their soil's nutrition needs, blend recommendations, the composition, color, and sizes of these blends, and how to apply these blends to ensure the best results. Holding these live demonstrations will slowly build trust and farmer adoption of these products, as well as sensitize farmers and agro-dealers on identifying quality blends.

There is a need to technically train blenders, extension agents, retailers, and regulators, as there is a gap in both technical and management skills. More specifically, strengthening PPRSD is a critical base needed for the sustainability of the sector. Working through the subsidy regime, the GoG can create efficiency within the current system through the promotion and use of more appropriate products, such as specific blends, instead of less appropriate compounds and granular (manufactured in Nigeria) instead of prilled urea.

6. Fertilizer Value Chain Optimization

This section of the report provides a brief overview of the GoG's FSP over the 2015-2018 period. Recommendations developed in this section are taking stock of previous analyses (AGRA, 2016) and the Regional Subsidy Program Guidance developed in 2017 by IFDC under the USAID West Africa Fertilizer Program, which seeks to improve the design and implementation of subsidy programs in West Africa.

6.1 Background of the Ghana Fertilizer Subsidy Program

6.1.1 Since 2008: Reintroduction of Fertilizer Subsidy Programs

In July 2008, in an effort to increase productivity of Ghanaian farmers and modernize agriculture, the GoG instituted a country-wide subsidy on four types of fertilizer (NPK 15-15-15, NPK 23-10-05, urea, and sulfate of ammonia). In 2008 and 2009, the subsidy was implemented through a voucher system, and from 2010 through a waybill system. While the voucher system targeted small-scale farmers, the waybill system was made available for all types of farms and farmers that could afford the subsidized price.

The total amount of subsidized fertilizers increased more than threefold from 43,200 mt in 2008 to 150,000 mt in 2011, at a cost equivalent to 10-13% of MoFA's total budget in 2008 and 2009 (IFPRI, 2012). During the fifth year of the renewed FSP, the GoG added maize, rice, and soybean seeds to the program. With the seed subsidy, the GoG was trying to promote the use of certified seed to help with the development of the local seed industry (MoFA, 2013).

6.1.2 2016: Prioritizing Agriculture

The current government, in power since 2016, aims to modernize the agriculture sector, which will lead to structural transformation of the national economy through food security, employment opportunities, and reduced poverty.

The government is investing in two flagship projects: "*Planting for Food and Jobs"* and "*One District One Factory."* The government earmarked U.S. $113.5 million and U.S. $98.8 million for 2016 and 2017, respectively, for these two programs. Investments in agriculture are guided by METASIP II (2014-2017),[14] which is the National Agriculture Investment Plan (NAIP) and is currently under review.

6.1.3 2017: Planting for Food and Jobs Program

MoFA's flagship program was introduced in 2017. The new program views subsidies through an integrated value chain approach by offering seeds and fertilizers, as well as complementary services in extension, marketing of outputs, and e-agriculture.

[14] Medium Term Agricultural Sector Investment Plan (METASIP) II, 2014-2017, Ministry of Food and Agriculture.

The program is expected to create an estimated 750,000 (direct and indirect) jobs and generate additional farm income worth over GHS 1.3 billion (U.S. $267.5 million). The PFJ focuses on three key commodity clusters identified as priority crops, namely (i) cereals (maize, rice, and sorghum); (ii) legumes (soybean); and (iii) vegetables (tomato, onion, and pepper) because of shorter gestation periods, adaptability to grow in all agro-ecological zones, and high propensity for income generation and export revenue.

In 2017, the input arrangement and payment mode included the following: the government would subsidize 50% of the cost of the inputs; the farmer would make a 25% down payment before the supply and receipt of the inputs directly from the MoFA district; and the remaining 25% would be paid after harvest (end of season). The Agricultural Development Bank (ADB) is engaged as the official bank to receive payments. ADB collaborates with rural banks, especially in areas where ADB does not exist.

6.1.4 2018: Adjusting the Planting for Food and Jobs Program

In 2018, after a year of implementation, the government boasted that its flagship program was a success, claiming that it had: 1) increased the use of improved seeds by strengthening the local seed industry; and 2) increased output of the targeted crops/increased crop productivity.

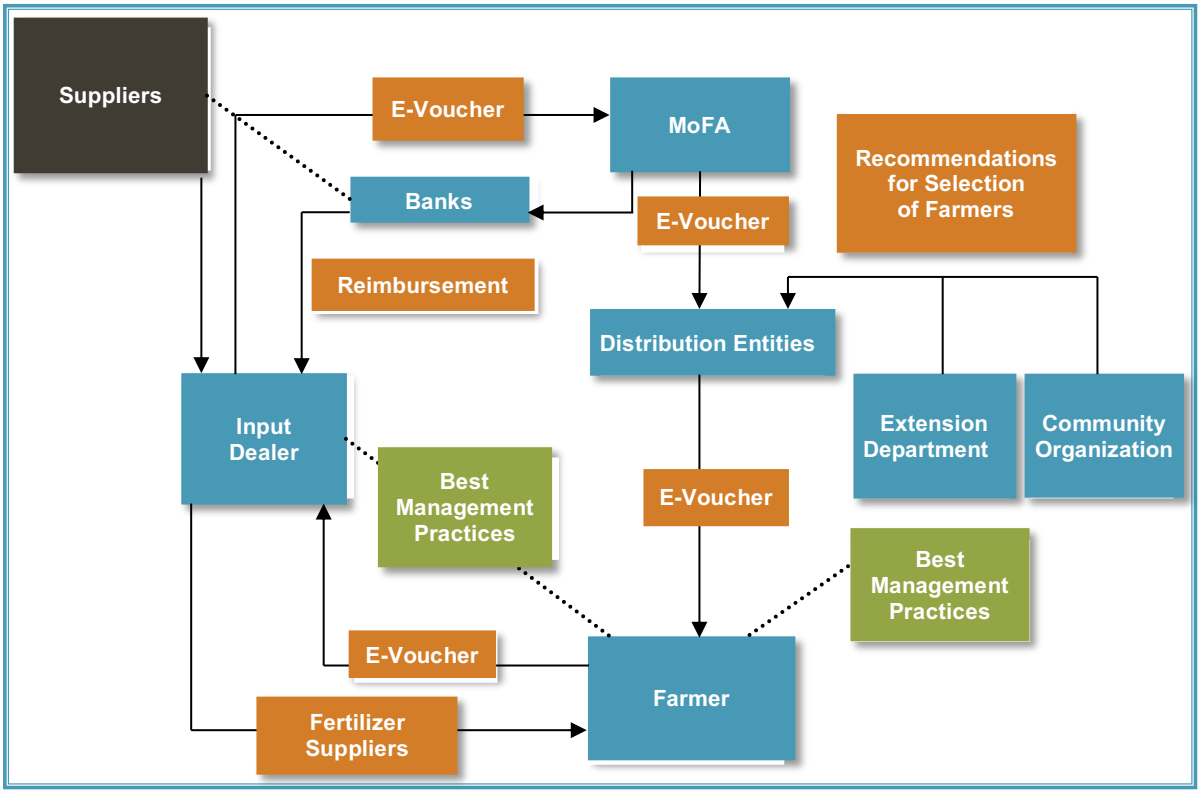
It was reported that the PFJ campaign registered 201,000 farmers across the country. A total of 2,160 university graduates and 1,070 youth were recruited to enhance extension delivery. In addition, 121,000 mt out of a target of 233,356 mt of subsidized fertilizers (51%) and 4,455 mt out of a target of 5,767 mt of subsidized seeds of maize, rice, sorghum, soybean, and vegetables (77%) were distributed to beneficiary farmers.

However, there were significant challenges reported:

- Inadequate storage space for the receipt and storage of seeds and fertilizers at the regional and district levels (rainfall failures in parts of Northern Savannah);
- Late delivery of inputs (seeds and fertilizers) in some regions;
- Inadequate domestic supply of improved seeds;
- Unavailable farmer database;
- Fall Armyworm invasion;
- Inadequate extension officers/personnel;
- Inadequate logistics – motorbikes, vehicles; and
- An estimated 3% repayment rate by the farmers of the remaining 25%.

Additionally, many farmers could not access the subsidized inputs in 2017 because GoG logistical arrangements meant that farmers had to travel to the districts and banks to make payments before getting seeds and fertilizers. This discouraged a lot of farmers from using fertilizers since they had to travel very far from their farms and homes.

These challenges led MoFA to adjust the modality of the program for 2018 implementation. The focus commodity clusters remained the same with the addition of groundnuts under the legume cluster and cabbage, cucumber, lettuce, and carrots under the vegetable cluster, while a new roots and tubers cluster was added with a focus on cassava.



Source: AGRA Ghana.

Figure 19. 2018 Fertilizer Subsidy Model of the Planting for Food and Jobs Program

6.2 The Fertilizer Subsidy Scheme

6.2.1 Determining Subsidy Allocation

To determine subsidy allocations, the Director of MoFA's Directorate of Crop Services (DCS), together with other stakeholders (advisors), meets to assess factors like previous fertilizer supplied, current fertilizer needs of farmers, estimated demand of fertilizer for food crops, as well as budgetary allocations for the program and MoFA. Based on these assessments and projections of required food crops, they estimate the quantity of fertilizer required to make an impact, and then set the subsidy quota.

DCS estimates that demand for the food crops sector is about 250,000 mt. However, given that the GoG cannot subsidize the entire market, 180,000 mt of subsidized fertilizer was provided in 2016 and 2017. The 2018 PFJ had a target allocation of 250,000 mt of inorganic fertilizers and 20,000 mt of organic fertilizers.

6.2.2 Selecting Fertilizer Suppliers

DCS then works with the Procurement Unit to request proposals for consideration for allocations from interested companies through advertisements in national daily newspapers. Interested eligible tenderers may purchase the Plant and Fertilizer document on the submission of a written application to the DCS upon payment of a non-refundable fee of GHS 1,000 (U.S. $171). The pre-qualification documents then must be delivered to DCS by an advertised deadline date. Qualified companies are selected by an evaluation committee. The agreed upon subsidy allocation is then shared among the companies selected.

6.2.3 Companies Involved in the Subsidy Program

Since the inception of the PFJ program, MoFA has developed a strong and growing partnership with private fertilizer importing and distributing companies in the country.

During the 2015 FSP, only six companies were engaged and given allocations to supply a total of 120,000 mt of NPK and 60,000 mt of urea. In 2016, the quota allocated remained at 180,000 mt, and the government selected the same suppliers in addition to Olam Ghana.

In 2017, the government requested 180,000 mt but later included an additional quota for PFJ, bringing the total quota for 2017 to 232,000 mt. Given the larger quota, the government not only increased the number of suppliers to 13 importers (including two organic fertilizer suppliers, ACARP Ltd. and Yayra Glover Ltd.), but MoFA also negotiated and contracted transporting companies to promote efficiency in the distribution channel.

According to 2018 MoFA documents, only 121,000 mt of fertilizers out of 232,000 mt (52%) were supplied in 2017 under the two initiatives. The GoG's decision to pay only 15% of the total 2016 outstanding subsidized fertilizer debt resulted in the supply of only half of the target to the program as a way of reducing risk. Some suppliers did not have the necessary funding to import and supply large volumes since the GoG's partial payment reduced their potential capital reserves.

In 2018, to further deepen support for agriculture and meet increasing demand for fertilizer for crop production based on the increased target of 500,000 farmers under PFJ, the subsidy was increased to approximately 250,000 mt of fertilizer for farmers. To further emphasize agribusiness development under the subsidy and ensure timely delivery of the increased volume of subsidized fertilizer, the GoG increased the total number of participating companies from 13 to 29 suppliers, signaling that stronger private sector participation is a major incentive for fertilizer expansion in Ghana. The expansion allowed for the inclusion of many new companies, each receiving 3,000 mt. A complete list of companies and their quotas can be found in the annex.

However, this rapid expansion has its potential drawbacks, given that several companies that received a quota did not have experience distributing fertilizer in Ghana, so there is a risk of non-performance, which would impact effective implementation of the subsidy program.

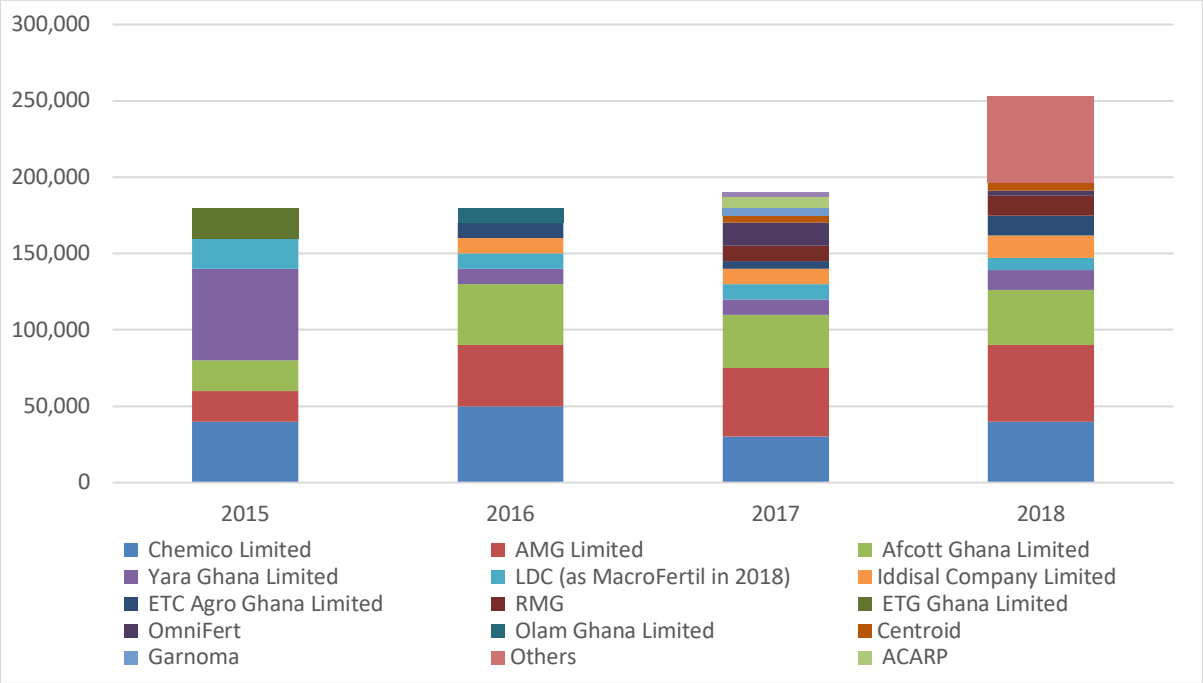


Figure 20. Fertilizer Subsidy Allocation in Ghana per Company (2015-2018)

6.2.4 Distributing Fertilizers to Farmers

6.2.4.1 Allocation by Region

Determining the subsidy allocation per region is done by referring to current demand from farmers enrolling in the scheme while historical data of the fertilizer needs of each region is used as a benchmark.

The three northern regions are typically the highest consumers of fertilizer while the Western Region consumes the least. The three northern regions are therefore allocated about 45% of the subsidy with the Northern Region receiving an estimated 20% (50,000 mt or 1 million bags of fertilizer), which translates to 1 million coupons dispatched to the region to cover allocations. In the event that a particular region reports shortages, the program reallocates fertilizer from regions that have excess fertilizer to cover these shortages.

Table 15. Subsidized Fertilizer Consumption by Region for 2016-2017

Region	Amount of Fertilizer Consumed (mt)			% of Subsidy	% of Total Market
	NPK	Urea	Total		
Northern	25,666	12,834	38,500	26%	15%
Brong-Ahafo	16,200	8,100	24,300	16%	10%
Ashanti	10.767	5,383	16,150	11%	6%
Eastern	10.267	5,133	15,400	10%	6%
Upper East	9,100	4,550	13,650	9%	6%
Central	8,500	4,250	12,750	9%	5%
Upper West	7,800	3,900	11,700	8%	5%
Volta	4,900	2,450	7,350	5%	3%
Greater Accra	4,200	2,100	6,300	4%	3%
Western	2,600	1,300	3,900	3%	2%
Total	**100,000**	**50,000**	**150,000**	**100%**	**60%**

Source: Adapted from MoFA regional consumption pattern in 2015.

6.2.4.2 Distribution Facilities for Subsidized Fertilizers

The fertilizer importers and their affiliate vendors serve as the distribution outlets for fertilizers while selected individual member-companies of the Ghana Agro-Input Dealers Association (GAIDA) serve as distributors of certified seed under the seed component of the program. The role of bulk storage and transport service providers is muted because the government absorbs port handling, loading, and transport costs as well as agents' commissions and margins to arrive at the approved prices under the current system.

6.2.4.3 Subsidy Beneficiaries

In 2018, PFJ targeted 500,000 farmers in all 216 districts and 10 regions in Ghana. The FSP focuses on ensuring that smallholder farmers across the country secure resources needed to improve their soils for higher crop yields. The groups and crops grown are verified before the district director makes the final decision to supply the farmers.

Beneficiaries are generally smallholder farmers who own 2 ha (5 acres) of land or less, and the program aims to have at least 40% female beneficiaries. However, the program also supports outgrower schemes with nucleus farms.

Table 16. Target Beneficiaries for PFJ, 2017-2020

	2017	2018	2019	2020
Eligible districts	216	216	216	216
Farmer-based organizations	10	650	1,350	2,000
Nucleus farmers	100	1,750	3,400	5,000
Direct clients	200,000	500,000	1,000,000	1,500,000
Households	202,860	562,400	1,123,500	1,682,000

Source: MoFA, 2017: Strategic Plan for Implementation of Planting for Food and Jobs Program.

6.2.4.4 The 2018 Subsidy Packages

The subsidy package comprises fertilizers, seeds, and free technical support in relation to marketing, extension, and e-agriculture.

- **Fertilizers**: The program gave farmers a maximum of 15 bags each (10 bags of NPK and five bags of urea, i.e., a maximum of 750 kg of fertilizers per farmer) at a 50% discount. This is one of the highest subsidy rates in the sub-region, and the highest among Ghana's contiguous countries. The hope is that farmers will realize the benefits of using agro-inputs and thereby increase their adoption of fertilizers, which in turn will stimulate the private sector to provide the appropriate fertilizer at the right time, leading to an increase in on-farm productivity and increased job creation.
- **Seeds**: The GoG subsidy program also offered seeds at 50% of the actual price, but when farmers could not afford to obtain the coupons, the seeds were provided at 100% credit.

A rapid assessment at the agro-dealer level shows that under the program, farmers accessed an average of six bags of fertilizer instead of 15. This is because the combined 15 bags cost a total of GHS 995 or U.S. $205 (GHS 680 for 10 bags of NPK and GHS 315 for five bags of urea), which is expensive for smallholder farmers. Some of the farmers kept the coupons, hoping to access financing to purchase the rest of their allocation at a later date. Some farmers kept the coupons to use for the following planting season (2019); this would allow farmers to redeem the coupons as soon as the subsidy is announced and save them from having to travel to the district again. Others sold the coupons, which is illegal.

6.3 Costs of the Program and Prices

6.3.1 Funding of the 2018 PFJ and Beyond

Over the first five years of its implementation, the annual cost of the FSP to the GoG continued to rise, from a total of GHS 20.65 million in 2008 to a maximum of GHS 117.4 million in 2012, declining to GHS 64 million in 2013. Because the GoG was unable to pay the 2013 claims to importers, there was no subsidy program in 2014. The program resumed in 2015, but the GoG was only able to fund 50% of the targeted quantity of fertilizer for the year at a total cost of GHS 45 million.

Table 17. Estimated Cost of Planting for Food and Jobs Program, 2017-2020

	2017	2018	2019	2020
	(GHS millions)			
Seeds	34.4	188.7	335.2	349.80
Fertilizers	52.40	363.60	563.40	729.90
Extension services	47.00	76.90	76.90	76.90
Marketing of produce	0.50	7.90	0.90	0.90
E-Agriculture	4.40	6.20	10.60	15.20
Total in GHS millions	138.70	643.30	987.00	1,172.70
Total in U.S. $ millions @ 4.8	28.9	134.0	205.60	244.30

Source: MoFA, 2017: Strategic Plan for Implementation of Planting for Food and Jobs Program.

Given that agriculture is a primary focus of the GoG, the government introduced a 50% subsidy in 2017 and 2018. However, this came at a significant cost, further straining GoG resources. Nevertheless, from discussions with MoFA, it is clear that the GoG intends to continue to fund a robust FSP because it is important to the smallholder farmers and the government's agenda to promote food security and create jobs.

Table 18. Projected Fertilizer Requirement for PFJ Program, 2018-2020

Fertilizer	2018	2019	2020
	(mt)		
NPK	198,119	388,056	407,050
Urea	110,909	219,043	229,857
Organic fertilizer	11,813	24,938	26,250
Total	**320,841**	**632,037**	**663,157**

Source: MoFA, 2017: Strategic Plan for Implementation of Planting for Food and Jobs Program.

According to the MoFA strategy, the GoG plans to end the subsidy program when PFJ reaches its target of a 30% adoption rate in using fertilizers and seeds. Currently, MoFA is focused on eliminating abuses, smuggling, and other losses along the fertilizer value chain.

6.3.2 Pricing, Payment Scheme, and Timelines

Prices are proposed by the companies who apply for allocation. The average price is determined based on: (i) world market prices for urea and NPK products; (ii) calculation of fertilizer cost buildup along the value chain, from ports to delivery to farmers; (iii) profit margin of the supply

chain actors (importers, distributors, and retailers); (iv) leeway for late payments; and (v) inflation.

Given it is the farthest distance from Accra, MoFA uses Tumu transportation prices as a benchmark; thus they are commonly used by all bidders to ensure uniform fertilizer prices across the country.

Table 19. Subsidized vs. Market Prices of Fertilizers from 2008 to 2018

	Product	2008	2009	2010	2011	2012	2013	2015	2016	2017	2018
Market Price (GHS/50-kg bag)	Urea	36	47	41	43	44	54	105	100	95	126
	SoA	28	33	34	33	40	44	–	–	–	–
	NPK	38	43	44	42	42	51	115	125	115	136
Subsidized Price (GHS/50-kg bag)	Urea	26	26	25	29	35	50	84	80	48	63
	SoA	18	18	18	26	38	44	–	–	–	–
	NPK	26	26	27	30	39	41	89	85	58	68
% Subsidy	Urea	28	45	39	33	20	7	20	20	50	50
	SoA	36	45	47	21	5	0	–	–	–	–
	NPK	32	40	39	29	7	20	23	32	50	50

Source: Authors' update, adapted from MoFA, 2016, Expert panel (2015), http://ghana.gov.gh/.

6.3.2.1 The Payment Scheme: The Coupon System

The government allocates specific fertilizer quantities to selected fertilizer companies. In 2018, MoFA adopted the coupon system, whereby fertilizer coupons with unique serial numbers were distributed to the districts through the Regional Departments of Agriculture (RDA). These coupons contain information on the amount, product type, farmer name, issue date, etc.

All coupons were authenticated and stamped by the District Departments of Agriculture (DDA) and specific quantities of coupons were given to each Agricultural Extension Agent to distribute coupons to farmers within their catchment areas. The extension agents kept records on the coupon issuance to farmers/beneficiaries. Farmers paid at agro-input shops/retail points an amount in cash equal to the amount quoted on the coupon to purchase inputs (fertilizers or seeds). Agro-input dealers kept records of coupons and lists of farmers who purchased inputs from their outlets. At the end of each month, all sales outlets sent collected coupons to their respective fertilizer companies. Finally, the fertilizer companies aggregated and submitted coupons for auditing and to DCS-MoFA for processing and payment.

Figure 21. Sample of Subsidy Coupons

6.3.2.2 Payment Timelines and Delays

The GoG still delays in making payments to importers and suppliers, and this impacts the cost of fertilizers. Importers have not received all their 2016 payments. The new GoG commissioned a comprehensive audit into all debts it inherited from the previous government, which took about five to six months to complete. At the end of the audit, the GoG decided to pay only 15% of the total bills. The new GoG rolled out its 2017 subsidy program; although the importers still participated in the program, some of them only supplied half of their quota allocation to reduce their risk. As of the writing of this report, MoFA has made all payments for all supplies made in 2017.

For 2018, suppliers are still submitting invoices for payments, which will be verified by MoFA before payments are made. An allocation of GHS 600 million has been apportioned to fund the PFJ program (fertilizers, seeds, extension, market, and e-extension).

6.3.2.3 Fertilizer Diversion and Smuggling

A major drawback of the 2018 PFJ subsidy program was that large quantities of subsidized fertilizers did not reach the intended beneficiaries due in part to the inability of some selected fertilizer suppliers to deliver them on time to farmers, but mainly due to diversion and smuggling. President Nana Akufo Addo,[15] MoFA, police forces, and civil society[16] have reported in local media many cases of fertilizers smuggled across borders in northern Ghana, mainly to Burkina Faso.

Based on interviews with private sector players operating in Ghana, Burkina Faso, and Mali, it is estimated that the volume of smuggled PFJ fertilizers in 2018 was about 50,000 mt, ranging from a possible 20,000 mt low to a high of 80,000 mt. Based on a 50,000 mt estimate, the loss to the GoG is estimated at U.S. $12 million for 2018 alone.

[15] https://www.ghanaweb.com/GhanaHomePage/NewsArchive/We-ll-punish-saboteurs-of-Planting-for-Food-Jobs-Nana-Addo-682321

[16] https://www.ghanaweb.com/GhanaHomePage/business/NGO-raises-concern-about-subsidized-fertilizer-smuggling-677763

6.4 Preparing for the 2019 Planting for Food and Jobs Campaign

On November 7, 2018, MoFA published its call for pre-qualification of the fertilizer suppliers for the 2019 Planting for Food and Jobs Campaign in local newspapers (see Figure 22).

Fifty-four companies submitted their applications to DCS on November 27, 2018, offering to supply various quantities and types of fertilizers in different regions of Ghana.

The total call amounted to the unprecedented volume of 393,000 mt, up from 253,000 mt in 2018 (+55%) but significantly below the 632,000 mt set in the 2017 Strategic Plan. This includes eight various grades of NPK for 235,000 mt (60%), urea for 119,000 mt (30%), and organic fertilizers for 39,000 mt (10%).

As stated in the announcement, "the fertilizers to be covered include NPK blends or compound fertilizers which are suitable for [our] soil conditions, and urea," following most of the fertilizer recommendations elaborated and tested by CSIR/SRI. Indeed, five new fertilizer grades are included under the 2019 PFJ call:

- NPK 15-20-20 for cereals
- NPK 25-10-10 for vegetables
- NPK 15-20-20 + 0.7 Zn for cereals
- NPK 12-30-17 + 0.4 Zn for soybean
- NPK 17-10-10 for cassava

The standard NPK 15-15-15, NPK 20-10-10, and NPK 23-10-05 are recommended on vegetables and cereals. This call represents a first important step toward more crop- and region-specific fertilizers. However, offering possibilities to suppliers to offer new formulas or "old" ones might jeopardize this attempt, especially if the previous price negotiation mechanism remains the same: lower nutrient analysis products (for example, NPK 20-10-10 vs. NPK 25-10-10 for vegetables) and standard formulas that are easier to procure on the international market (e.g., NPK 15-15-15) may be offered by fertilizer suppliers instead of higher quality, more suitable ones.

It is also important to note that there are important **carryover stocks** along the supply chain, from importers' and blenders' warehouses to distributors' and retailers' shops, but unfortunately, they cannot be estimated, neither in total nor by region or product. The 2020 requirements, therefore, shall be significantly below the 393,000 mt called for by MoFA (possibly below 300,000 mt).

IFDC recommends that a light and simple, declarative monitoring system is put in place in 2019, in collaboration with the private sector, to estimate at least on a quarterly basis key metrics on fertilizer stocks available in the country (e.g., consolidated stocks in each of the three AEZs for urea and NPKs altogether, plus estimates of feedstocks and bagged/finished products available in importers' and blenders' warehouses in GA).

THE REPUBLIC OF GHANA

MINISTRY OF FOOD AND AGRICULTURE (MOFA)

PLANTING FOR FOOD & JOBS CAMPAIGN

PRE-QUALIFICATION OF FERTILIZER SUPPLIERS

1. The Ministry of Food and Agriculture intends to purchase fertilizer for distribution to farmers for the 2019 cropping season under the "**Planting for Food and Jobs"** campaign. The fertilizers to be covered include NPK Blends/Compound fertilizers which are suitable for our soil conditions and urea.

The quantities to be delivered under each type would be:

ITEM No.	DESCRIPTION	FERTILIZER TYPES	CROP TYPES	RECOMMENDED FORMULATIONS	QTY (MT)	DISTRIBUTION LOCATIONS
1	Inorganic Fertilizers	NPK Blends/Compound	Maize, Rice, Sorghum	15-20-20	60,840	Guinea Savannah Zone (Northern, Upper East & Upper West
			Vegetables	23-10-05, 20-10-10, 25-10-10	31,000	
			Soyabean	12-30-17+0.4Zn	5,000	
		Urea	Maize, Rice, Sorghum	46%N	48920	
2	Inorganic Fertilizers	NPK Blends/Compound	Maize, Rice,	15-20-20+0.7 Zn	44,952	Forest Savannah Transitional Zone (Brong Ahafo & Ashanti)
			Vegetables	15-15-15, 23-10-05, 20-10-10, 25-10-10	28,000	
			Soyabean	12-30-17+0.4Zn	1000	
		Urea	Maize, Rice Vegetables	46%N	39,975	
		NPK Blends/Compound	Cassava	17-10-10,	5,000	
3	Inorganic Fertilizers	NPK Blends/Compound	Maize, Rice, vegetables	15-15-15, 23-10-05, 20-10-10, 25-10-10	54,208	Volta, Central, Greater Accra, Eastern & Western
		Urea	Maize, Rice Vetabels	46%N	30,105	
		NPK Blends/Compound	Cassava	17-10-10,	5,000	
4	Organic Fertilizers	Granular/Liquid/Compost	All Crops	Various	39,000	All Districts

The Ministry may allocate specified quantities under each fertilizer types to qualified companies for importation and distribution for the promotion of efficiency and minimizing risk to the programme.

2. The Ministry now invites eligible firms to indicate their interests in providing the services which include:
   - Distributing these fertilizers at designated supply points in all the districts in Ghana
   - Maintaining fertilizers supply to farmers all year round
   - Compiling data on supplies, sales and beneficiary farmers

3. Interested firms/companies must provide the following information indicating their ability to participate in the PFJ campaign.
   - Must have the capacity and facility to import and distribute fertilizers.
   - Must have established outlets and agents in all districts in the regions
   - Must have access to warehousing facility in the designated Regions.
   - Must have PPRSD certifications with respect to fertilizer import
   - Must have Fertilizer manufacturer's authorization and quality assurance.
   - Must provide Company profile/brochures
   - Give a summary of Companies operations in fertilizer distribution for 2017 and 2018.
   - Companies should state their indicative prices and give cost structure in respect to transportation charges.

4. Pre-qualification will be conducted through prequalification procedures specified in the Public Procurement Act, 2003 (Act 663) as amended, by Act 914 (2016) of the Republic of Ghana and is open to all tenderers from eligible source countries, as determined by the Public Procurement Authority of the Republic of Ghana.

5. Interested eligible Tenderers may purchase the pre-qualification and the Plant and Fertilizer document on the submission of a written application to the address "A" below and upon a payment of a nonrefundable fee of one **Thousand Five Ghana Cedis (GHC1,500) only.**

5. Pre-Qualification document must be delivered to the address below on or **before 10:00am Tuesday November 27, 2018.** Late submission will be rejected.

"A" The address for Delivery/Submission of Bids:

The Director
Directorate of Crop Services
Ministry of Food and Agriculture
P. O. Box M37, Accra
Ministries, Accra.

ADP0505

Figure 22. MoFA Announcement for Pre-Qualification of Fertilizer Suppliers for the 2019 PFJ Campaign

7. Fertilizer Value Chain Optimization

7.1 Key Findings and Challenges in the Fertilizer Value Chain

As observed in most other West African countries, a major problem in the agriculture sector in Ghana is inadequate contribution of fertilizer to sustainably increase crop productivity, despite large public investments in support policies, namely subsidies, research, finance, and infrastructure.

This is reflected through a wide array of constraints or bottlenecks in the fertilizer value chain affecting the fertilizer product, delivery channels, and policy and regulatory environment that limit the efficient supply and use of appropriate and quality fertilizers delivered at affordable costs to farmers. The challenges in the fertilizer sub-sector mostly relate to inefficiencies in the fertilizer value chain, summarized in Figure 23.

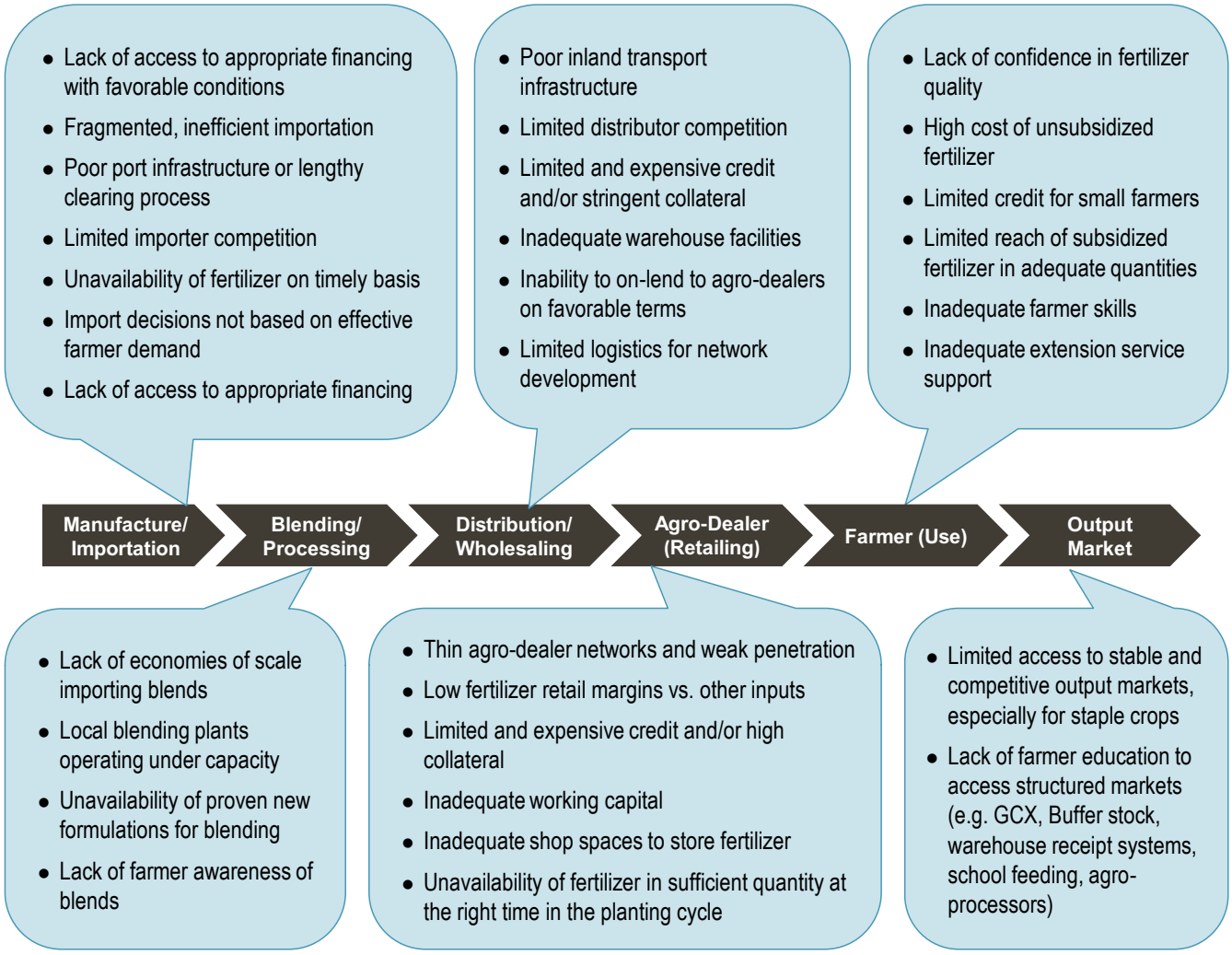


Figure 23. Challenges Faced by Actors in the Fertilizer Value Chain

Furthermore, the fertilizer value chain is too dependent on the subsidy program, the cost of which represents a significant share of the budget for the agriculture sector. This makes it difficult for the GoG to invest in other parts of the sector that could improve efficiency in this

value chain – productive and transport infrastructure, for example – while limiting opportunities for the private sector to invest in non-subsidized segments of the market.

The national FSP, as it is structured and has performed to date, is among the main factors impeding the sustainable development of the fertilizer value chain in Ghana. The FSP has created a supply "push" condition while restraining the expansion of the national distribution network and neglecting the demand "pull" side of fertilizer marketing.

Retail fertilizer prices in Ghana are relatively high (nearly twice FOB prices), largely because of a lack of preference for fertilizer and high logistic and financial costs. However, Ghanaian prices are the lowest in the region, equivalent to those in Nigeria, even though Nigeria is a producer and Ghana is not.
Blending capacity in Ghana far exceeds current, short-term, and at least medium-term quantitative and qualitative needs, and building/developing additional blending capacity now would result in driving some of the current blenders out of business and eliminating workers' jobs.

7.1.1 Limited Capacity to Enforce Regulatory and Policy Framework for Product Quality Control

Ghana is in alignment with the regional fertilizer quality control regulatory system and has ratified and published the ECOWAS regulation in its national gazette. The GoG has designated PPRSD as the responsible technical directorate for registering fertilizer products, companies, and retailers, issuing permits for importers, testing and laboratory inspection of fertilizer products, and conducting field trials on the efficacy of "new" fertilizer products.

However, PPRSD is still under-staffed and under-equipped, resulting in poor enforcement of the regulations. Once fertilizer is in-country or blends are produced locally, little or no testing is performed at the blending plants, wholesale, or retail levels, which cannot ensure the quality of fertilizers sold on the Ghanaian market, particularly in terms of their nutrient content, net product weight and physical qualities.

This situation has resulted in the supply and use of fertilizers that were adulterated, short-weighted, and had fewer nutrients than declared on the label by suppliers and farmers, respectively. This lack of enforcement and inadequate training and sensitization on fertilizers have led to a lack of confidence by farmers in the quality of fertilizer available in the market and a negative public perception of inorganic fertilizer.

7.1.2 Low Margins Along the Domestic Distribution Channels

This study's findings show that MoFA-negotiated prices with importers/suppliers under the FSP do not factor in all the costs incurred by all value chain actors, as the actual cost of financing (or opportunity cost of financing if own finance is used, which is typically the case at distribution and retail) and the operational cost at each level of the domestic value chain may not be taken into consideration.
As a consequence, the predetermined portion of the price to be shared among all the actors in the domestic value chain may not be enough to cover all transaction costs, especially the cost of capital and other operational costs. It is, on average, 20% below the price paid for non-subsidized fertilizer.
Therefore, this lower cost is achieved at the expense of the domestic distribution and retail network. Local distributors, wholesalers, and retailers are left with low, if any, margins, a practice that provides a further disincentive for suppliers to invest in the weak inland distribution network.

This practice has become a major factor limiting the expansion of the fertilizer distribution network in Ghana, affecting all actors down to the farmer. It is the opposite of the intended result – increasing the availability and use of good quality fertilizer for farmers by making it more affordable and accessible to increase crop productivity and production.

7.1.3 Weak Distribution Networks Served by Agents With Limited Capacity and Knowledge

Fertilizer distributors and agro-dealers face poor inland infrastructure, limited market opportunities beyond the FSP, inadequate warehousing facilities, limited logistics, and inadequate financing to extend their distribution networks closer to the farmer.

Agro-dealers are concentrated in urban or semi-urban areas with very few located in the rural interior near smallholders' farms. Between four and 10 agro-dealers serve an average of 10,000 farmers; this results in farmers traveling up to 50 km to access fertilizer, seeds, and other inputs from the nearest retailer, raising the cost that farmers pay to use inputs.

Some also suffer from inadequate shops and warehousing facilities to store fertilizer at the appropriate time and under the proper conditions. This results in quality fertilizer being unavailable in sufficient quantities at the right time and place in the planting cycle.

7.1.4 Limited Incentives for Private Sector to Invest Beyond Government-Sponsored Programs

The FSP provides incentives to import fertilizer required by the program, but importers may or may not import additional quantities and formulations to supply unforeseen needs beyond firm orders placed by large-scale and commercial farms. Usually, suppliers' import decisions are based on previous quantities imported and GoG tenders rather than on effective farmer demand because of the lack of reliable data on fertilizer demand and limited commercial sales opportunities.

Therefore, the actual quantity of fertilizer on the Ghanaian market is restrained. Despite the incentive to import, importers and blenders have no incentive to develop a distribution network of their own down to the farmer level, particularly in remote rural areas. This would require further investment and perceived unnecessary risk given the limited level of profits and long-term market development opportunities that can be generated from this activity.

7.1.5 High Financial Costs and Limited Access to Finance

In addition to these constraints, there are other structural limitations, including the high cost of capital and limited availability of credit for investing in the expansion of the distribution network. High interest rates (24-30%) are at least partially the result of the instability of the local currency, the Ghanaian cedi, which has suffered consistent devaluation.

Importers lack access to appropriate financing with favorable conditions (credit guarantees, collateral, etc.) and also face bureaucratic import waiver and permit processes, poor infrastructure, and lengthy port clearing processes. Although the situation is improving, delays in payment by the GoG (some 2016 bills are still outstanding) have added to the burden and to financial costs that must be supported by fertilizer importers.

7.1.6 High Logistic Costs

High domestic logistic costs (transport, storage, and handling) restrain the fertilizer distribution network as a consequence of limited and/or costly warehousing capacities and poor road

conditions, especially rural feeder roads. This increases the cost of distribution and can also inhibit the expansion of the retail network to more remote rural areas.

Thus, farmers find it difficult to access fertilizer, since they must travel long distances to acquire inputs. This is most critical in the northern regions where, despite these constraints, the use of fertilizer has been increasing to produce cash crops.

7.1.7 Lack of Farmer Access to Reliable and Remunerative Markets

On the demand side, the main issues deterring the expansion of fertilizer consumption are farmers' and retailers' lack of knowledge on proper fertilizer use and recommendations based on crop and soil conditions, and farmers' mistrust in the recommended quantity and quality of fertilizer to be applied to their crops.

Lack of trust by farmers on the quality and truth-in-labeling of the recommended fertilizer is based on their previous experiences/results in which they did not experience clear benefits of fertilizer application, despite following recommendations from extension agents and fertilizer suppliers' technical teams; they have often seen only the disadvantages of increasing their production costs by buying fertilizers.

There is a huge disconnect between farmers/producers and agro-processors (assured markets for farmer produce), particularly for feedstock, due to lack of actionable market information and weak business relationships. In addition, although structured markets exist, such as the Ghana Commodity Exchange (GCX), Ghana School Feeding Programme (GSFP), and National Buffer Stock (NAFCO), where farmers can sell their produce at profitable prices, most farmers lack the necessary skills to trade in such markets.

7.2 Policy Implications and Recommendations (Medium to Long Term)

To address issues and conclusions highlighted above, the most important policy measure is **rethinking and redesigning the FSP in the shorter term with the goal of ending it in the longer term to allow for greater competition and effectiveness in fertilizer importation, blending, and distribution**.

If the GoG continues the FSP, it must allocate adequate funds in a timely manner and at preferential rates for local investment in the fertilizer distribution network and to support agriculture production activities. To make this measure more effective, the FSP must be redesigned to be more inclusive of the distribution and retail network's participation in price determination to make margins more attractive for further investment in the distribution system all the way to the farmer. It also needs to be built on farmer demand for appropriate, balanced fertilizer.

7.2.1 Toward Smart Subsidies: Policy Reform Approach and Tool to Reform the Current Subsidy Program

In West Africa, FSPs have failed in general to bring about expected increases in agricultural productivity, overall food production, food security, and poverty reduction. The poor performance of FSPs is largely because these programs are poorly designed and managed and do not draw upon or include principles for smart subsidies.

In 2017, ECOWAS, under its new Regional Agricultural Investment Plan for Food Security and Nutrition, called for the need to harmonize national input subsidy policies. IFDC, through its USAID West Africa Fertilizer Program (WAFP), developed a Regional Guide for FSPs, aimed at reforming current, ineffective programs into smart ones, improving their design, implementation, and performance. Specific guidelines define principles and actions to ensure

programs can be "smart," do not distort markets, allow balanced roles between the public and private sector, and ensure better targeting, increased efficiency, and more sustainability.

7.2.1.1 Key Principles for Smart Subsidy Programs

The Regional Fertilizer Subsidy Program Guide lists 13 broad guiding principles that characterize a "smart" subsidy program:

1. INCLUSIVE PARTICIPATION that promotes private sector development and participation;
2. SPECIALIZATION, where roles of all participating actors are defined and assigned on the basis of specialization and comparative advantage to achieve complementarity and exploit potential synergies;
3. FAIR COMPETITION, which promotes competition between private suppliers in order to drive down costs of delivering subsidized fertilizer and increase quality of services provided to farmers;
4. EFFICIENCY (cost reduction, profitability, economies of scale, etc.) as the basis for fertilizer promotion efforts;
5. BETTER TARGETING (EQUITY) using a mechanism/approach involving village communities, local administration and authorities, and farmer organizations that ensures the right beneficiaries (producers, areas, and crops) are properly identified and effectively reached;
6. TRANSPARENCY in overall targeting and distribution system;
7. TIMELINESS through programs rigorously planned and implemented to avoid delays in delivery of subsidized fertilizers at affordable costs and to reduce uncertainty and unpredictability with subsidy programs;
8. APPROPRIATE AND QUALITY PRODUCTS that meet requirements established by the relevant research recommendations and regional fertilizer regulations, respectively;
9. PROPER INCENTIVES through market-based measures that do not undermine incentives to private sector investments;
10. COMPLEMENTARY INPUTS that promote fertilizer products as part of a wider strategy that includes complementary inputs (and strengthening of markets);
11. EXIT STRATEGY devised to limit the time period of public intervention;
12. SUSTAINABILITY of gains in input use and crop yields as the goal when designing the program, tied to other public investments to support current beneficiaries and product suppliers; and
13. ACCOUNTABILITY to ensure that impacts of the use of public resources in the subsidy program are objectively and rigorously assessed.

A list of 36 proposed actions on how to apply these principles can be found in the annex.
The recommendations below for Ghana FSPs have been organized to relate to one or more of the above principles.

7.2.1.2 Key Metrics with Policy Scenarios

Recommendations have been packaged into two policy change scenarios to be contrasted with the "no change–status quo" scenario as described below:

1. Status quo or continuation of current policy;
2. Limited reform of FSP with selected principles (applicable in short to medium term); or
3. Full reform of the FSP with all principles (applicable in medium to longer term).

Table 20 presents expected results in terms of fertilizer markets and crop productivity.

Table 20. Expected Results for Policy Scenarios

Components	Variables	Scenario 1: Ongoing Reforms CURRENT (2018)	Scenario 2: Limited Reforms SHORT TERM	Scenario 3: Full Reforms LONG TERM
Costs	FOT price vs. FOB price	41%	< 40%	35%
	Retail price vs. FOT price	40-45%	35-40%	30-35%
Consumption	Total volume in 5 years (in mt)	440,000	650,000	760,000
Types / Formulas	Blanket fertilizer recommendations	NPK 15-15-15 NPK 23-10-5 NPK 20-10-10		
	Crop- and AEZ-specific fertilizer recommendations		Balanced fertilizer introduced: Maize: NPK 15-20-20 + 0.7Zn or NPK 15-20-20 Soybean: NPK 12-30-17 + 0.4Zn Rice: NPK 15-20-20 Cassava: NPK 17-10-10	Balanced fertilizers developed: 20+ fertilizer grades developed, including micronutrients (AEZ-, crop-, and soil-specific, and soil amendment where needed)
	Balanced fertilizers %	10%	50%	90%
	Yields (mt/ha) [adapted from Dr. Tetteh, CSIR]	[current average yields] Maize: 1.7 mt/ha Rice: 2.2 mt/ha Cassava: 12 mt/ha	[mean yield new formulas] Maize: 6 mt/ha forest Savannah Maize: 4.5 mt/ha Guinea Savannah Soybean: 1.5 mt/ha Rice: 6.5 mt/ha (lowlands) Rice: 2.5 mt/ha (upland) Cassava: 25 mt/ha	[target yields] Maize: 7 mt/ha Soybean: 3 mt/ha Rice: 7 mt/ha (lowlands) Cassava: 40 mt/ha

7.2.2 Promote Inclusive and Fair Participation of Key Business Actors in the Subsidy Program

Recommendations below relate mainly to:

- *Key Principle (KP) 1 – INCLUSIVE PARTICIPATION*
- *KP 3 – FAIR COMPETITION*
- *KP 6 – TRANSPARENCY*

Inclusive participation should be applied to involve key stakeholders during the design of FSPs (public-private partnership) and, more broadly, during the design of any programs or strategies affecting the fertilizer sector. All major actors or stakeholders should be consulted during design and implementation to document challenges that arise and their potential solutions as the process evolves.

7.2.2.1 Promoting a More Efficient Selection of Participating Companies

Participating companies supplying fertilizer under the FSP should be properly constituted (fully registered and be able to show financial and bank statements over at least the last three years), have an excellent reputation, and have verified capabilities to deliver fertilizers efficiently through an adequate retail/agro-dealer network able to serve all FSP beneficiaries. In particular:

- The companies must have a **proven capacity** to deliver granted allocations on time. New companies, in particular, will need to be properly scrutinized to ensure that they meet the set criteria for qualification and have the distribution capacity on the ground to deliver fertilizer of the right quality to farmers at the right time and at the right place.
- In cases of **poor performance**, the current practice of reducing or reallocating volumes of non-performing companies should be changed. Companies found to have provided false information on their capabilities, distributor networks, and product quality, thus failing to perform, should not only have their quotas reduced, but also should be completely barred from participating in subsequent years until found to be credible. Such liability for false information and non-performance should be explained in the application documents or implementation modalities.
- **A database of qualifying companies** for the PFJ program should be established by MoFA; key business information (derived from the company's application) will be recorded, and for those having been allocated any quota under the subsidy program, key performance indicators will be tracked on an annual basis. The resulting information should be available to all parties involved in the selection process, so that they can make well-informed decisions.

7.2.2.2 Setting Prices and Redefining Profits and Margins

Currently, the subsidized, negotiated price of fertilizers under the FSP takes into consideration transportation costs along the supply chain from import to retail and a predetermined margin to be shared among wholesalers, distributors, and retailers. MoFA and importers should ensure that the downstream supply chain actors (distributors and retailers) are represented during subsidy price negotiations. In particular:

- MoFA should take into consideration the **actual cost** of financing at distribution and retail operational cost at each stage of the domestic supply chain, thereby ensuring that all stakeholders along the supply chain have economic incentives to invest in bringing inputs closer to the farm gate while preserving the interests of GoG and farmers.
- The cost buildup section of this study and new **Excel simulations** developed during 2019 by Nitidæ for IFDC to estimate fertilizer costs along primary trade corridors in West Africa can be further refined to allow Ghanaian stakeholders to update the actual costs and profits along the supply chain ahead of each season and determine buying and selling prices for the upcoming season in a more factual and transparent manner.

7.2.2.3 Improve Subsidy Program Timelines

Recommendations below relate mainly to:

- *KP 4 – EFFICIENCY*
- *KP 7 – TIMELINESS*

The GoG/MoFA must be commended for improving the timeline for the design, launch, and implementation of the FSP over recent years. However, further improvements are possible:

- **Conditions and calls** for application for the following year's subsidy program should be announced earlier, ideally in September/October instead of the usual December/January. Implementation of robust database and monitoring tools (see below) will facilitate such a change, as feedback from the current cropping season and required data will be available and consolidated in real time. Earlier announcements will allow importers and blenders to source their raw materials more efficiently and at lower costs.
- Implementing e-tracking of the FSP should also allow GoG/MoFA to reduce if not completely **eliminate delays** in paying fertilizer suppliers, removing a major business risk for the private sector. This will encourage more competition and reduce financial costs.

7.2.2.4 Setting a Limit to the Subsidy Rate and Program Time Length

Recommendations below relate mainly to:

- *KP 11 – EXIT STRATEGY*
- *KP 12 – SUSTAINABILITY*

The exit strategy should define a clear timeline for the end of interventions and when/how public interventions will be limited. The strategy should identify/embed approaches to gradually move the FSP targeting from current to future beneficiaries (producers, areas, and crops) in real need of the subsidy until the program is eventually completely phased out.

Reforming the FSP to lead eventually to a GoG exit will follow the principle of a gradual approach as specified in the National Fertilizer Policy, which indicates that any reform shall be gradual, within a timeframe agreed upon by all stakeholders.

- Implement **short-term** (2019-2020) reforms to the FSP (see detailed recommendations in Section 7.3). The objectives include more efficient management of the program, reducing smuggling, enforcing quality control enforcement, and developing a farmer database for better targeting and for facilitating a shift from "subsidy fertilizer supply" or "push" to "subsidy fertilizer demand" or "pull" implementation in the medium to long term.
- Revise in the **medium term** (2021-2022) the subsidy rate (currently 50%), which has created an enabling environment for smuggling subsidized fertilizer products to neighboring countries, especially since all of the contiguous countries have lower rates. If subsidies are reduced to 20-25%, as recommended in the Regional Subsidy Program Guide, the profit margins for attempted smuggling are lowered, minimizing the incentive to smuggle the subsidized fertilizers. This is in line with the GoG's effort to ensure that Ghanaian farmers derive greater benefit from the program. Reducing the subsidy rate also will make it easier for the GoG to exit the program when appropriate.
- Implement **long-term** (2021-2024) reforms, with the objectives to shift to a "demand-driven" system, leading to graduation of farmers from the FSP, and to enter a fully competitive private sector-led fertilizer market by the end of 2024.

7.2.3 Promoting a More Transparent and Collaborative Environment in the Fertilizer Sector

Recommendations below relate mainly to:

- KP 1 – INCLUSIVE PARTICIPATION
- KP 2 – SPECIALIZATION
- KP 3 – FAIR COMPETITION
- KP 4 – EFFICIENCY
- KP 6 – TRANSPARENCY

- KP 9 – PROPER INCENTIVES

7.2.3.1 Encourage the Creation of a Ghana Fertilizer Platform for Enhanced Public-Private Sector Dialogue

In June 2018, MoFA constituted an ad-hoc National Task Team (NTT) to coordinate the development of the Five-Year Strategic Plan for the Ghana Fertilizer Expansion Program (GFEP). The NTT consisted of representatives from the public and private sector, research and development institutions, fertilizer industry players, specialized institutions, professional farmer associations and input dealers, and development partners.
In view of the team's diversity, specialization and expertise across the fertilizer value chain, this NTT could form the core team of a **National Fertilizer Platform (NFP)** that would:

- Serve as a "think-tank" for matters related to the fertilizer industry in Ghana and link to the National Fertilizer Council (NFC), the Ghana Fertilizer Advisory Committee (GFAC), and the GFEP secretariat;
- Engage the GoG through policy advocacy for the creation of an enabling environment for expanded fertilizer use; and
- Periodically organize public fora and discussions on balanced fertilization, farmer sensitization, fertilizer subsidy management, fertilizer quality control regulations, etc.

Facing similar issues in a relatively similar agricultural and policy context, Kenya's experience in the matter should be explored, as public and private stakeholders formed KeFERT[17] in 2018 with the following objectives:

> *"The proposed Kenya Fertilizer Platform is a public-private mechanism composed of key stakeholders involved in fertilizer access, quality, and use, whose purpose is to resolve issues and enable dialogue, coordination, and information exchange. The Fertilizer Platform is intended to facilitate action on key fertilizer issues through multi-stakeholder dialogue and public-private task forces on an ongoing basis. A key outcome of this platform is increased accessibility, affordability, and availability of fertilizers to smallholder farmers as a result of a more competitive fertilizer sector."*

7.2.3.2 Encourage the Creation of the Fertilizer Industry Association of Ghana

While the Ghana Agri-Input Dealers Association (GAIDA) was established in the early 2000s to represent agro-dealers operating across the country, the upstream players of the value chain (importers, blenders, manufacturers, and major distributors) are yet to organize and speak with one voice in instances such as the National Fertilizer Council and/or the Ghana Fertilizer Advisory Committee, both created under the Plants and Fertilizer Act 2010 (Act 803).
A national **fertilizer industry association** will allow the private sector (importers, manufacturers, blenders, and large distributors) to contribute effectively, from a sound institutional footing to the design, implementation, and monitoring of FSPs, the GFEP, and related projects, programs, and policies.
While early discussions are already taking place among some of the fertilizer industry players to form a national association (with the possible name Fertilizer Industry Association of Ghana, FIAG), the West Africa Fertilizer Association[18] (WAFA) could provide assistance and guidance in this endeavor. The regional association endorsed its five-year strategic plan, focusing on seven main areas of intervention (finance, quality, stewardship, availability, trade, information, and dialogue) that are fully aligned with issues and challenges the private

[17] See https://ifdc.org/kefert/ for more information.
[18] See https://wafafertilizer.org/en/.

sector is facing in Ghana in 2019. Several key fertilizer players operating in Ghana are already active members of WAFA (Omnifert, Macrofertil, Yara, OCP, and ETG to date).

7.2.4 Enforce Fertilizer Regulatory Framework and Increase Quality Control Capabilities

Recommendations below relate mainly to:

- *KP 3 – FAIR COMPETITION*
- *KP 4 – EFFICIENCY*
- *KP 8 – APPROPRIATE AND QUALITY PRODUCTS*

Establishing the rule of law and policing in the rural sector is important to protect consumers, producers, and merchants. It is important to recognize that quality control and truth-in-labeling are critical for the proper development of a market, particularly when it is becoming more diverse and dynamic, as is the case in Ghana. Measures or conditions put in place for adopting and enforcing ECOWAS fertilizer regulations must be strengthened to ensure that non-subsidized and subsidized fertilizers meet quality specifications (type, formulation, weight, labeling, etc.).

The GoG should strengthen the testing capacity of PPRSD to ensure that quality and appropriate fertilizers are being imported, blended, and distributed in Ghana. Since the GoG hopes to promote blends, which can be the ideal market in the long term when there are larger demands, it will be imperative that quality products are demanded from the importers, local blenders, and local distributors.

In order to achieve that, GoG leadership should support the **National Fertilizer Council** (NFC) to:

- Effectively enforce the fertilizer law and regulations to ensure good quality fertilizers are provided to farmers and protect private sector investments against unethical practices in the market.
- Provide adequate institutional, technical, and financial support to the NFC and its members to accomplish its functions, as spelled out in Section 95, Part III, of the Plants and Fertilizer Act 2010 (Act 803).

Key Roles of the NFC

- Advise the Minister on policies for development of fertilizer manufacture, inspection, sampling, analysis, and marketing;
- Monitor the supply of fertilizer to ensure fertilizer security in the country;
- Develop procedures for registration of fertilizers;
- Define standards for fertilizers and procedures for their registration;
- Recommend to the Minister a list of fertilizer types for which marketing is permitted for annual publication in the commercial and industrial bulletin;
- Recommend to the Minister fees for the registration, inspection, and testing;
- Recommend to the Minister procedures for accreditation; and
- Perform other functions that are specified under this act and that are assigned by the Minister

GoG leadership also should support the **PPRSD** to:

- Maintain adequate human and financial resources to effectively and sustainably enforce fertilizer quality control policies and regulations for fertilizers produced, imported, and sold in Ghana in order to identify most quality issues.
- Roll out standardized fertilizer testing systems using spectral technology, a less expensive and more rapid technology than traditional wet chemistry. PPRSD and private blenders have already agreed to pilot this system in Ghana to test fertilizers while upgrading the current PPRSD fertilizer testing laboratory for optimal operation. When a large and reliable database of calibration is built to cover all fertilizer types and mixtures, spectral analysis will be preferred over and more

effective than the conventional methods of fertilizer analysis. This and corresponding setup and operational budgets should be integrated into the five-year (2019-2023) GFEP Strategic Plan.

- Strengthen the capacity of fertilizer inspectors and fertilizer analytical staff (public and private laboratories) through in-service trainings and exchange visits (fertilizer inspection techniques and procedures; inspections of fertilizer warehouses, blending facilities, distribution and retail outlets; spot inspection and sampling of fertilizer products for analysis; administrative actions and prosecution; fertilizer analytical methods and procedures; use and maintenance of laboratory).
- Encourage self-regulation by the fertilizer industry (trainings and sensitization) and private sector investments in soil testing, fertilizer quality control labs, and services (e.g., through CropNuts, SGS, etc.).

7.2.5 Properly Target Beneficiaries (Farmers, Zones, and Crops)

Recommendations below relate mainly to:

- *KP 4 – EFFICIENCY*
- *KP 5 – BETTER TARGETING (EQUITY)*
- *KP 13 – ACCOUNTABILITY*

7.2.5.1 Register Farmers for Better Targeting and Monitoring

In the wake of the recent PFJ program, which has doubled the number of beneficiaries, criteria for eligibility for the FSP need to be reexamined. Reliable agricultural census data becomes more necessary, but also technically more feasible, with the rapid development of more affordable and customized IT solutions. Use of a voucher system, together with other ICT tools to reach proper targets, is a workable option, through private sector participation and development of a biometric farmer database. The biometric farmer database and geo-referencing of beneficiary farmers will help to better target beneficiary farmers of the FSP. The following are necessary to ensure proper development:

- Prioritize the development of a comprehensive and robust **farmer database** for targeting and developing demand-driven fertilizer use (and other complementary agro-inputs, such as seeds), while building the underlying foundation and infrastructure needed to operate a large-scale program (able to reach 1 million farmers by the 2020 cropping season).
- Develop concurrently a **series of associated services**, such as e-voucher management, e-tracking of fertilizer flows and stocks, financial transactions, monitoring and impact assessment tools, in order to build a complete and durable ecosystem. Roles of local and global participating actors should be defined and assigned on the basis of specialization and comparative advantage to achieve complementarity and exploit potential synergies (e.g., IBM and MasterCard for database management, Edenred for e-voucher management, mobile phone operators for last-mile financial transactions, etc.).
- Update and enrich the country-wide 2012 **agro-dealer directory**. The updated directory should encompass the entire supply chain, from importers to retailers, and include essential public and private associated services (government agencies, labs, etc.). Data collected to update the directory will inform GoG/MoFA and key fertilizer stakeholders on the current status and needs of the retail network (e.g., technical and business knowledge and skills, size and location of storage facilities, and financial capacity) and will help in the design of more efficient and demand-driven capacity building programs and interventions. The directory will also facilitate the rapid and full implementation of e-registration and e-surveillance of agro-dealers by PPRSD and provide another delivery channel for extension

and sensitization messages, as well as for business and marketing operations for other private sector players.

7.2.5.2 Develop More Efficient Fertilizers for Balanced Soil and Crop Nutrition

After the initial introduction of blended fertilizers during the 2019 PFJ program, the GoG should encourage MoFA, in partnership with CSIR-SRI, SARI, universities, regulators from PPRSD, and the private sector, to test and recommend more fully balanced fertilizer formulas and blends to cover the entire country and all cropping systems. Soil nutrient deficiency mapping is important for "prescribing" and formulating the right types of fertilizers that meet soil and crop nutrient needs. Blending is a cost-effective way to incorporate the deficient nutrients and also customize formulas locally to respond to demand, thereby addressing the issue of blanket fertilization.
The Soil testing, Mapping, Recommendations development, and Transfer to farmers (SMaRT) approach for balanced fertilizer recommendations in Ghana will include the following activities/steps:

- Sustain and coordinate current and proposed efforts related to mapping initiatives from various promoters, often using different but complementary approaches and methodologies (soil maps, soil fertility maps, crop suitability maps, and crop coverage);
- Expand soil sampling and soil analysis to cover the entire country: comprehensive chemical soil analyses, including all major, secondary, and micronutrients and pH/soil acidity, shall be conducted by a reference laboratory using standardized analytical methods;
- Map nutrient deficiencies/toxicities or soil constraints to guide fertilizer formulation;
- Develop and validate formulation of balanced fertilizers: based on the soil nutrient deficiency maps, "best-bet" site- and crop-specific fertilizers will be developed and validated using nutrient omission trials to evaluate yield benefit and economic contribution of addition of a given nutrient; and
- Transfer new balanced fertilizers to farmers, involving all stakeholders in the balanced site- and crop-specific fertilizers development process. They will be encouraged and facilitated to support effective technology transfer through partnership with extension services, development partners, and the fertilizer industry, thus stimulating farmer demand through demonstration.

7.2.6 Invest in Knowledge and Research Capacity in the Fertilizer Sector

Recommendations below relate mainly to:

- *KP 1 – INCLUSIVE PARTICIPATION*
- *KP 2 – SPECIALIZATION*
- *KP 3 – FAIR COMPETITION*
- *KP 8 – APPROPRIATE AND QUALITY PRODUCTS*

Lack of knowledge is another barrier to increasing the use of agricultural inputs and to agricultural and economic development. From technical knowledge to business management to regulations, customized trainings for the fertilizer supply chain actors and supporting institutions/organizations will increase their capacity to serve as private extension agents and better serve farmers as end users of the fertilizer.

Targeting more specifically the fertilizer supply chain stakeholders, **demand-driven training programs** should be developed and/or expanded to address sector-specific issues.
*To enhance **fertilizer industry research and development**, the following should be provided:*

- Technical/operational management study tours and exchange visits for fertilizer plant engineers and managers of fertilizer production, blending, and organic fertilizers companies;
- Refresher training and new training for soil scientists and technicians to analyze soil, plant, and fertilizer material for deficiency mapping and fertilizer recommendations development; and
- Technical training for private sector blenders and agronomists, extension agents, researchers, and NGO and donor technical staff on soil analysis, balanced fertilizer determination, production, distribution, and use.

*Towards public **regulatory services**:*

- In-service training, retraining, and/or exchange visits for PPRSD fertilizer inspectors and Pesticide and Fertilizer Regulatory Division (PFRD) staff on post-registration inspections, sampling, evaluation of physical properties, sample preparation, preparation of reports, and testing of fertilizer; and
- In-service training, retraining and/or exchange visits for fertilizer analytical staff of PFRD on use and maintenance of laboratory equipment, sample preparation, methods and procedures for analysis, and preparation of reports.

*To stimulate the **fertilizer industry, service providers, and public services**, the following should be provided:*

- Training for security agencies, regulatory bodies, customs, extension agents, importers, manufacturers, blenders, and clearing agents on the regional ECOWAS and Ghana Fertilizer laws and regulations; and
- Updates on any change affecting the fertilizer subsidy program mechanisms and rules.

*To strengthen **distributors, agro-dealers, and extension services**, the following are needed:*

- Training (of trainers) of agro-dealers in business management, product knowledge, safe product usage, handling, storage, and crop husbandry practices. The program will build on the successful trainings developed and delivered by GAIDA, AFAP, and/or CropLife. As much as possible, training certificates should be required by PPRSD to deliver fertilizer distribution licenses to agro-dealers;
- Experiential classroom and hands-on field training for farmers, extension agents, agro-dealers, and village-based advisors on the use of balanced fertilizers and integrated soil fertility management (ISFM); and
- On-farm (cascade) demonstrations and farmer field schools for smallholder farmers on responsible fertilizer use, including the 4Rs (right source, right application rate, right time of application and right placement of fertilizer), alongside mass communication campaigns (see section 7.2.9.3 on communication).

7.2.7 Offer Financial Incentives by Easing Access to Finance

Recommendations below relate mainly to:

- *KP 4 – EFFICIENCY*
- *KP 7 – TIMELINESS*
- *KP 9 – PROPER INCENTIVES*

Financial reform should aim to provide incentives for the further development of local financial markets and infrastructure (local savings and loans institutions) and financial instruments (special savings accounts and loans for agriculture, crop insurance instruments, etc.). The GoG

should provide financial incentives, coupled with proper technical assistance to support the agriculture production activities and market access, to guarantee returns to farmers and the banks' lending portfolios.

Specifically, for fertilizer value chain actors, the GoG and its partners should:

- Facilitate access to **existing**, effective financing mechanisms for manufacturers, importers, blenders, and agro-dealers,[19] including short-term financing facilities in foreign exchange for the payment for imported fertilizer or fertilizer ingredients, and working capital for agro-dealers to purchase fertilizer from importers and blenders;
- Explore **additional** and innovative financing mechanisms from the African Development Bank's African Fertilizer Financing Mechanism (AFFM) and from other inclusive finance initiatives, such as value chain and/or Hub-Agro Dealer financing (AFAP), that can benefit actors throughout the fertilizer value chain;
- Reduce **risks** associated with the provision of and access to investment and working capital by working with Ghana's risk-sharing initiative (GIRSAL), and promotion of other instruments, such as crop and weather insurance and microfinancing; and
- Ensure fast and **traceable payments** from customers to suppliers along the entire value chain. If needed, guarantee funds can also help avoid late payment to importers/distributors of the subsidized portions of the fertilizer prices. Use of mobile banking systems should be promoted for last-mile transactions.

7.2.8 Reduce Logistics Costs by Investing in Infrastructure

Recommendations below relate mainly to:

- *KP 4 – EFFICIENCY*
- *KP 12 – SUSTAINABILITY*

The most important policy measures aimed at public and/or government-induced private investments are those to eliminate the physical isolation of markets due to a lack of infrastructure, including transportation and productive infrastructure.

7.2.8.1 Reduce Port and Logistic Costs for Fertilizers

While the Port of Tema is one the most efficient and inexpensive ports in West Africa, it remains relatively congested and poorly connected to good roads and affordable storage capacity despite recent major investments in new infrastructure (new berths and a container terminal). Reduction of waiting time at sea and at quayside will reduce demurrage and operational costs incurred by the importers and will have a direct impact on costs of raw materials and finished products, while increasing timely availability of fertilizers to farmers who depend heavily on rains. We recommend that the GoG:

- Negotiate with Port of Tema authorities to **dedicate a berth** that can handle appropriate-sized vessels (30,000 tons) for fertilizer operations and, when necessary (peak season for fertilizer imports is currently March-May), grant fertilizer shipments priority over other commodities, as recommended by all African governments in the *Abuja Declaration* (2006);
- Accelerate improvement of **road conditions** in Greater Accra and specifically around the Port of Tema. This will allow for more efficient and faster transfers of fertilizers from Port

[19] Based on "Vetting of Existing Financial Models Suitable for the Fertilizer Value Chain in ECOWAS Zone." Workshop proceedings on Financial Mechanisms for the Fertilizer Value Chain in West Africa. West Africa Fertilizer Program, Accra, Ghana, September 2016.

to Tema warehouses, using tippers for bulk product instead of cargos for fertilizer bagged at quayside. Better roads will also allow operators to increase the discharge rates at the port close to their maximum during peak seasons (up to 3,900 tons per day); and

- Accelerate current efforts to improve availability of **large storage capacity** (in bulk or bag) at or around the Port of Tema and of logistics equipment and services (tippers, high capacity cranes, electronic tracking, payment, and clearing systems).

7.2.8.2 Invest in Inland Road and Transportation Systems

The GoG should invest further in improving the current road conditions and in feeder roads serving remote rural areas. These roads not only will help to bring fertilizer to the end user, lower its cost, and increase productivity and production but also will allow farmers better access to a local markets with the option to sell their production surpluses and increase their income.

The main recommended transportation infrastructure investment involves repairing damaged roads and constructing new roads, mainly feeder roads in rural areas, while exploring the feasibility of implementing alternative transportation systems (railroad or waterways), especially for the most remote rural areas in the northern regions, to reduce transportation costs and give physical access to at least the nearest urban markets for their outputs and productive inputs (e.g., fertilizer).

7.2.9 Improve the Business Environment in the Agriculture Sector

Recommendations below relate mainly to:

- *KP 4 – EFFICIENCY*
- *KP 9 – PROPER INCENTIVES*
- *KP 9 – COMPLEMENTARY INPUTS*

7.2.9.1 Invest in Complementary Inputs

GoG should further invest in **complementary inputs**, such as seeds, soil, and water management and conservation practices, and equipment that will allow and encourage better use of complementary inputs, including improved seed varieties, proper mechanization services, energy, etc.

Soil management involves improving soil structure by replenishing fertility and improving organic matter and pH of the cultivated layer (possibly including liming programs), while water management implies the conservation and management of rainforests (vegetation) and their biodiversity as well as developing infrastructure for capturing rainwater to be used in irrigation. Investing in this type of infrastructure will help in the efficient use of resources, reduce the inherent risks of agriculture, and preserve the environment.

7.2.9.2 Develop Output Markets for Crops/Commodities

Farmers being able to sell their produce will encourage greater use of fertilizers to produce more crops of the highest quality that meet local and international food safety and market standards. Farmers also will have more income with which to buy inputs, such as fertilizer. To this end, the FSP/PFJ should promote better agribusiness linkages and inclusive value chain approaches in which all actors are integrated to expand the market for agricultural produce and fertilizers. Priority should be given to:

- Enhancing farmers' access to reliable and remunerative markets (including access to customized market information, see below);

- Building farmers' skills to effectively trade in structured markets and with private sector off-takers and agro-processors (SMEs and large-scale operators; tripartite agreements with fertilizer/agro-input suppliers);
- Facilitating farmer linkages to structured markets, such as the Ghana Commodity Exchange (GCX), Ghana School Feeding Programme (GSFP), and the National Buffer Stock (NAFCO); and
- Leveraging existing programs and incentives, such as the One District, One Farmers' Market initiative, certification programs under the MoFA Green Label quality standards, or Farmers' Market aggregation centers.

7.2.9.3 Invest in Information and Communication

Lack of market information is often a major problem in remote rural areas. Most farmers in these areas have no or very limited access to input and output market information. They also tend to have limited technology and little knowledge on the use of inputs that would help them to make better and more informed decisions on what to produce and how to produce it. In the past decade, Ghana's investments and policies have triggered the development of a vibrant "ICT 4 Ag" (ICT for agriculture) sector. Boosted by mobile technologies, public services, startups, and corporate services are providing technical and market information; this should be expanded or leveraged to reach priority last-mile users and their local service providers (agro-dealers, local/district public servants, and administration), with special attention to youth.

In particular, in order to improve farmers' perceptions and knowledge of fertilizer use:

- The GoG/MoFA should continue using **mass communication** programs (e.g., television, radio, print media, interpersonal communication, road shows, social media, SMS reminders, and household visits) for the general public and farmers to announce and inform about the FSP's launching and mechanisms, fertilizer products available and their use, sensitization on risks of misuse and diversion, profitability of balanced fertilizers, etc.;
- The **e-Agriculture platform**, which was developed by the Extension Directorate of MoFA, should be revamped and expanded to provide end users with more customized and demand-driven messages related to fertilizer use, good agricultural practices, etc.;
- Private sector-led ICT tools and platforms (e.g., OCP's school labs program, the Hubs and Spokes and Distribution Partner models, Esoko, and mFarms) for managing and delivering inputs and e-extension services at the community level should be encouraged and promoted; and
- **Advocacy campaigns** should advocate for equitable access to productive inputs in the fertilizer value chain for youth and women.

As far as fertilizer market information is concerned:

- The GoG/MoFA should enforce **reporting requirements** as defined in the Plants and Fertilizer Act 2010 (Act 803) and monitor, at least on a quarterly basis, imports, exports, production, sales, and estimated inventories of fertilizers;
- Regular monitoring, analysis, and publication of **prices and market conditions** for both inputs and outputs on the local and international markets should be further developed and made available to the various stakeholders along the value chain (e.g. SRID/Esoko market information bulletins, AfricaFertilizer.org and Argus Africa reports, and similar publications dedicated to fertilizer); and
- A detailed and regular (at least every three years) monitoring of fertilizer **use by crop** and by type of fertilizer across the country will provide both the public and private sectors with essential information on the level of adoption of new fertilizers to measure impact of fertilizer use on crop production and farm revenues, design more targeted and efficient

business and product development strategies, and better estimate demand forecasts in the short- and mid-terms.

Table 21 illustrates the alignment of the proposed recommendations with the smart subsidy principles.

Table 21. Proposed Recommendations and Smart Subsidy Principles

Key Recommendations	Time Frame	Key Principles
Promote Inclusive and Fair Participation of Key Business Actors in the Subsidy Program		
▪ Promote a more transparent selection of participating companies, with results-based performance contracts ▪ Set prices and redefine profits and margins, using appropriate cost buildup and price structure analyses ▪ Improve subsidy program's timelines	Short-term	KP 1 – inclusive participation KP 3 – fair competition KP 6 – transparency KP 7 – timeliness KP 11 – exit strategy KP 12 – sustainability
▪ Set a lower limit for subsidy rate and program length, or at least subsidies for particular populations	Short- to medium-term	
Promote a more transparent and collaborative environment in the fertilizer sector		
▪ Encourage the creation of a Ghana Fertilizer Platform for comprehensive and continuing public-private sector dialogue ▪ Encourage the creation of the Fertilizer Industry Association of Ghana	Short- to medium-term	KP 1 – inclusive participation KP 2 – specialization KP 3 – fair competition KP 4 – efficiency KP 6 – transparency
Enforce Fertilizer Regulatory Framework and Increase Quality Control Capabilities		
Support to the National Fertilizer Council and PPRSD to: ▪ Enforce fertilizer quality control and policies ▪ Roll out standardized fertilizer testing systems ▪ Encourage self-regulation/quality promotion by the fertilizer industry	Medium-term	KP 3 – fair competition KP 4 – efficiency KP 8 – appropriate and quality products
Properly Target Beneficiaries (Farmers, Zones, and Crops)		
Register farmers for better targeting and monitoring: ▪ Develop a comprehensive database of farmers ▪ Develop concurrently a series of associated services ▪ Update agro-dealer database	Short- to medium-term	KP 4 – efficiency KP 5 – better targeting (equity) KP 13 – accountability
Develop more efficient fertilizers for balanced soil and crop nutrition: ▪ Sustain and coordinate current and proposed efforts ▪ Expand soil sampling and soil analysis ▪ Develop and validate formulation of balanced fertilizers ▪ Transfer new, balanced fertilizers to farmers	Medium-term	KP 1 – inclusive participation KP 2 – specialization KP 3 – fair competition KP 8 – appropriate and quality products
Invest in Knowledge and Research Capacity in the Fertilizer Sector with Demand-Driven Training Programs		

Key Recommendations	Time Frame	Key Principles
▪ Enhance fertilizer industry research and development ▪ Strengthen public regulatory services ▪ Strengthen distributors, agro-dealers, and extension services ▪ Stimulate fertilizer industry, service providers, and public services	Medium-term	KP 1 – inclusive participation KP 2 – specialization KP 3 – fair competition KP 8 – appropriate and quality products
Offer Financial Incentives by Easing Access to Finance		
▪ Ease access to finance with development of risk management instruments, loan guarantee programs, etc. ▪ Timely planning and implementation of program to avoid/reduce delays ▪ Management of interest rates	Medium-term	KP 4 – efficiency KP 7 – timeliness KP 9 – proper incentives
Reduce Domestic Logistics Costs		
Reduce port and logistics costs for fertilizers by investing in: ▪ Dedicated berth at port of Tema for larger shipments ▪ Road infrastructure in Tema/Greater Accra ▪ Storage and warehousing capacity in key locations ▪ **Inland road and transportation systems**	Long-term	KP 4 – efficiency KP 12 – sustainability
Improve the Business Environment in the Agriculture Sector		
▪ Invest in complementary inputs ▪ Develop output markets for crops/commodities ▪ Invest in information and communication	Long-term	KP 4 – efficiency KP 9 – proper incentives KP 9 – complementary inputs

7.3 Specific Recommendations for the 2019 PFJ Campaign (Short-Term)

Following the public release of the call for application for the 2019 PFJ campaign on November 7 and a presentation of early findings on November 12, 2018, of this study to MoFA, other relevant elements of the GoG, private fertilizer suppliers, and technical and financial partners, IFDC/EnGRAIS embarked on a two-week extensive consultation process with key fertilizer suppliers and experts to design a series of recommendations for immediate action to improve the efficacy and efficiency of the 2019 FSP. The main objectives of the recommendations were to:

- Significantly reduce the magnitude of smuggling and diversion of GoG-subsidized fertilizers during the current planting season;
- Ensure timely delivery of quality fertilizer by the industry and use by targeted beneficiaries; and
- Ensure successful adoption by the farmers of the new crop- and site-specific formulas to be provided by the FSP that will lay the foundation for a successful and complete shift from blanket to balanced fertilizers in subsequent years, under the new GFEP.

These recommendations were developed to be:

- **Easy to implement** within a very short timeframe, since they required immediate decisions and public announcements to allow fertilizer suppliers to adjust their procurement processes and must be in place when the agricultural season began in the Southern regions (March);
- **Endorsed and owned** by the GoG, the farmers, and the industry, with minimal cost and risk and with maximum positive impact for all stakeholders involved; and
- **Contributing to the longer term** (re)vision of GoG/MoFA strategy and plans and aligned with the smart subsidy guiding principles defined above.

7.3.1 Eight Measures Proposed for the PFJ 2019 Campaign

A series of eight recommendations were developed and presented for consideration and discussion with GoG/MoFA representatives on December 3, 2018:

1. **Labeling**: Combine ECOWAS labeling rules and PFJ standards;
2. **Bagging**: Use 25-kg bags for PFJ subsidized fertilizers, at least in selected regions;
3. **Coloring**: Use colored bags for all PFJ subsidized fertilizers;
4. **Pricing**: Offer the same subsidized price for all NPK fertilizers for farmers, but pay suppliers a premium for the most appropriate and/or best formulas based on agronomic and economic efficiency;
5. **Allocation**: Give preference to fertilizer suppliers with demonstrated strengths (financial, technical, logistics, and network);
6. **Quality control**: Conduct quality control checks at port, blending plant, and warehouse levels;
7. **Export permits**: Allow the Ghanaian fertilizer industry to directly supply fertilizer demand in Burkina Faso based on commercial demand and thus curtail the demand for smuggled fertilizer; and
8. **Information**: Communicate PFJ 2019 measures to governments of neighboring countries, the Ghanaian fertilizer industry, and farmers.

Table 22 provides more details on the proposed recommendations, their expected benefits and risks, feasibility, and estimated costs.

Table 22. Eight Measures to Improve the Efficiency of the 2019 PFJ Program

	Problems	Actions	Benefits	Risks/Limits	Feasibility	Costs*
1	• Smuggling • Quality control • Limited trust in new products by farmers • Regional rules not enforced	• Apply **ECOWAS labelling rules** for bags of subsidized fertilizers • Add PFJ-specific marks as required	• More difficult to copy and sell original bags outside the country • Easy for farmers to identify to which crop it should be applied • Help promote adoption of crop-specific blends by small-scale farmers • Provide incentives/non-tariff barriers to local suppliers/blenders over international traders • Demonstrate commitment of MoFA and Ghanaian suppliers to implement the ECOWAS rules	• No risks identified	• Immediate • Easy to implement (already partially done)	• Very limited (borne by suppliers) • About U.S. $0.50 per bag
2	• Smuggling • Reaching the last mile	• Use **25-kg bags**, at least in some regions prone to smuggling (north)	• Immediate identification of subsidized fertilizers • Easier to move to the last mile and make available to small-scale farmers • May better serve women and the smallest farms • Costlier to smuggle	• Costlier to bag and handle along the distribution chain • Can incite farmers to use less than recommended rates	• Immediate • Easy to implement if announced early enough to allow suppliers to order 25-kg bags	• About U.S. $1 per bag
3	• Smuggling • Quality control • Limited knowledge of small-scale farmers on new products	• **Use specific-colored bags** for subsidized fertilizers • *Note: Coloring actual PRODUCTS (at least urea used straight and in blends) was considered too difficult to implement this year*	• Easy for farmers to identify PFJ products • Provide disincentive for smugglers to sell outside Ghana (immediately identifies them as smugglers) and for potential buyers to pay a near-market price, therefore limiting profits	• No risks identified	• Easy to implement	• Very limited if combined with #1 and #2 • About U.S. $0.50 per bag

	Problems	Actions	Benefits	Risks/Limits	Feasibility	Costs*
4	• All NPKs are offered and sold at the same price • No premium or incentive to supply best/most effective blends	• Encourage suppliers to offer **different pricing for different grades** and subsidize the most appropriate fertilizers, even if at a higher cost for MoFA	• Allow MoFA to select products based on economic and/or agronomic efficiency (based on SRI results) • Allow private suppliers to optimize their price offer based on their technical capacity (blend) and procurement/sourcing options • Educate farmers and stakeholders on the real cost and value as well as differences between various blends	• More complex at distribution/ voucher management levels	• Easy to implement at procurement level	• Costs can be estimated based on actual offers
5	• Some companies (mainly small) could not deliver fertilizers and services • Disincentives for serious suppliers to invest in the long-term	• Select fertilizer supplier transparently according to their verified capacities • Monitor/evaluate their performance more closely during previous/upcoming campaigns	• Minimize risk from non-performing suppliers, hence risk of farmers not receiving fertilizers • Facilitate monitoring of the performance of selected companies • Increased quality of associated services	• Could limit the number of small/medium local companies – but they will not necessarily be cut out	• Easy to implement at procurement (MoFA) level	• No additional direct costs
6	• Quality control of new PFJ blends is required	• Deploy **spectral analysis systems** (e.g., CropNuts Labs) to certify PFJ 2019 fertilizer batches at port, blending units, and importer warehouses	• Allow standardized basic but good level of quality control at critical levels of the supply chain • Batch markings will allow for further investigation in the case of adulteration and smuggling (traceability) • Build confidence of stakeholders (upstream first) in Ghanaian fertilizer quality and capacity to move toward balanced fertilizers • Set the stage for a full quality control system in place for the 2020 FSP	• Requires immediate action to have a working system in place for the upcoming season (4-5 month delivery time)	• Relatively easy to implement	• In the range of U.S. $1 million to initiate • Initial high cost with long-term benefit!

	Problems	Actions	Benefits	Risks/Limits	Feasibility	Costs*
7	• Difficulties obtaining export permits limit Ghanaian fertilizer players supplying Burkina Faso, hence encouraging smuggling of fertilizers	• Facilitate delivery of **export permits** for non-subsidized fertilizers to registered and reputable companies	• Allow supply of fertilizers to Burkinabe farmers based on market demand • Reduce demand for illegal supplies of subsidized fertilizers by Burkinabe farmers • Restore competitiveness of Ghanaian suppliers in the region • Better control of authorized exports of fertilizers to Burkina Faso and other countries	• No risks identified	• Easy • Immediate	• No cost
8	• Price/subsidy rate higher than for neighboring countries, encouraging smuggling • Late distribution of coupons	• **Inform** other governments and fertilizer suppliers in the region about PFJ program, implementation plans, etc. • Aggressively **publicize** 2019 PFJ rules and availability of coupons to Ghanaian farmers and stakeholders	• Ensure that Ghana and neighbors (Burkina Faso, Mali, and Togo) are each aware of their respective [subsidy] programs ahead of the planting season • If possible, take joint action and coordinate better with police forces and other Ghanaian public agencies • Ensure that farmers claim their coupons early enough to allow suppliers to serve them on time	• No risks identified	• Easy to implement • Immediate (can be done with WAFA and ECOWAS at the regional level)	• No significant costs

Out of the eight proposed measures, five are considered high-priority measures for immediate implementation, as summarized in Table 23.

Table 23. Priority Measures Recommended for PFJ 2019

	Proposed Measures	Feasibility	Estimated Cost for GoG and MoFA	Alignment with ECOWAS Guidelines	Buy-In by the Fertilizer Industry	Potential Impact on PFJ 2019 Campaign	Priority Measures for PFJ 2019
1	**Labeling**	Easy	Low	High	High	High	**High**
2	**25-kg bags**	Easy	Medium	Medium	Medium	Medium	**Medium**
3	**Colored bags**	Easy	Low	N/A	High	High	**High**
4	**Pricing**	Medium	Medium	N/A	Medium	Medium	**Medium**
5	**Allocation**	Medium	Nil	High	High	High	**High**
6	**Quality control**	Medium	High	High	High	High	**High**
7	**Export permits**	Easy	Nil	High	High	Medium	**Medium**
8	**Information**	Easy	Low	High	High	High	**High**

7.3.2 How MoFA Intends to Implement the Measures?

All eight measures were well received by MoFA, and all were at least partially implemented during 2019:

- **Labeling** (product composition, weight [50/25 kg], manufacturer's contact, guaranteed analysis, source of nutrient in blends as required by ECOWAS, PFRD No., PFJ on the back of the sack, PFJ logo on the front of the bag) and **coloring** (2-3 inch yellow band at the base of sacks) will be mandatory on all PFJ fertilizer bags **[measures #1 and #3]**;
- Differentiated **buying prices** was introduced this year, with higher buying prices accepted to purchase fertilizers of higher quality (e.g., NPK 15-20-20 +/- Zn vs. NPK 15-15-15 or NPK 20-10-10, whether blends or compounds) and for new blends procured in smaller quantities (e.g., NPK 15-20-20 + 0.7 Zn for cereals, NPK 12-30-17 + 0.4 Zn for soybean, NPK 17-10-10 for cassava). The selling prices to farmers, however, remained the same for all types of subsidized NPKs **[measure #2]**;
- MoFA immediately requested technical and financial offers to equip PPRSD with spectral analytical capabilities to ensure controls at ports, blending plants, and warehouses, provided that funding is secured **[measure #6]**;
- **Export permits** were granted if conditions were fulfilled by exporter **[measure #7]**; and
- **Sharing information and sensitization**: Suppliers were prepared to share information with MoFA and also help MoFA to sensitize farmers on blends; the Minister should call for a high-level roundtable with his counterparts **[measure #8]**.

Concerning **measure #2**, MoFA suggested that **25-kg bags** would be mandatory for PFJ subsidized fertilizers for the three northern regions only, where most of smuggling is thought to occur. MoFA also initially suggested that, in these three regions, MoFA local representatives at district level should be in charge of distributing fertilizers directly to the farmers. In IFDC's opinion, this would have had a very adverse effect on the industry and the GoG could not be as effective at implementing these distributions as the private sector. By IFDC's count, there are (about) 52 districts in the three northern regions (Northern, Upper East, and Upper West), and if MoFA has an office in each district, this would constitute a maximum of 52 outlets. The main fertilizer suppliers have over 250 direct and indirect agro-

dealers distributing fertilizer, or five times more outlets available in these same districts. This means that, in terms of accessibility, the industry is better placed to handle the distribution to farmers. In addition, it is not practical to expect all farmers to travel to widely spaced MoFA offices and transport heavy loads of fertilizers back, when private outlets are much closer to them. Finally, as stated earlier, GoG officials have acknowledged that some of their own representatives facilitate or are even actively engaged in smuggling. Direct distributions by the GoG/MoFA would only exacerbate this problem, giving potential smugglers easy access to the products.

As per ECOWAS guidelines, GoG/MoFA should avoid being a "competitor" in the inputs value chain and allow the private sector to distribute and develop that space while engaging with and regulating them to provide the necessary checks (stocks, coupons, quality management, and regulation) to ensure timely and efficient operations in the three northern regions or anywhere else.

Therefore, IFDC strongly recommended that MoFA partner with reliable, reputable, and willing fertilizer suppliers to supply and distribute subsidized fertilizers in 25-kg bags in the three northern regions. In line with the proposed **measure #5**, we recommend that, at least in these three regions, MoFA allocate fertilizer quotas to a limited number of suppliers that operate with a known and established network of agro-dealers and collaborate with them on specific measures to ensure a smooth delivery mechanism and monitoring system that will contribute to an effective reduction of smuggling to neighboring countries.

7.3.3 Preparing for the 2020 PFJ Campaign (Medium-Term)

In addition to the proposed measures above, IFDC also recommends further actions be undertaken during the 2019 campaign in order to prepare for more in-depth and comprehensive optimization of the 2020 subsidy program:

1. **Monitor suppliers'** efficiency and performance under the PFJ/FSP in order to propose a more transparent and informed selection process for suppliers in 2020;
2. **Monitor** acceptability and the economic and agronomic return on investments in **new fertilizer recommendations and formulas** by farmers that will help in designing a tailored sensitization program and in adjusting fertilizer recommendations as appropriate;
3. **[Re]assess distribution and retailing network** pattern and capabilities, in order to design technical and financial capacity building programs for fertilizer suppliers and users (public-private partnership mode);
4. Conduct an in-depth study of **fertilizer use and demand** by crop, in order to obtain a detailed estimation of real and commercial demand for different types/specific fertilizers;
5. Build a **farmers' database** based upon PFJ/FSP 2019 beneficiaries, in order to prepare to transition from the current "push" (supply-driven) to a "pull" (demand-driven) program, and from subsidizing fertilizers to subsidizing farmers beginning in 2020;
6. Encourage the fertilizer industry to create a **national fertilizer association** in order to promote inclusive participation of fertilizer suppliers, importers, blenders, and main distributors in consultations and decision-making regarding design and implementation of the FSP and further optimization of the fertilizer value chain; and
7. Transform the current National Task Force initiated by the GoG into a **National Fertilizer Platform**[20] that would be responsible for coordinating the design and implementation of the GFEP and Ghana's subsequent fertilizer and soil health strategy and development programs.

[20] Options to set up such a platform can be learned from the Kenyan experience and its KeFERT platform. See https://ifdc.org/kefert/ for more information.

8. Annex

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Methodology

Methodology for the Cost Buildup Study

To achieve the objectives of this study, the information and data collection process consisted of surveying as many players and actors as possible along the fertilizer supply chain, from importation to retail. During these surveys, we collected quantitative data and qualitative information to corroborate the supply chain structure and its associated cost at each link of the identified chain, taking into consideration importers, banks/financial institutions, blenders, government agencies (Customs, Ministry of Agriculture, and others involved in fertilizer supply through government programs), transporters, distributors, retailers, farmers and farmers; organizations/cooperatives, researchers or research organizations; among other relevant actors identified during the assessment.

To the extent possible, marketing margins were estimated as the differential between the cost of delivery and sale prices at each stage of the supply chain. It is important to emphasize that the purpose of the surveys was to identify not only tangible but also intangible costs; therefore, the physical and other limitations faced by fertilizer supply chain players are not allowing them to reduce costs and therefore reach higher operational efficiency, consequently constraining their business development and expansion.

Part of the effort under this activity was to focus on identifying and visiting major agricultural zones in Ghana where fertilizer is used to capture the diversity of production zones and gather as much complementary information as possible to assist in explaining the identified cost structure, e.g., condition of roads, road stops/weighbridges, storage facilities, customs delay and costs, issues facing distributors, retailers, and farmers, etc.

Considering the small number of importer and blenders, the consulting team was able to visit and interview most of them, in addition to government agencies (MoFA, Customs, the Port Authority) and visit the port. In general, private importers and blenders were willing to collaborate, responding to general questions and providing general information regarding the market, subsidy program, and at times firm specific issues, but some were not able or willing to provide data on the market and they were less inclined to provide information on their business specifics. In addition, although their number is larger, a small number of distributors and agro-dealers were surveyed in regions with a high concentration of agro-dealers, i.e., the Ashanti and northern regions.

Some key considerations as a premise for the study:

- It is important to recognize that in Ghana, there is more than one fertilizer distribution system, differentiated as private and public-private distribution systems, depending on the level of government involvement in the supply chain through the fertilizer subsidy programs and the different crops/agricultural activities (e.g., for cereals**,** cash/export crops like cocoa, commercial crops like palm oil, and other food crops subsidized by the government).
- Under these considerations, the costs of supplying fertilizer are differentiated mainly by the distances of delivery, which defines the cost of transportation and the number of layers involved in the supply chain that can determine the level and cost of financing at each stage of the supply chain. Government involvement through the subsidy program can also influence the cost of supplying fertilizer to farmers. For example, there will be a difference between supplying fertilizer under the Ministry of Finance (MoF)/COCOBOD program for cocoa, the MoFA subsidy program for food crops, and the supply of fertilizer to large commercial plantations (i.e., palm oil and rubber), although importers and suppliers might be the same for all types of deliveries.
- Regardless of the crop activity and government involvement, **the focus of this study is on the value chain for food and cash crops grown by smallholder farmers**. The reason for

this focus is that they are the segment of the farming population in Ghana who are still using negligible amounts of fertilizer per hectare of cropped area with low yields; therefore, this is the segment from which growth in fertilizer use and consumption is expected to emanate, which will lead to market growth and expansion, higher yield, and rural economic growth. In addition, this is the segment of the population in which the government programs, such as the PFJ presidential initiative, are focused on also.

Methodology for the Blending Section

In carrying out this study, the information and data collection process consisted of semi-formal interviews of key stakeholders that influence the Ghanaian fertilizer value chain – from importation to distribution/delivery to farmers. The interviews were conducted with representatives the following organizations – OmniFert, GloFert, Yara, Chemico, Macrofertil AMG, RMG, the Crops Directorate of MoFA, MoFA PPRSD, Global Haulage, Ghana Ports and Harbours Authority, GRA Ghana Customs, Freight Forwarders, Peasant Farmers Association of Ghana (PFAG), Ghana Agri-Input Dealers Association, AGRA, and IFPRI. We also reviewed documents relating to the Ghana fertilizer value chain and subsidy by AGRA and IFPRI. We reviewed assessments on development of fertilizer blends in Ghana by IFDC and AFAP, as well as fertilizer recommendations and validations by CSIR-SRI. The last two initiatives are funded by AGRA.

Methodology for the Subsidy Optimization Section

This section of the report provides a brief overview of the fertilizer subsidy program run by the government over the 2015-2018 period.

The evaluation adopted an inclusive approach of obtaining and analyzing information from all segments of the subsidy chain. Field visits were conducted to assess facilities used by the various subsidized fertilizer distributors and learn first-hand their experience with the program. Relevant stakeholders from both the public and private sectors were interviewed. Data was also obtained from the participants for analysis. Challenges from all the sector actors were collected, and their recommendations toward improving the program were all noted.

Recommendations developed in this section take stock of previous analyses (AGRA, 2016) and of the Regional Guide for Subsidy Programs developed in 2017 by IFDC under the USAID West Africa Fertilizer Program that seek to improve the design and implementation of subsidy programs in West Africa.

Essential Agricultural Statistics

Table 24. Cultivated Areas and Average Yields of Some Major Crops in Ghana (2010-2015)

	2010		2011		2012		2013		2014		2015	
Crop	Area (x1000 ha)	Yield (mt/ha)	Area (x1000 ha)	Yield (mt/ha)	Area (x1000 ha)	Yield (mt/ha)	Area (x1000 ha)	Yield (mt/ha)	Area (x1000 ha)	Yield (mt/ha)	Area (x1000 ha)	Yield (mt/ha)
Maize	992.0	1.9	1,023.0	1.6	1,042.0	1.9	1,023.0	1.7	1,018.9	1.7	880.0	1.9
Millet	177.0	1.2	179.0	1.0	172.0	1.0	161.0	1.0	162.3	1.0	162.0	1.0
Rice	197.5	2.3	197.5	2.4	189.5	2.5	215.9	2.6	224.5	2.7	233.0	4.7
Sorghum	253.0	1.3	243.0	1.2	231.0	1.2	226.0	1.1	226.9	1.1	228.0	1.2
Cereals	1,619.5		1,642.5		1,634.5		1,625.9		1,632.6		1,503.0	
Cassava	875.0	15.4	889.0	16.0	869.0	16.7	875.0	18.3	888.6	18.6	917.0	18.8
Cocoyam	205.0	6.6	204.0	6.4	196.0	6.5	194.0	6.5	200.4	6.5	200.0	6.5
Plantain	328.0	10.8	336.0	10.8	337.0	10.6	340.0	10.8	356.6	10.6	363.0	10.9
Yam	385.0	15.5	204.0	28.7	426.0	15.6	422.0	16.8	428.0	16.6	430.0	17.0
Starchy staples	1,793.0		1,633.0		1,828.0		1,841.0		1,873.6		1,910.0	
Groundnuts	353.4	1.5	356.8	1.3	345.2	1.4	328.9	1.2	334.3	1.3	336.0	1.2
Cowpea	167.0	1.3	182.3	1.3	168.8	1.3	162.0	1.2	165.7	1.2	163.0	1.2
Soybean	76.2	1.9	97.6	1.7	85.2	1.8	84.8	1.6	86.9	1.6	86.0	1.7
Legumes	596.6		636.6		599.2		575.7		586.9		585.0	
Cocoa	1,600.2		1,600.3		1,600.8		1,650.8	0.5	1,683.8	532.3	1,717.4	555.2
Coffee	0.4		0.4		0.4		0.5	1.6	0.5		0.5	
Rubber	25.5		25.8		26.0		26.8	0.8	27.4		27.9	
Cashew	77.0		82.0		86.5		89.0	0.5	90.8		92.6	
Oil palm	367.1		381.8		397.1		409.1		349.0		425.6	
Coconut	25.2		25.3		25.3		26.1		26.6		27.2	
Tree crops	2,095.4		2,115.6		2,136.1		2,202.3				2,291.1	
Fruits	40.7		41.7		42.8		44.1		45.8			
Vegetables	77.0		78.9		80.7		83.2		84.8		86.5	

Source: Statistics, Research and Info. Directorate (SRID), Ministry of Food and Agriculture,-March 2017.

Table 25. Ghana 2017 Fertilizer Statistics Summary

HS Code	Product	Total Imports	Exports	Domestic Availability	Non-Fertilizer Use	Agricultural Imports	Apparent Consumption
3105200000	NPK	213,887	3,500	210,387		213,887	210,387
3102100000	Urea	88,510		88,510	251	88,259	88,259
3102210000	Ammonium sulfate	43,865		43,865	0	43,865	43,865
3101000000	Organic fertilizers	37,643	75	37,568		37,643	37,568
3103101000	TSP	26,766		26,766		26,766	26,766
3104200000	MOP	24,245		24,245	10	24,235	24,235
3104900000	Other K	3,301		3,301	0	3,301	3,301
3105300000	DAP	1,493		1,493		1,493	1,493
3102600000	Calcium nitrate	1,322		1,322	0	1,322	1,322
2530200000	Kieserite	1,064		1,064		1,064	1,064
3103900000	Other P	1,008		1,008		1,008	1,008
3105400000	MAP	608		608		608	608
3104300000	SOP	340		340	5	335	335
2510000000	Phosphate rock	203		203		203	203
2834210000	Potassium nitrate	125		125		125	125
2833210000	Magnesium sulfate	50		50		50	50
3105510000	NP compounds	40		40		40	40
3105900000	NPK unknown	17		17	1	16	16
3105600000	PK compounds	11		11	0	11	11
3102900000	Other N	5		5		5	5
3105700000	NK compounds	0		0		0	0
3102300000	Ammonium nitrate	73,056		73,056	73,056	0	0
3102500000	Sodium nitrate	330		330	330	0	0
3102800000	UAN	303		303	303	0	0
Totals		**518,193**	**3,575**	**514,618**	**73,957**	**444,236**	**440,661**

Source: AfricaFertilizer.org, 2018

Detailed Structure of Fertilizer Distribution in Ghana

Currently, there are about **10 major importers and between 35 and 50 major distributors** that participate in the importation and distribution of subsidized fertilizer in Ghana, although the government allocates import quotas among 29 businesses under the subsidy program. To overcome the constraints associated with the relatively small fertilizer market in Ghana and the small allocations among some of the businesses, some have entered strategic alliances for joint importation to achieve economies of scale and reduce costs of procurement and importation.

The main parastatal agricultural organization in Ghana is COCOBOD, which is the state-run umbrella organization under the Ministry of Finance that covers more than 90% of farmers involved in the production of cocoa. Cocoa production is concentrated in the central region of Ashanti, the western part of the Brong-Ahafo region, and the northern part of the Western region. Cocoa production is handled by thousands of small producers who also produce staple food crops, such as maize. COCOBOD also has traditionally directly imported their fertilizer used in the cocoa production; however, to improve efficiency and as part of the government attempt to not interfere or disrupt private sector activities, COCOBOD has also turned over fertilizer importation to the major importers in country. This fertilizer is distributed to cocoa producers through the board's own distribution network, located in the cocoa-farming districts of the producing regions, under a unique system paid by their own production and exports.

Plantations are large private operations to produce industrialized crops like palm oil, rubber, fruits (banana, pineapple, mango), tobacco, and sugarcane. Plantations have typically been involved in their own import and distribution of fertilizer for their own operation and provide it to a selective group of large independent producers that work with the industry under contractual agreement, which involves inputs supply and management with guaranteed output price. Farmers not eligible to receive services and fertilizer from the plantation operation must purchase it in the local market at the prevailing market price. Most recently, given the large demand for financial resources, time, and logistics coordination involved, many of these organizations have transferred most of the fertilizer imports operations to the main in-country importers.

Wholesalers are located in most of the 10 regions in the country, with the major ones being in the larger regional capitals, mainly Kumasi and Tamale, which are considered the main distribution hubs for the northern and central regions (other than the Greater Accra region, which is the national hub where the importers' main operations are located). A large amount of fertilizer distribution, estimated at a 75% of imports, takes place in Kumasi given its central location, which explains in part the major concentration of distributors and retailers in the Ashanti and Brong-Ahafo regions. Most distributors are independent businesses that work with their own capital or under a bank line of credit. In a few cases, the most prominent also work with credit from the importers. Very seldom, wholesalers provide credit to retailers, and some may even have their own agronomist who makes farm visits, serving as extension and sales agents in support of their own business operation and their associated retail network in the rural area. Most distributor operations are a combination of wholesale and retail businesses located in the major business centers around the country.

Retailers are small input and fertilizer shops typically located in most of the 158 districts in the country. They sell their products directly to farmers in the typical 50-kg bags or in smaller quantities, according to farmers' needs. They are located within the peri-urban areas of towns and villages to provide easy access to producers, still in most cases at a considerable distance from the cropping farm area. There are more than 3,000 retail shops spread throughout the country, with the highest concentration in the central regions of Brong-Ahafo and Ashanti, where there is also a major concentration of farmers involved in the production of food crops,

mainly maize and cocoa. Retailers as well as farmers rely almost entirely on their own finance, and in very rare cases, retailers may receive credit from the wholesaler. The imported fertilizer follows all or just one of the three differentiated distribution channels according to the end user: (i) the plantations and commercial/industrialized crops, (ii) parastatal agricultural organizations, such as COCOBOD, and (iii) small farmers/producers of staple food crops.

ECOWAS Customs Harmonized System Codes, Tariffs, and Taxes Applicable to Fertilizers

Table 26. ECOWAS Customs Harmonized System Codes, Tariffs, and Taxes Applicable to Fertilizers

Heading	TSN	Commodity Description	SU	CET ID	VAT	IE
31.01	3101.00.00.00	**Animal or vegetable fertilisers, whether or not mixed together or chemically treated; fertilisers produced by mixing or chemical treatment of animal or vegetable products.**	kg	0	0	
31.02		Mineral or chemical fertilisers, nitrogenous.				
	3102.10.00.00	• Urea, whether or not in aqueous solution	kg	0	0	
		• Ammonium sulphate; double salts and mixtures of ammonium sulphate and ammonium nitrate:				
	3102.21.00.00	○ Ammonium sulphate	kg	0	0	
	3102.29.00.00	○ Other	kg	0	0	
	3102.30.00.00	• Ammonium nitrate, whether or not in aqueous solution	kg	0	0	
	3102.40.00.00	• Mixtures of ammonium nitrate with calcium carbonate or other inorganic non-fertilising substances	kg	0	0	
	3102.50.00.00	• Sodium nitrate	kg	0	0	
	3102.60.00.00	• Double salts and mixtures of calcium nitrate and ammonium nitrate	kg	0	0	
	3102.80.00.00	• Mixtures of urea and ammonium nitrate in aqueous or ammoniacal solution	kg	0	0	
	3102.90.00.00	• Other, including mixtures not specified in the foregoing subheadings	kg	0	0	
31.03		**Mineral or chemical fertilisers, phosphatic**				
		• Superphosphates:				
	3103.11.00.00	○ Containing by weight 35% or more of diphosphorus pentaoxide (P_2O_5)	kg	0	0	
	3103.19.00.00	○ Other	kg	0	0	
	3103.90.00.00	• Other	kg	0	0	
31.04		**Mineral or chemical fertilisers, potassic**				
	3104.20.00.00	• Potassium chloride	kg	0	0	
	3104.30.00.00	• Potassium sulphate	kg	0	0	
	3104.90.00.00	• Other	kg	0	0	
31.05		**Mineral or chemical fertilisers containing two or three of the fertilising elements nitrogen, phosphorus and potassium; other fertilisers; goods of this Chapter in tablets or similar forms or in packages of a gross weight not exceeding 10 kg**				
	3105.10.00.00	• Goods of this Chapter in tablets or similar forms or in packages of a gross weight not exceeding 10 kg	kg	0	0	

Heading	TSN	Commodity Description	SU	CET ID	VAT	IE
	3105.20.00.00	• Mineral or chemical fertilisers containing the three fertilising elements nitrogen, phosphorus and potassium	kg	0	0	
	3105.30.00.00	• Diammonium hydrogenorthophosphate (diammonium phosphate)	kg	0	0	
	3105.40.00.000	• Ammonium dihydrogenorthophosphate (monoammonium phosphate) and mixtures thereof with diammonium hydrogenorthophosphate (diammonium phosphate)	kg	0	0	
		• Other mineral or chemical fertilisers containing the two fertilising elements nitrogen and phosphorus:				
	3105.51.00.00	○ Containing nitrates and phosphates	kg	5	0	
	3105.59.00.00	○ Other	kg	5	0	
	3105.60.00.00	• Mineral or chemical fertilisers Containing the two fertilising elements phosphorus and potassium	kg	5	0	
	3105.90.00.00	• Other	kg	5	0	

Source: "ECOWAS Common External Tariff and Other Schedules, Ghana." 2017

Import Process Flow

1. Importer registers his business and/or products with regulatory agencies online.
2. Importer obtains a unique consignment reference (UCR) number online.
3. Importer fills and submits import declaration form (IDF) online. IDF fee is paid electronically via Ghana's trading hub portal using mobile money card (Visa: Gh-Link) or online banking.
4. Importer obtains required import licenses, permit, and certificate prior the arrival of goods. Tariff controlling agency manager determines tariffs based on the Harmonized System (HS) codes. Fees and charges may be paid using existing modes of payment or electronically, as with the IDF fee payment.
5. Shipping lines, or their authorized representative, submit a manifest electronically prior to arrival of goods. The manifest is shared in real time with the Ghana Ports and Harbours Authority (GPHA)[21] and all relevant systems/agencies. Amendments are carried out online. Manifest is reconciled with the Customs Classifications and Valuation Report (CCVR) declaration. Penalties may be paid using existing modes of payment or electronically, as with the IDF fee and tariffs payments.
6. Importer applies for the CCVR online with electronic signature. Licenses, permits, and certificates of regulatory agencies are mandatory for the CCVR application.
7. A risk clearance system determines selectivity of transactions for customs clearance. Compliant Transactions are granted automatic customs clearance without scanning or physical examination. Non-compliant transactions are subject to scanning and further joint inspection.
8. CCVR is issued electronically and transmitted to all relevant agencies/systems.
9. Importer submits Bill of Entry online after transmission of CCVR, in which goods are declared for bonded warehouse if applicable. The application is made online via the bonded warehouse module, complemented by an inventory and bond management system. Duties and fees may be paid using existing modes of payment or electronically via Ghana's trading hub portal using the same system as the IDF fee and tariffs payments.

[21] GPHA: https://www.ghanaports.gov.gh/

10. The Ghana Revenue Authority (GRA)[22]/Customs releases consignment online.
11. Importer/agent submits a request electronically to the shipping lines for delivery of the consignment with the original electronic Bill of Lading. Importer presents the paper Bill of Lading to the shipping line to confirm title of goods.
12. Shipping lines issue an invoice to the importer for payment (invoice covers freight, container deposit, demurrage, and administrative charges as necessary). Importers/agent pays invoice value using the same system as the IDF and other fee payments.
13. After payment, the shipping line issues the Delivery Order to the terminal and the consignees.
14. Importer makes a request to GPHA/Terminal/Inland Container Depot (ICD) to take delivery of the consignment.
15. GPHA/Terminal/ICD assesses shipping line release status and ability to provide service by required date. GPHA/Terminal/ICD generates an invoice.
16. Importer/agent makes payments to GPHA using the same system as the IDF and other fee payments. Receiving bank will send the electronic payment receipt to GPHA/Terminal/ICD.
17. GPHA/Terminal/ICD receives the payment. For compliant transactions, the cargo is positioned for delivery and an SMS/email is sent to the importer/agent for pickup.
    - Alternatively:
        - Goods of non-compliant transactions are scanned. If no anomalies found, the goods are released. Otherwise, the goods are subjected to further joint inspection.
        - Consignment is jointly inspected by all required agencies based on HS codes.
        - If testing is required, testing will be conducted by a nominated testing agency based on agency-agreed Service Level Agreements, on behalf of all with result shared electronically.
        - If anomalies are found, compliance directives are issued.
        - Consignment is seized whenever compliance directives are not met and product maybe properly disposed. In the case of fertilizer, an authorization for disposal is requested by the MoFA, which may determine alternative uses of disposal.
18. GPHA/Terminal/ICD issues a delivery time, and an electronic notification is sent to importer/ agent.
19. GPHA/Terminal/ICD generates e-waybill and sends copy to accompany cargo, which is gated out at Exit Gate.

Movement of Cargo to ICD

- Shipping line prepares and submits Import Container List (ICL) to GPHA for approval.
- Shipping line creates Cargo Movement Report (CMR) on Ghana Integrated Cargo Clearance System (GICCS) platform.
- Customs validates CMR after acceptance by ICD. In case supplementary ICL is required to be treated, the same process of submission and approval is followed as in the main.
- Import containers are loaded on ICD trucks from MPS/Terminal 1 en route to ICD through Western Gate.
- Customs and GPHA Security at Western Gate confirm the status of containers being transferred on GICCS and validate same with trucks and driver ID.
- ICD receives containers into stack and upload status on GCNet platform.

Source: https://www.ghanaports.gov.gh/Files/TEMAPORT/PaperlessRoadMap.pdf

[22] GRA : http://www.gra.gov.gh/

Estimated Fertilizer Use by Crop (1990-1999)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1990-94	1995-99	Growth %
NPK	1,275	n.a.	4,350	3,000	3,912	2,790	1,761	5,769	3,917	961	12,537	15,198	
Urea	2,010	n.a.	0	0	0	425	95	185	50	0	2,010	755	
MOP	0	n.a.	200	1,000	1,250	1,700	2,250	2,725	1,548	3,253	2,450	11,476	
Oil palm	3,285	n.a.	4,550	4,000	5,162	4,915	4,106	8,679	5,515	4,214	16,997	27,429	5
Share	0.1		0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.2	
NPK	638	n.a.	2,175	1,500	1,956	1,395	881	2,885	1,959	480	6,269	7,599	
AS	2,500	n.a.	11,500	7,600	8,500	9,000	5,320	10,700	13,265	4,800	30,100	43,085	
Urea	16,080	n.a.	0	0	0	3,400	760	1,480	400	0	16,080	6,040	
Other NPK	17,000	n.a.	3,000	0	0	0	2,830	17,850	8,800	400	20,000	29,880	
Cotton	36,218	n.a.	16,675	9,100	10,456	13,795	9,791	32,915	24,424	5,680	72,449	86,604	2
Share	0.8		0.6	0.5	0.4	0.5	0.5	0.6	0.6	0.3	0.6	0.5	
NPK	1,488	n.a.	5,075	3,500	4,564	3,255	2,055	6,731	4,572	1,121	14,627	17,731	
KNO	0	n.a.	0	560	20	2,190	900	1,083	3,597	5,531	580	13,301	
Urea	2,010	n.a.	0	0	0	425	95	185	50	0	2,010	755	
Tobacco	3,498	n.a.	5,075	4,060	4,584	5,870	3,050	7,999	8,219	6,652	17,217	31,787	6
Share	0.1		0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.3	0.2	0.2	
NPK	850	n.a.	2,900	2,000	2,608	1,860	1,174	3,846	2,612	640	8,358	10,132	
MOP	0	n.a.	200	1,000	1,250	1,700	2,250	2,725	1,548	3,253	2,450	11,476	
Pineapple	850	n.a.	3,100	3,000	3,858	3,560	3,424	6,571	4,159	3,893	10,808	21,608	7
Share	0.0		0.1	0.2	0.2	0.1	0.2	0.1	0.1	0.2	0.1	0.1	
Total	**43,850**		**29,400**	**20,160**	**24,060**	**28,140**	**20,370**	**56,164**	**42,317**	**20,439**	**23,494**	**33,485**	**4**

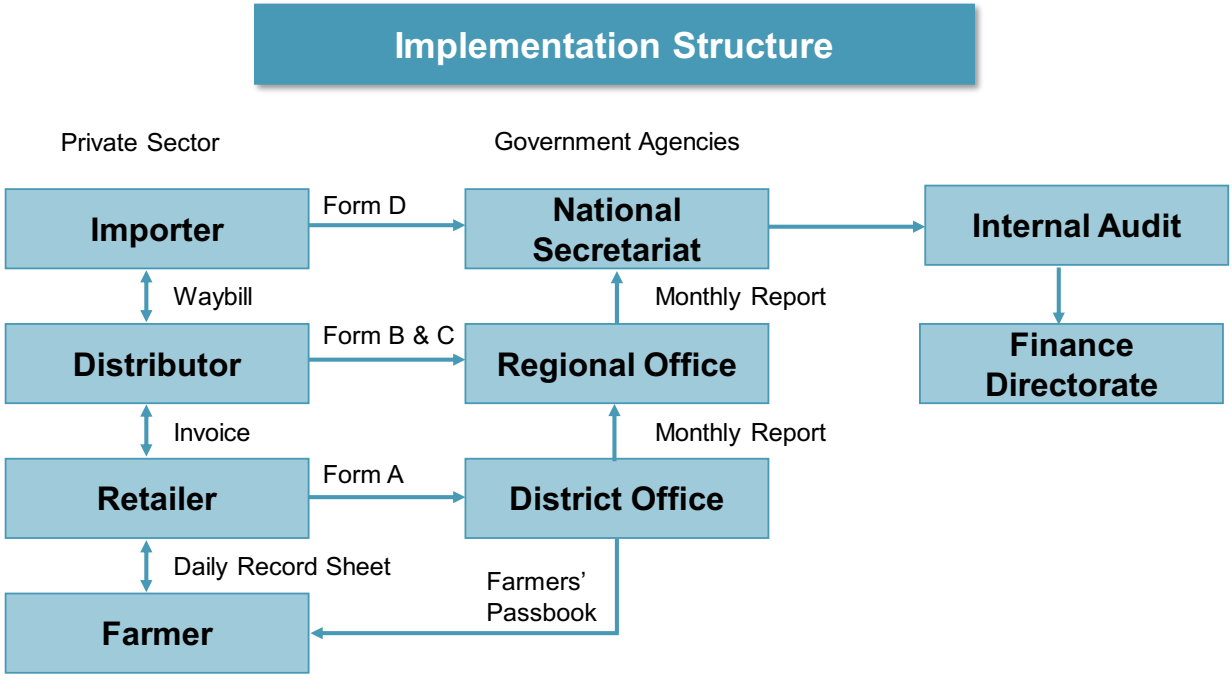
Source: MoFA, Crops Services, and Wienco.

Nutrient Removal Factors to Estimate Fertilizer Requirements

Crops (METASIP target crops are bold)	Incremental Crop Production ('000 mt)	Nutrient Removal (kg/mt of production)			Incremental Nutrient Removal ('000 mt nutrient)
		N	P_2O_5	K_2O	
Cassava	4,978	1.15	0.39	1.50	15.08
Maize	601	14.16	6.19	3.59	14.39
Yam	1,996	2.88	1.47	7.20	23.07
Rice	126	12.30	5.81	4.84	2.89
Total (METASIP)					**55.43**
Cocoyam	668	1.15	0.39	1.50	2.02
Sweet potato	234	5.20	2.30	10.00	4.09
Plantain	936	2.08	0.78	5.99	8.28
Millet	61	19.18	7.22	4.39	1.88
Sorghum	134	16.59	6.77	4.14	3.68
Soybean	16	59.03	13.84	16.69	1.43
Groundnut	128	39.64	7.48	6.27	6.83
Tomato (rainfed)	380	1.25	0.50	2.85	1.75
Tomato (irrigated)	408	1.25	0.50	2.85	1.87
Cashew nuts	9	28.00	7.40	6.44	0.38
Cotton	9	24.61	10.77	14.61	0.45
Coffee	1	40.00	5.00	52.00	0.10
Bananas	13	2.95	0.75	12.54	0.21
Sugarcane	57	1.00	0.63	1.75	0.19
Tobacco	1	28.00	5.00	52.00	0.08
Beans, green	9	37.15	10.56	16.31	0.58
Other crops					**33.84**
Total (all crops)					**89.27**

Data source: MoFA and authors' calculations using removal factors from research stations.

2017 Fertilizer Subsidy Model of the Planting for Food and Jobs Program



Source: MoFA, 2017

Fertilizer Allocations by Fertilizer Suppliers Under the PFJ Program (2015-2018)

Company	2015	2016	2017	2018	*NPK 2018*	*Urea 2018*
Chemico Limited	40,000	50,000	30,000	40,000	*26,667*	*13,333*
AMG Limited	20,000	40,000	45,000	50,000	*33,333*	*16,667*
Afcott Ghana Limited	20,000	40,000	35,000	36,000	*24,000*	*12,000*
Yara Ghana Limited	60,000	10,000	10,000	13,000	*8,667*	*4,333*
LDC (as Macrofertil in 2018)	20,000	10,000	10,000	8,000	*5,333*	*2,667*
Iddisal Company Limited		10,000	10,000	15,000	*10,000*	*5,000*
ETC Agro Ghana Limited		10,000	5,000	13,000	*8,667*	*4,333*
RMG			10,000	13,000	*8,667*	*4,333*
ETG Ghana Limited	20,000					
OmniFert			15,000	3,000	*2,000*	*1,000*
Olam Ghana Limited		10,000				
Centroid			5,000	5,000	*3,333*	*1,667*
Garnoma			5,000	3,000	*2,000*	*1,000*
Adwenkese				3,000	*2,000*	*1,000*
Agrovolex				3,000	*2,000*	*1,000*
Beft Agro				3,000	*2,000*	*1,000*
Chemplan				3,000	*2,000*	*1,000*
Chobi				3,000	*2,000*	*1,000*
Colvin Services				3,000	*2,000*	*1,000*
Demeter				3,000	*2,000*	*1,000*
Dizengoff				3,000	*2,000*	*1,000*
GloFert				3,000	*2,000*	*1,000*
Lumba Prod.				3,000	*2,000*	*1,000*
MC AGRO				3,000	*2,000*	*1,000*
Mes-Bre				3,000	*2,000*	*1,000*
Nanam Vent.				3,000	*2,000*	*1,000*
Nbula				3,000	*2,000*	*1,000*
Oklaw				3,000	*2,000*	*1,000*
Prime Pacific				3,000	*2,000*	*1,000*
Sidalco				3,000	*2,000*	*1,000*
Sub-total fertilizers	**180,000**	**180,000**	**180,000**	**253,000**	***168,667***	***84,333***
ACARP			7,000			
Yayra Glover Ltd.			3,000			
Sub-total organic fertilizers	**–**	**–**	**10,000**	**–**	**–**	**–**
Total fertilizers	**180,000**	**180,000**	**190,000**	**253,000**	***168,667***	***84,333***

Source: Adapted from MoFA.

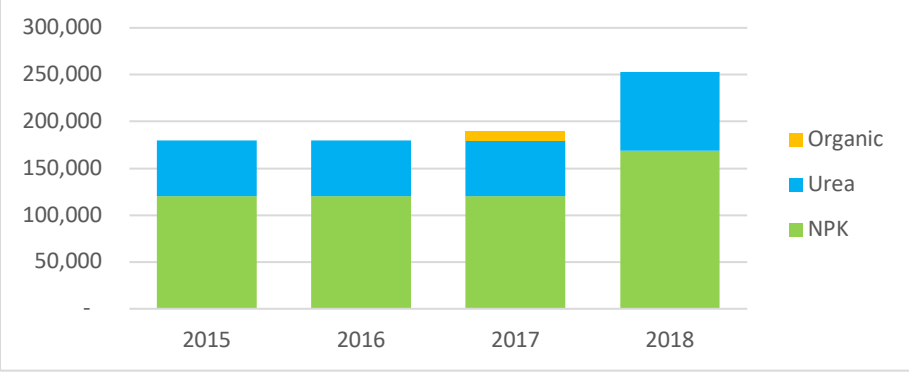


Figure 24. Fertilizer Subsidy Allocations per Type (2015-2018)

Packages Provided in 2018 to Farmers per Crop at 50% Subsidy

Fertilizers (50-kg bags)	Unit Cost (GHS)	Quantity (bags/ha)	Cost (GHS/ha)	Cost (U.S. $/ha)
NPK	68	5	340	74
Urea	63	3	158	34
SoA	40	3	100	22
Fertilizer packages	5 bags NPK + 3 bags urea/ha		498	108
	5 bags NPK + 3 bags SoA/ha		440	96

Seeds of Field Crops (1 kg)	Unit Cost (GHS)	Quantity (kg/ha)	Cost (GHS/ha)	Cost (U.S. $/ha)
Maize (OPV)	4	11.25	180	39
Maize (hybrid)	10	11.25	450	98
Rice	3.5	10	140	30
Soybean	5.5	11.25	248	54
Sorghum	2.5	11.25	113	24
Groundnut	5.5	11.25	248	54
Cassava	7.3	25	730	159

Vegetable Seeds (100 g sachet)	Unit Cost (GHS)	Quantity (sachet/2 ha)	Cost (GHS/ha)	Cost (U.S. $/ha)
Tomato	29	188	110	24
Pepper	35	75	53	11
Onion	29	1,500	870	189
Cabbage	19	375	143	31
Carrot	22	450	198	43
Cucumber	24	300	144	31
Lettuce	19	425	162	35

Cost of Packages Provided to Farmers			Cost (GHS/ha)	Cost (U.S. $/ha)
Lowest cost	Pepper seed + NPK + urea		550	120
	Pepper seed + NPK + SoA		493	107
Highest cost	Onion seed + NPK + urea		1,368	297
	Cassava cuttings + NPK + urea		1,310	285

Source: Adapted from MoFA.

Key Principles and Proposed Actions to Design Smart Fertilizer Subsidy Programs

Below are 13 broad guiding principles to follow and 36 proposed actions on how to apply them.

1 – INCLUSIVE PARTICIPATION

Promote private sector development and participation.

1. Involve key stakeholders during the design of subsidy programs (public-private partnership).
2. Consult with all major actors or stakeholders during implementation to document challenges that arise and their potential solutions as the process evolves.
3. Promote private sector participation by making it easy to register as a business and building their capacity.

2 – SPECIALIZATION

Roles of all participating actors should be defined and assigned on the basis of specialization and comparative advantage to achieve complementarity and exploit potential synergies.

4. Focus Government interventions on the sovereign roles of the State related to creating an enabling environment, setting relevant policy and regulatory frameworks, and coordinating program implementation.
5. Establish regular consultation forums with countries with common land borders to avoid adverse effects resulting from subsidy program implementation (e.g., subsidized fertilizer sold across borders for profit due to differences in prices resulting from different subsidy rates).
6. Leave production, importation, and distribution of fertilizers to the private sector.

3 – FAIR COMPETITION

Promote competition between private suppliers in order to drive down costs of delivering subsidized fertilizer and increase quality of services provided to farmers.

7. Establish fair, objective, and transparent selection system (tender).
8. Eliminate any barriers to entry into market by new fertilizer businesses.
9. Design a tender selection process that incentivizes the development of West African suppliers (subregional, national and local) in a sustainable manner.

4 – EFFICIENCY

Use economic efficiency (cost reduction, profitability, economies of scale, etc.) as the basis for fertilizer promotion efforts.

10. Favor market-based solutions that do not undermine incentives for private investment.
    In application of Article 1 (defining fertilizer “distributor” and “licensing”) and Articles 11, 12, 13, and 14 (relative to functions of fertilizer producer, importer, and distributor) of ECOWAS Regulation C/REG.13/12/12.
11. Encourage linking delivery of subsidized fertilizers with the more efficient fertilizer and other input delivery systems associated with cash crops (cotton, cocoa, oil palm, coffee, etc.), so that (i) cash crop producers also receive fertilizer/inputs for their food crops and do not use those intended for cash crops and (ii) other nearby subsidy beneficiaries receive fertilizers at the lowest cost, ensuring higher productivity for all crops.
12. Establish results/performance-based and yearly assessed multi-year contracts with selected suppliers to ensure timely fertilizer production, importation, and distribution at affordable costs.

5 – BETTER TARGETING (EQUITY)

In pursuit of equity, improve targeting by using a mechanism/approach involving village communities, local administration and authorities, and farmer organizations that ensures right beneficiaries (producers, areas, and crops) are properly identified and effectively reached.

13. Give priority to/target farmers not using fertilizers but potentially profitable (low credit but good fertilizer response), vulnerable producers and promising supply chains, especially for food crops. Reliable agricultural census data may be necessary.
14. Avoid/minimize displacement of commercial sales (crowding out) by subsidized fertilizers that distort fertilizer markets. Avoid areas with already established commercial private sector channels.
15. Avoid providing subsidy to areas with low fertilizer response rates; such areas require research and extension on relevant technologies more than subsidies.
16. Use of voucher systems and other ICT tools to reach proper targets is a workable option, through private sector participation.

6 – TRANSPARENCY

Ensure transparency in overall targeting and distribution system.

17. Monitor field distribution of subsidized product with the involvement of village communities, local administration, representatives of target farmers; compared to the current mainly manual systems, many new ICT-based ones can more easily and better track field delivery of products to targeted producers, if properly implemented and adapted.

7 – TIMELINESS

Rigorously plan and implement program early enough to avoid delays in timely delivery of subsidized fertilizers at affordable costs, to reduce uncertainty and unpredictability with subsidy programs.

18. Plan ahead the full program based on the crop calendar, and not on political considerations, as is often the case, and respect and enforce deadlines from program design to implementation. The early adoption of a national budget, including that of agriculture, is a favorable step.
19. Publish information on subsidy timing, amounts of fertilizers and subsidy rates to be adopted well ahead of the season; publish delivery dates and time in advance of the season.
20. Clearly state and announce tender process and rules early enough, especially announcement of subsidy well before planting time.

8 – APPROPRIATE AND QUALITY PRODUCTS

The formulations and quality of subsidized fertilizer should meet requirements established by the relevant research recommendations and regional fertilizer regulations, respectively.

21. Ensure that the most updated fertilizer recommendations by crop and agroecological zone exist for areas where the program will operate and that the existing fertilizer private sector can produce/procure appropriate formulations before tendering for fertilizers to be furnished by the program. Support for the development of soil fertility and fertilizer recommendation maps is necessary to determine these formulations.
22. Put in place conditions for adopting and enforcing ECOWAS fertilizer regulations so that subsidized fertilizers meet quality (types, formulations, weight, labeling, etc.) specifications.
23. Encourage balanced nutrition including micronutrients as reflected in the products that are imported and/or blended for subsidy.

9 – PROPER INCENTIVES

Favor market-based measures that do not undermine incentives to private sector investments. For example, delayed payment to suppliers affects (i) private sector investment in markets, (ii) farmer participation in fertilizer markets and hence (iii) yields and area planted.

24. Consider options, including guarantee funds, to avoid late payment to importers/distributors of the subsidized portions of the fertilizer prices.
25. Establish an "escrow" account where funds are set aside before the season to be used strictly to pay importers and distributors in a timely manner; these funds should be protected from withdrawal other than for the intended purpose.
26. Use IT to better track allocated fertilizer to ensure it goes to intended beneficiaries, for real-time verification, reconciliation, and reporting of sales by distributors so that payment can made on time to suppliers.

10 – COMPLEMENTARY INPUTS

Promote fertilizer product as part of a wider strategy that includes complementary inputs (and strengthening of markets).

27. Associate fertilizer with appropriate complementary inputs (seeds, equipment, irrigation, integrated soil fertility management [ISFM], etc.) in a package to be promoted, along with provision of proper information and training.

11 – EXIT

Devise a clear exit strategy to limit the time period of public interventions.

28. Embed a clear time- and objective-bound exit strategy that gradually moves the program from current to future beneficiaries (producers, areas, crops) in real need for subsidy until the program is completely phased out, since public funds are limited and have competing needs.

12 – SUSTAINABILITY

To emphasize sustainability of gains in input use and crop yields as the goal when designing the program, tie it to other public investments to support current beneficiaries and product suppliers.

29. Link program to public investments that:
    i. ensure access to other yield-enhancing inputs to research and advisory services that maximize the efficiency and profitability of fertilizer use;
    ii. encourage savings schemes and remove barriers to access finance/loans by input dealers; and
    iii. improve physical infrastructure (irrigation, transport, storage, processing, and marketing) that increases the profitability of fertilizer distribution and use and adds value to farm produce.
30. Fund program with domestic resources to improve efficiency and encourage phasing out and eliminating unneeded subsidy programs.
31. Encourage increased participation of the private sector in subsidy programs for sustainability of system.
32. Ensure that government provides regulatory and quality control oversight.
33. Encourage development of regional (ECOWAS) market for both produce and inputs.

13 – ACCOUNTABILITY

Impacts of the use of public resources in the subsidy program should be objectively and rigorously studied and established.

34. Establish regularly updated farmer/crop databases from reliable agricultural censuses and continuous farm surveys.
35. Monitor program for reliable and accessible data on the basis of specific indicator variables.

36. Conduct evaluations of entire program after each season to gather lessons learned for improvement; possibly establish an independent technical committee involving the public and private sector and the civil society to carry out the impact assessment studies. This will assess performance/impacts against measurable benchmarks (productivity, adoption, private sector involvement, efficiency, etc.). M&E or cost-benefit analysis will reveal the true costs of subsidy and deter over-invoicing on procurement, transport etc. This exercise may lead to encourage private sector participation especially if public funds are limited or constrained.

Source: IFDC, 2017

List of Companies/Institutions Met/Interviewed

No.	Company / Individuals	Location
1	OmniFert (Plant)	Tema
2	GloFert (Head Office)	East Legon
3	MoFA (Subsidy Program)	MoFA
4	OmniFert (Head Office)	Labone
5	Dangbe West Mango Farmers Association	Ayikuma
6	Lawyer Farms (Mango)	Somanya
7	Albe Farms (Pineapple)	Nsawam
8	Macrofertil	Tema
9	AMG	Dzorwulu
10	Yara Ghana	Airport Residential
11	PPRSD	Airport
12	Chemico	Tema
13	Global Haulage	Achimota
14	Peasant Farmers Association of Ghana	Kotobabi
15	Customs	Tema Port
16	Agromonti Ltd.	Madina, Accra
17	RMG	Airport Residential
18	IFPRI	CSIR Campus
19	GAIDA vice chairman	Tamale
20	Badu Kaakyire (CEO)	Kaakyire Agrochemicals Ltd.
21	Addai Frimpong (Accountant)	Kaakyire Agrochemicals Ltd.
22	Kofi Sefa (CEO)	Sefa and Jane Agrochemicals Ltd.
23	Alhaji Madasivu Amidu	Gawal Agrochemicals Ltd.
24	Alhaji Baba Gonja (Leader)	Amanten Farmer Based Organization
25	Mr. Amaniampong	Kyeiwaah Agro. Co. Ltd.
26	Asante Fabio	Agrochemicals & fertilizer retailer
27	Dr. Dartey (Rice Researcher and Seed Producer)	CSIR-CRI
28	Emmanuel Boateng	Yara Ghana – Mampong
29	James Kese (CEO)	Jackess Agrochemicals Co. Ltd.