Improving Fertilizer Markets in West Africa: The Fertilizer Supply Chain in Mali
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Preface

African governments, in response to the recent oil and food crisis and to Resolution 5 of the *Abuja Declaration on Fertilizer*¹ have been induced to [re-]introduce subsidies as a short-term solution to artificially reduce fertilizer prices and increase its use. Yet, if these subsidies are not managed properly and are implemented in a constrained environment that contributes to inefficiencies and higher fertilizer costs, the introduction of subsidies not only adds to market distortions but also to higher fiscal burdens. Therefore, a primary motivation for this study is to identify key constraints along the fertilizer supply chain and recommend policies to expand fertilizer markets through more efficient distribution and to lower the fiscal burden on governments who wish to effectively increase fertilizer use in their country and in the West Africa (WA) region.

To carry out this work, four country case studies were conducted in 2009 and 2010 to assess the fertilizer supply chain in West Africa. The countries included are Ghana, Mali, Nigeria and Senegal. Field visits were made to each country to assess the domestic supply chain, including fertilizer distribution channels and their associated supply cost structure in order to identify key constraints, analyze them and ultimately recommend policies necessary to effectively remove such constraints, or at least reduce their negative impact, along the domestic supply chain.

This document, part of a series of case studies for the WA region, is based on data and information collected during the country visit to Mali for a rapid appraisal, complemented by literature review and analysis of secondary data. In addition, this and the other country assessments are the basis for and a complement to the document “Policy Options for Improving Regional Fertilizer Markets in West Africa” by Bumb, Johnson and Fuentes (IFPRI/IFDC 2011), which has a broader regional perspective.

Opinions expressed in this paper are those of the authors and not of the International Fertilizer Development Center (IFDC) or the International Food Policy Research Institute (IFPRI).

¹ Resolution 5 of the 2006 *Abuja Declaration on Fertilizer for an African Green Revolution* calls for African governments to improve small/poor farmers’ access to fertilizer through targeted subsidies in favor of the fertilizer sector.
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This study would not have been possible without the collaboration of numerous private organizations, government agencies and individuals who assisted IFDC in collecting data during field visits to Mali. In particular, the authors wish to acknowledge the assistance and contributions of Dr. Mando Sadio Keita, advisor to the Prime Minister, Government of Mali; Wim van Campen (IFDC-Mali); Yves Duplessis, Malian consultant; and other IFDC regional personnel who contributed to accomplish the tasks set forth during the implementation of this study.

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Acronyms

ADIT   Acompte sur Divers Impôts et Taxes
BMS    Banque Malienne de Solidarité
BNDA   Banque Nationale pour le Développement Agricole
CAREC  Centre d’Appui au Réseau des Caisses d’Epargne et de Crédit
CCAE   Commission Centrale pour l’Acquisition d’Engrais
CMDT   Compagnie Malienne pour le Développement des Textiles
CNFA   Citizens Network for Foreign Affairs
CSCRP  Cadre Stratégique de Croissance et de Réduction de la Pauvreté
CVECA  Caisses Villageoises d’Epargne et de Crédit Agricole
DNA    Directeur National d’Agriculture
DRA    Directeur Régional d’Agriculture
FCMRD  Fédération de Caisses Mutuelles Rurales du Delta
GIE    Groupement d’Intérêt Economique
GoM    Government of Mali
GSCVM  Groupement des Syndicats et Vivriers du Mali
JICA   Japanese International Cooperation Agency
KR II  Kennedy Round II Program
OHVN   Office de la Haute Vallée du Niger
ON     Office du Niger
OPAM   Office des Produits Agricoles du Mali
ORIAM  Opérateurs d’Intrants Agricoles du Mali
PACCEM Projet d’Appui à la Commercialisation de Céréales au Mali
PDES   Projet pour le Développement Economique et Social
PRMC   Le Programme de Restructuration du Marché Céréalier
SFD    Système Financier Décentralisé
UN-SCPC Union Nationale d’Approuve Producteurs Sociétés Coopératives du Mali
Introduction

The main focus of this study is on the marketing/distribution networks and cost structure of the domestic supply chain in the Mali fertilizer market. The premise of this assessment is that high fertilizer prices paid by farmers are the result of high transaction costs along the domestic supply chain (in addition to international prices and transportation), perhaps due to an inefficient distribution structure and ineffective marketing—factors that are also constraining consumption and demand. Although we recognize the intricate nature of supply and demand, and therefore the importance of addressing other factors that are also affecting demand and the expansion of the fertilizer market, we expect those factors to be addressed in other studies. However, some of the recommendations made in this document to address issues on the supply side of the fertilizer market to ultimately reduce its price will also have an effect on demand.

The fertilizer market in Mali is the fifth largest in the WA region, representing an average of 10.1 percent of the total fertilizer imported (in nutrients base) in the Economic Community of West African States (ECOWAS) after Nigeria, Burkina Faso, Côte d’Ivoire and Ghana, for the years 2005-2009. Yet the average nutrient fertilizer application rate, estimated at 3.1 kilograms/hectare (kg/ha) in 2009 (FAOSTAT, 2011), is lower than the 2009 regional average of almost 4 kg/ha and lower than other developing regions of the world.

In Mali, the agricultural input market is essentially dominated by fertilizer intended for cotton and rice production. These two crops and their respective production zones (which includes maize and other subsistence crops), consume more than 90 percent of agricultural inputs, including fertilizer. In the case of fertilizer specifically, the level of consumption has been decreasing since the late 1990s (Figure 2), with a spike in 2004. More recently, fertilizer use has decreased relative to 2004 levels and started recuperating thanks to a subsidy introduced by the government of Mali (GoM) in response to the 2007-08 fuel and food crisis, which helped lower the high domestic fertilizer price.

Despite Mali having a natural resource base for producing fertilizer, mainly phosphate rock, the country imports the bulk of fertilizer it consumes. Given the relatively small size of its domestic market like most countries in the WA region, Mali is also a price taker in the international market. Thus, the upward price fluctuation in the international market resulting from the oil and food crisis, explains in part the high price Malians have been paying for fertilizer in the domestic market. This is in addition to the trans-border crossings cost because Mali is a landlocked country. Furthermore, there is evidence suggesting that in Mali, there are market constraints and distortions throughout the domestic supply chain, which contribute about 31.5 percent to the total cost and the price farmers ultimately pay for fertilizer (in addition to an 11 percent cross-border transportation cost for a total of 42.5 percent), relative to the international price. Consequently, the objective of this study is to identify what those constraints are and to what extent domestic costs could be lowered to achieve more affordable fertilizer in the domestic market, if such constraints are removed. This study is also intended for the reader to gain a better understanding of the fertilizer market distribution and supply cost structure in Mali. The report will identify the various cost components along the supply chain, the factors contributing to an increase in fertilizer costs and will shed light on potential ways to reduce distribution cost, improve efficiencies along the supply chain and ultimately reduce fertilizer prices paid by farmers in Mali.

The Fertilizer Supply Chain in Mali

Figure 1 provides a general schematic view of the fertilizer supply chain, i.e., in Mali and the West African region, and highlights the role of the different actors along the chain, as well as the policy, socio-economic and physical environments that may influence their evolution.

Costs that arise from the different steps along the fertilizer supply chain according to Figure 1, contribute to the final price paid by farmers. The final cost is affected by limited access to finance in the domestic banking system; poor infrastructure, especially rural road conditions; inefficient coordination in the acquisition and distribution of credit and fertilizer products; weak and undeveloped marketing and retail networks; and a weak institutional and regulatory environment. If these factors are improved, it will positively affect the functioning of the fertilizer supply chain in Mali and reduce transaction costs while
improving efficiency in the market. Consequently, the need for subsidies could be reduced. Additionally, in the event a subsidy is still required, the improved efficiency would lower the final cost of the subsidy program, reducing also the government fiscal burden.

**Methodology**

To accomplish our objective, the study involved gathering qualitative information and quantitative data through field visits and interviews with private sector traders and government agencies involved in fertilizer procurement and distribution in Mali. Data and information were explicitly gathered to identify the distribution channels and assessed the cost structure along the fertilizer supply chain from importation to the point of final sale. To facilitate the information and data collection process, a local expert on fertilizer markets in Mali was hired to assist with the coordination of country visits and interviews. Data collection involved informal (semi-structured) and formal interview methods. Informal methods were used to gather qualitative information and documentation on the domestic distribution and cost structure of the supply chain, including known constraints and inefficiencies. Formal interviews were conducted to gather cost and price information on the main components of the fertilizer supply chain.

Figure 1. General Fertilizer Supply Cost Structure and Players’ Functions in the Domestic Supply Chain.

Note: The pyramid illustrates the cost structure, the number of actors and their functions along the supply chain.

Source: Authors creation.
This document is organized as follows. First, we review the agricultural and fertilizer policies, and the overall trends of fertilizer markets in Mali in terms of consumption, production and trade (page 3). This section is followed by a detailed assessment of the fertilizer marketing structure and distribution system based on the in-country surveys (page 5). Given the integration of the subsidy in the fertilizer market, this section also provides a description of the subsidy program. Pages 16-22 are about analyzing the market’s performance and conduct along the domestic supply chain. Pages 23-25 identify key constraints and bottlenecks along the supply chain before concluding with policy recommendations needed to address such constraints on pages 26-32.

Agricultural Policy and Fertilizers in Mali

The 2007-12 Malian Government Economic and Social Development Program (Projet pour le Développement Economique et Social – PDES) in support of the Malian Poverty Reduction Strategy (PRS), assigns an important role to agriculture in the social and economic development of Mali. The PDES recognizes that for the agricultural sector to accomplish its role, the proper supply of inputs and the provision of technical assistance are essential. To this end, the government of Mali (GoM) has begun strengthening a program in support of agricultural research and development. However, one of the greatest weaknesses for agriculture development, considering the pressure and ambitious expectations placed on the sector under the PDES, is the appropriate provision of fertilizer and other inputs in terms of quantity and quality at reasonable prices and without delays according to the specific activity production schedule. To this end, the government plans to reinforce the use of fertilizer by further supporting the current input/fertilizer subsidy program and promoting the use of credit for fertilizer among agriculture producers with a stronger involvement of banks and microcredit institutions. This is in addition to strengthening the local capacities of fertilizer production and the rehabilitation of the Tilemsi phosphate plant.

Like many other countries in the region, Mali has a large deposit of phosphate rock in Tilemsi, Tombouctou region, with a potential production capacity of about 36,000 mt/year. In 2007 the Malian government gave Toguna Agro-Industries a concession to reopen the Tilemsi mine, inactive since the early 1990s. The purpose was to produce phosphate rock to be distributed as subsidized fertilizer, for direct application by cotton producers. However, in spite of the high reactivity of the rock, results of this project were not as promising as expected due to technical issues with the use and application of the processed phosphate rock; consequently, farmers were reluctant to continue using it. Due to the poor results, Toguna initiated plans to develop feasibility studies for establishing a fertilizer plant to produce TSP from the Tilemsi phosphate rock. The plant would be located in the Segu region, the largest fertilizer distribution hub in Mali, near the main agriculture centers – the Compagnie Malienne pour le Développement des Textiles (CMDT), Office of the Upper Niger Valley (Office de la Haute Vallée du Niger – HOVN) and Office du Niger (ON) production zones.

According to the PDES program, the estimated needs of fertilizer in Mali in a normal year, are between 140,000 to 175,000 mt. These needs are divided between the cotton complex (40 percent), which is an augmented NPK blended formulation with sulfur and boron (14-22-12-7S-1B), urea (35 percent) and NPK cereal complex (about 16 percent) in the form of triple 15 or triple 17. The remaining 9 percent is composed of DAP (18-48-0) and other formulations. Table 1 presents the main fertilizer products used in Mali.

Fertilizer Imports and Use

Since the early 1960s, importation and consumption of fertilizer in Mali has been increasing. However, imports after the late 1990s started to decline from 156,000 mt in 1998 to about 93,000 mt in a ten-year period. This decrease is attributed in part to a reduction in planted area and production of cotton (as a result of the 1990s cotton crisis), which traditionally absorbed an average of 73 percent of fertilizer consumption for urea and NPK combined. The high consumption of fertilizer for cotton production was in contrast to its relatively small planted area, since about 62 percent of the arable land is planted with cereal grains representing 1 to 2 percent of fertilizer consumption. The most recent sudden drop in fertilizer consumption to 93,000 mt from 150,000 mt, between 2006 and 2008, is attributed to the increase of fertilizer prices during the 2007/08 oil and food crisis. As a result of this crisis, the GoM implemented a fertilizer subsidy program to incentivize its use during the 2008/09 cropping season.
Fertilizer Market Structure and Distribution System

The Market Players

Prior to market liberalization, the public sector was directly involved in procurement and distribution of fertilizer through state agencies like the CMDT for cotton and the rice offices (RO) – OHVN, ON and the Office du Riz Segou – for rice. Since its creation the CMDT has been directly involved in procurement of fertilizer through international tenders and its distribution and the management of credit to cotton producers. This operation entailed establishing a relatively efficient logistics and distribution network.

<table>
<thead>
<tr>
<th>Fertilizer Type</th>
<th>Composition (NPK)</th>
<th>Crops</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urea</td>
<td>46-0-0</td>
<td>Cotton, cereals, sugarcane</td>
</tr>
<tr>
<td>Diammonium Phosphate (DAP)</td>
<td>18-46-0</td>
<td>Cereals</td>
</tr>
<tr>
<td>Simple Superphosphate</td>
<td>0-20-0</td>
<td>Peanuts</td>
</tr>
<tr>
<td>Cotton Complex</td>
<td>14-22-12-7S-1B</td>
<td>Cotton</td>
</tr>
<tr>
<td>Cereals Complex</td>
<td>15-15-15</td>
<td>Cereals</td>
</tr>
<tr>
<td>Sulfate of Potash</td>
<td>0-0-50-18S</td>
<td>Cereals – cowpeas</td>
</tr>
<tr>
<td>Chloride of Potash</td>
<td>0-0-60</td>
<td>Sugarcane</td>
</tr>
<tr>
<td>Natural Phosphate du Tilemsi (PNT)</td>
<td>0-28-0</td>
<td>Cotton, cereals, peanuts</td>
</tr>
</tbody>
</table>

Table 1. Main Fertilizer Product Use in Mali

Source: IFDC data collected during country visits and interviews, 2009.

Figure 2. Fertilizer Imports in Mali

Data Source: FAO and IFDC.
to service the fertilizer market for cotton through an exchange arrangement with cotton producers; cooperatives, successfully integrating the sale and delivery of fertilizer with the purchase of cotton. For the rice sector, fertilizer was also procured through international tenders and supplied to producers through existing private distribution networks. Starting with the production season of 2001/02, the privatization of CMDT was initiated and the process of fertilizer procurement was transferred to farmer organizations, becoming effective in 2008/09. However, this transfer of operations presented difficulties related to credit guarantees for production, the weak financial capability of the existing private distributors and the mastery of the logistics and financial operation of farming organizations. These factors have contributed to the current inefficiencies in fertilizer procurement and distribution, while constraining the sector development.

Over the past 20 years, Mali has made considerable advances on fertilizer market liberalization as a result of economic and structural reforms, giving rise to a nascent private distribution network. This new distribution network has played an increasing role in fertilizer and other inputs importation and distribution, replacing the previous state monopolies – CMDT and ROs. Despite the privatization efforts, the provision of fertilizer today continues to be dominated by the traditional annual tenders launched by producer organizations through new intermediary structures. These structures are more representative of farmers through their respective organizations in which the parastatals CMDT and the ROs still play a central role. Furthermore, the fertilizer market is not operating efficiently because of a lack of coordination among various organizations and institutions involved in the new import and distribution structure, which is a complex and complicated system. These inefficiencies also affect the high cost of fertilizer and consequently reduce demand and supply, resulting in farmers not having access to fertilizer and other inputs in terms of price, quantity, quality and place. This is in spite of Mali having a well-integrated fertilizer acquisition and distribution system.

Currently, the procurement and distribution of fertilizer in Mali integrates most of the stakeholders in the fertilizer supply chain. The process involves the participation of private and public organizations: farmers and farmer organizations, financial institutions, importers, distributors and retailers and the government through the National Director of Agriculture (Directeur National d’Agriculture – DNA) in addition to the parastatal institutions’ technical structures (CMDT and ROs). The CMDT and ROs have traditionally been in charge of providing marketing for agricultural inputs and farmers’ products, and are now in the process of being privatized. Institutions and organizations involved in fertilizer procurement and distribution in Mali are described below.

**Independent Farmers:** There are significant numbers of independent producers not affiliated to any organization, inside and outside the main agricultural zones in Mali. These producers include commercial farmers involved in the production of cash or industrial crops as part of a plantation operation or are independent and non-organized. In addition, there are non-commercial small farmers not within the CMDT and the ROs zones that may not be eligible for credit due to unpaid debts. These farmers are typically located in climatic risk zones and depend on rain for their production activity and consequently face frequent crop failures. Their involvement in the fertilizer supply chain is by filing a caution technique issued by the Regional Director of Agriculture (Directeur Régional d’Agriculture – DRA) to determine fertilizer needs based on the crops and areas to be planted. For these farmers to have access to credit, they must join an organization and provide a credit guarantee to demonstrate their interest in credit and intention of repayment, and as collateral in case of no payment. However, these producers typically do not have such guarantees and consequently are excluded.

**Farmer Organizations** are common in the CMDT and the ROs zones representing individual farmers growing cotton/maize and rice. Their focus is on credit sourcing and application, the centralization of credit and fertilizer needs of individual farmers (based on the caution techniques), and loan repayment responsibility. Some farmer organizations are considered non-solvent, according to the Decentralized Financial System (Systeme Financier Decentralise – SFD) ratings, based on the number of farmer members who have unpaid debts, the rate of repayment and how timely repayment is made. These criteria are the reason the existing organizations tend to group farmers eligible for credit only, while neglecting farmers with negative credit history, in part due to production losses as a consequence of adverse climatic conditions and the cotton crisis.

**Central Commissions** are intermediary structures formed by producer organizations, regional agricultural chambers, the zone technical structures (CMDT and ROs), banks and other financial institutions. The mandate and specific functions of
these commissions include: (1) centralizing the needs of fertilizer from different farmer organizations; (2) organizing the calls to tender and procurement of fertilizer for their respective zones to satisfy farmer needs while achieving economies of scale, reducing the acquisition costs and stimulating competition among providers; (3) reinforcing the negotiation capacities of the actors; and (4) organizing and reinforcing the information/communication and dialogue between actors.

For the cotton and maize production zone, the Group of Economic Interest (Groupement d’Intérêt Economique – GIE) clusters the cotton producers of the National Union of Cotton Producers Cooperative Societies (Union Nationale d’Approuve Producteurs Sociétés Coopératives du Mali – UN-SCPC) with the maize/cereal producers represented in the Group of Cotton and Food Producers’ Unions of Mali (Groupement des Syndicats et Vivriers du Mali – GSCVM) and the OHVN. The SFD and the CMDT serve as technical structures in support of procurement, distribution and production assistance to farmers.

For the rice production zone, the Central Commission for the Provision of Fertilizer (Commission Centrale pour l’Acquisition d’Engrais – CCAE) clusters all farmer groups in the Office du Niger, the SFD and the local agriculture chambers of Niono and Macina. The Office du Niger serves as the technical support structure of the commission and permanently holds the commission secretariat chair.

These commissions (GEI and CCAE) are temporary, assembled annually and led by a council of representatives from each organization in the commission. They were created to reduce or eliminate the inefficiencies of the previous system, which allowed producers to carry debts from more than one cropping season. This situation created aggregated sector debt and defaults of about 8 billion CFA, a disincentive to the banking system to continue agricultural lending without any form of collateral or guarantee.

Decentralized Financial Systems (SDF)/Caisses of Credit are a network of rural micro-financial institutions, part of the central commissions (CCAE and GIE). They provide credit for the acquisition of fertilizer and credit for producer organization members of the central commissions. The SDF functions include: (1) negotiation and signing of loan agreements with the central commissions; (2) follow up the producers’ expression of fertilizer needs to make the necessary loan adjustments; (3) serve as intermediaries to mobilize funds from the banking pool system; and (4) provide loans to farmers.

Council Support Structures/Development Offices are the structures within the central commissions that provide technical support to the councils in determining fertilizer requirements, issue expression of needs and calls to tender and follow-up of credit for producers. Considering the novelty of the process in 2008/09 and the lack of experience of CCAE and GIE, these technical structures were filled by the CMDT and the Office du Niger for cotton and rice zones, respectively, given their expertise in the tender process, procurement and distribution of fertilizer. Mali’s cotton production industry is at the brink of disappearing as a result of the cotton crisis, which contributed to CMDT’s consequent privatization. CMDT has now assumed a primary role and responsibilities under the new fertilizer procurement and distribution structure for cotton (GIE), taking advantage of the existing agro-input distribution experience, network and infrastructure.

Control Structures are the structures within the commissions that control the weight and quality of fertilizer formulations, according to the tender specifications and in conformity with the packaging labels and standards. This is accomplished by taking samples and conducting laboratory analysis of imported products. This practice is not compulsory (mainly due to the lack of proper laboratory equipment and to avoid delays in the delivery of fertilizer) but is performed following requests based on suspicions of adulteration or in the event of litigation between the recipients and suppliers. This structure is led by CMDT and ON, when the need arises.

Banks: Induced by a government guarantee fund the GoM has established a banking pool, channeled through the Malian National Agricultural Development Bank (Banque Nationale pour le Développement Agricole – BNDA), which functions as the pool lead bank. The pool combines funds from the private and public banking system to finance the agriculture sector activities through direct lending to individual farmers and more commonly to farmer organizations. Among the functions of the banking pool are: (1) granting letters of credit (LoC) for financing the importation of fertilizer; (2) financing the central commissions (GIE and CCAE) to provide credit to organizations or producers eligible for credit, or directly to individual producers or farmer organizations considered to be solvent and supported by their own collateral; (3) signing loan agreements; (4) providing financial funds to the SFD; and
The Government initiates and implements agriculture and rural development policies in support of the Poverty Reduction Strategy. The government’s fertilizer policies aim to reduce the cost of fertilizer and of food production while making it readily accessible to producers. This is accomplished by providing price discounts through direct subsidies and by giving access to credit through a government guarantee fund. Thus, importation and distribution of fertilizer by suppliers and consumption by farmers/ agricultural producers is incentivized.

Private Import and Distribution Firms respond to the calls to tender of the CCAE, the GIE and the government through the DNA to supply fertilizer to the organized and non-organized farmers within and outside the rice and cotton zones. In Mali there are several companies, established as importers and distributors with very limited capital and logistics capabilities, which may import fertilizer occasionally (i.e., Agrarian Partner, Faso-Jigi). However, there are three companies that dominate the fertilizer import market in Mali, two of which enjoy good rapport with government officials, especially with the DNA, manager of the subsidy program. These companies are subsidiaries of fertilizer producers or international marketing firms established in country or local companies that have developed close relationships with their international counterparts and the in-country private business network for the importation and distribution of fertilizer. Due to the highly politicized/non-transparent tender process, some of the international companies represented in country have been discouraged from participating in the tenders; instead they cater mainly to the reduced open market. These importers are described below.

Toguna Agro-Industries is a newly formed company with French capital that has been in full operation since 2007. It is perhaps the largest importer and a major player in the fertilizer importation and distribution market in Mali with about 50 percent of market share. The company also has a regional presence by supplying neighboring countries: Burkina Faso, Senegal, Guinea Bissau and Côte d’Ivoire. Their main activities include fertilizer importation and transportation, blending and distribution. They have a blending facility in Bamako, considered one of the largest in the WA region. They have their own truck fleet to import raw material from Abidjan and Dakar ports, and a small technical/sales team to support the distribution and retail network.

Their main Malian agriculture sector market is cotton-maize and rice through the CMDT, Office du Niger and Segu and the OHVN.

Yara-Mali is the second largest importer of fertilizer in Mali. Recently, Yara International acquired Hydrochem based in Abidjan, Côte d’Ivoire, one the largest regional blending operations in WA along with Toguna Agro-Industries. Yara-Mali imports its blended products from Yara/Hydrochem, which ships the products to the regional warehouses of CMDT and the rice offices in Mali. Yara-Mali does not own a distribution system. Like Toguna, Yara-Mali makes use of the domestic distribution and retail network to supply its fertilizer outside the organized rice and cotton-maize zones. They compete with discounted prices to retailers, to allow a mark-up on their products so that retailers make a profit.

La Cigogne/SCP-A-SSI, a French-based company with a regional presence in WA, plays a minimal role in fertilizer importation and distribution in Mali. They supply non-subsidized fertilizer to non-organized producers outside CMDT and rice zones. Their main customers are commercial producers and small farmers, who typically do not have access to credit; consequently, their market is very small. Their importation and distribution activity is concentrated in pesticides, where there are fewer restrictions and, according to them, the process is less politicized.

In 2009, these three companies were responsible for the importation of about 97 percent of expressed fertilizer needs in Mali. Toguna Agro-Industries dominated with a 50 percent market share. Yara/Hydrochem had 47 percent and the remaining three percent was imported by other small and sporadic importers: La Cigogne and aid-in-kind, e.g., fertilizer donated by the Japanese International Cooperation Agency (JICA) under the Kennedy Round II (KRII) Program. Yara/Hydrochem and Toguna Agro-Industries supply mainly the cotton and rice zones through their respective procurement and associated distribution structures and to non-organized farmers through the national distribution network where La Cigogne competes.

Private Distribution Network: Most importers in Mali do not have their own distribution network, but rely on the national distribution system. The private national distribution network serves mainly the producers outside the organized rice and cotton zones: farmers growing rainfed crops or in natural flooding areas. They also served those farmers in the rice and cotton-maize zones who are not part of
organizations or have been excluded because of their lack of credit and, consequently, have to rely on their own cash to purchase fertilizer. According to industry representatives and government officials from the Mali Prime Minister’s office, it is estimated that the potential demand outside the organized rice and cotton zones is about 50 percent of the total fertilizer needs, accounting based on caution techniques.

Wholesalers are more numerous than importers. The greater number of wholesalers is attributed to the fact that at the beginning of the fertilizer liberalization process, many merchants designated themselves importers to take advantage of the potential profitable opportunities offered by the importation and distribution of fertilizer. However, they have been unable to develop the technical capacity (in agriculture and business) to manage the activity and, given their limited capacity to import, acquired the fertilizer through major importers. These wholesalers (Arc-en-Ciel, SOMADECO, Faso Jigi, Gnoumani, Agri 2000, Partenaire Agricole, SAD, etc.) are the main ones that participate in the different tenders to provide the fertilizer needs for the GIE, CCAE and the DNA. Their importance is in function of their network size determined by points of sale as well as the number of retailers they provide with fertilizer around the country.

Retailers are small input and fertilizer dealers differentiated by the size and volume of sales, typically located nearer rural areas. They are considered the weakest links in the national distribution network given their low numbers and locations in the rural areas. They sell their products to the end user or farmer in the typical 50-kg bags or in smaller quantities, according to the farmer’s need. They rely almost entirely on their own finances since they generally do not have access to bank finance, partly due to their lack of business and managerial skills. Most wholesalers and some retailers are affiliated with the Network of Agricultural Input Dealers of Mali (Opérateurs d’Intrants Agricoles du Mali – ORIAM), which is the advocacy organization that represents Mali’s agricultural input suppliers and promotes the professionalization of businesses, among other activities. Currently, due to its financial limitations, ORIAM’s role in the fertilizer market is confined to lobbying among the government and donor organizations. In an effort to improve agro-dealers capacity, CNFA has been implementing a training program to strengthen their agricultural technical and business managerial skills.

The Distribution Channels
Most fertilizer procurement and distribution in Mali is in response to private and public tenders and heavily reliant on the demand estimation from the cotton and rice sectors, and to a lesser extent from the non-organized sector (commercial, corn and other grains/crops producers within and outside the cotton and rice zones). These demand estimations follow a bottom-up approach using a caution technique tool issued by the DNA, in which farmers are asked to estimate their fertilizer needs based on the expected planted areas and crops. These needs are totaled at the farmer’s organization and then at the intermediary structure (GIE and CCAE) levels, which aggregate the cotton-maize and rice zones needs, before launching the calls to tenders. As previously explained, there are numerous local companies that have been designated as importers and respond to the calls to tender; however, only three companies, some with close links to the international fertilizer market, do the procurement and importation. Therefore, although there is a dominance of two companies in fertilizer importation, the tender seems to be more competitive with the participation of a larger number of companies.

At the beginning of the agricultural production season, the CCAE and GIE organize and issue calls to tender on behalf of farmer organizations, based on global needs, to supply fertilizer in their respective zones. These calls to tender are an aggregated order to suppliers, chosen by common consent of the farmer organizations. The intent is for farmer organizations to benefit from favorable prices, as a result of economies of scale, from large orders rather than from smaller individual organization orders. Once fertilizer has been imported, its procurement and distribution follows all or just one of the three differentiated channels according to the management/supervisory structure determined by the production zones, the farmer organizational structure and the accessibility to credit. These channels can be categorized by the:

- Rice production zones led by the CCAE.
- Cotton production zones led by the GIE.
- Independent small farmers/producers of staple food crops led by the DNA and commercial plantations.

For those farmers outside or even within the rice and cotton zones, not organized, and non-eligible for credit under any of the known structures (CCAE, GIE, DNA) and according to SDF and the RDAs, the procurement and provision of fertilizer is left to the initiative and entrepreneurship of distributors and
the private retail network. Figures 3, 4 and 5 show the various fertilizer procurement and distribution networks as previously described.

For the *rice zones* (Office du Niger and the other ROs) under the CCAE, the importation/provision of fertilizer is dominated by Yara-Mali, which in the 2008/09 season supplied about 90 percent of farmers’ needs as expressed in their caution techniques. These imports are channeled through wholesalers who have designated themselves as importers and, as such, have participated in the CCAE tender, but given their limited capacity to import they acquire the fertilizer from major importers. The wholesalers adjudicated by the CCAE tender are required to deliver the fertilizer directly to the rice cooperative warehouses, where it is distributed among rice producers according to their caution techniques. Figure 3 is a representation of the rice fertilizer distribution system under the CCAE system.

In the *cotton zone*, provision of fertilizer is also dominated by imports from Yara-Mali, which supplied about 62 percent of their needs as expressed in the caution techniques during the 2008/09 season. The wholesalers participating in the GIE tender also typically participate in the rice tender. They

Figure 3. Rice Zone Fertilizer Distribution Structure in Mali
are required to deliver the fertilizer to the CMDT regional warehouses, which in turn deliver it to the cooperative warehouses in the rural villages. Cotton and maize producers collect the fertilizer from the coop warehouses, according to their caution techniques, and on a credit basis. Under the GIE regulations, the fertilizer for maize production in the cotton zone is restricted to an amount equal to two times the planted area of cotton (e.g., if a farmer plants one hectare of cotton, s/he can request the fertilizer required for one ha of cotton and two ha of maize). The reason behind this restriction is that the financing of fertilizer for maize is tied to cotton production and counts for the total fertilizer credit (for cotton and for maize combined) requested by a producer in the caution techniques. Figure 4 is a representation of the cotton and maize fertilizer distribution under the GIE system.

Figure 4. Cotton and Maize Zone Fertilizer Distribution Structure in Mali
The DNA organizes a tender to supply fertilizer to independent cereal producers (maize, rice and wheat) who are eligible for credit according to the RDAs. The DNA estimates fertilizer needs with the collaboration of the RDAs for the regions outside of the rice and cotton zones, and the CMDT and ROs for the non-organized farmers within the cotton and rice zones. The wholesalers participating in the tender are typically the same as in the cotton and rice tenders. The provision of fertilizer under the DNA tender is dominated by Toguna Agro-Industries, which supplied almost 100 percent of the needs as expressed in the caution techniques in the 2008/09 season, in compliance with a provision contract signed with the government in 2008.

Under the DNA system, fertilizer is supplied through the national retail private network in the open market for producers not elected for credit according to the RDAs, whether within or outside the CMDT and ROs zones, mainly for those with their own finances. In an effort to ensure physical access to fertilizer by these producers, the DNA provides suppliers with the potential needs based on the caution techniques and other estimates. The DNA incites suppliers to make fertilizer available to producers by assuring the reimbursement of the subsidized component for the fertilizer sold. Figure 5 is a representation of the fertilizer distribution for farmers under the DNA distribution system.

Figure 5. Fertilizer Distribution Structure for Areas outside the Cotton and Rice Zones in Mali
The portion of fertilizer being supplied in an “open” market is considered negligible, since this market consists mostly of small subsistence producers of staple food crops that are not organized, within and outside the main production zone. These producers are located in marginal lands and face adverse climatic conditions that determine their level of risk in production, and consequently are cash poor.

The lack of or no access to credit by most farmers is a deterrent to importers and suppliers to provide additional fertilizer within the organized GIE, CCAE and the DNA tender systems. Consequently, independent small farmers, producers of staple and food crops, whether within or outside the main production zones, must acquire their fertilizer directly from the private sector distribution network. Some of these farmers may include producers of commercial crops, which explains why some of the subsidized fertilizer destined for the production of food crops may be diverted to the production of commercial crops. This is an important concern because the subsidy is intended to support the small producers of staple food crops to increase food production and food security in rural areas.

Implementing the Provision of Fertilizer

As previously implied, most of the fertilizer in Mali is procured in an open market based on a tender-bid process and distributed under a subsidized system for producers located in the main production zones, that are organized and eligible for credit, according to the banking system. However, some farmers determined ineligible by the banking system, based on their credit ratings, may be eligible for credit according to the DNA, whether they are located in or outside the main production zones. The MoA (through the DNA) helps in procurement and distribution of fertilizer based on a tender-bid process also.

In Mali, a high percentage of fertilizer is subsidized. Its procurement and distribution is based on the CCAE, GIE and DNA tenders, and follows different distribution channels according to the type of crop being produced and the different climatic/production zones. The distribution of credit and of fertilizer also takes in consideration whether producers are organized under one of the management/supervisory structure. The quantity supplied under the tender-bid process represents about 50 percent or slightly more of the expressed total needs according to the caution techniques. This does not consider the needs demanded by commercial crops outside the subsidy program, which represent a small quantity relative to the total subsidized plus non-subsidized fertilizer. The tenders do not include a large number of farmers that lack credit and consequently have been left out of the organizations within and outside the cotton and rice zones. Consequently, they are not accounted for in the GIE and CCAE tender, but some may be included in the DNA tender.

Across the production zones, there are differences in the programming approach for the provision of fertilizer. This programming is linked to the management/supervision structure for fertilizer acquisition and distribution and to the production support structure in place for agriculture activities (cotton, rice, cereal grains, etc). Programming the provision of fertilizer consists of several phases:

a. **Expression of farmers’ needs**, which consists of filing a caution technique issued by the DNA in collaboration with the RDAs in the non-organized farmers’ areas, and with the CMDT and ON in the cotton- and rice-organized zones. These needs are channeled through the farmer organizations in the rice and cotton zones and through the DRA in the areas outside the zones and the non-organized producers within the cotton and rice zones.

b. **Centralization and validation of needs** is corroborating the requests on the caution techniques and aggregating all the needs, according to the zones. This activity is typically done by the intermediary structures for the cotton and rice zones (GIE and CCAE, respectively) and by the DRA outside the zones and for non-organized farmers within the zones with the support of the CMDT and ON, respectively.

c. **Financing** consists of searching for finance sources, finance negotiation and readjustment of orders according to available finance. This activity is done through the intermediary structures for the cotton and rice zones (GIE and CCAE, respectively). In the non-organized areas outside and even within these zones, this activity is done by the individual farmers, who typically need collateral in order to gain access to finance. The readjustments of orders and the level of finance are generally linked to the production objectives of the government and/or the production zone and to available funds from the banking pool. Fertilizer remnants in the farmers’ storage from the previous cropping season are also considered. Financing may also be adjusted based on the selection of farmers’ organizations eligible for credit.
d. Elaboration and launching of the calls to tender involve the selection of a short list of suppliers, analysis of the offers, assignment of contracts and attribution and signing of contracts. These activities are normally done by the intermediary structures for the cotton and rice zones (GIE and CCAE, respectively). In the areas outside these zones there is a mix of call to tender organized by the DRA and a non-tender provision on the part of the private sector distribution network, as previously explained. In the latter case, the provision of fertilizer is left to the good will and entrepreneurial spirit of suppliers, who are assured the payment of the government subsidy for each bag of fertilizer sold.

e. Delivery and reception of fertilizers in the storage facilities as indicated in the contracts, sampling and quality control are activities supervised by the GIE and CCAE technical structures (CDMT and ON, respectively). These structures confirm the delivery of the fertilizer and take samples for quality analysis and control, if necessary. The actual analysis is done typically in Burkina Faso since, at the time of this assessment, Mali did not have a well-equipped independent facility to perform such analysis. Toguna Ago-Industries does have a private laboratory to analyze their product after blending and before packaging. However, there are concerns about using such facilities for the quality analysis and control of the product delivered to GIE and CCAE, due to a potential conflict of interest since Toguna is one of the main fertilizer providers in country.

f. Distribution and delivery of fertilizers to producers are also supervised by the GIE and CCAE technical structures, based on the needs expressed in the caution techniques. If the fertilizer requirements of a farmer increase with respect to the filed caution technique, they have the option to purchase fertilizer in the open market at a non-subsidized price. There is also the option to wait until all other farmers’ requirements have been met, whether within or outside the zones. These requirements are normally met late in the cropping season when they may no longer be needed.

g. Payments to fertilizer providers/suppliers chosen in the tender process (according to the contract) after reception in storage facilities or after delivery to producers are made through the banking system, with the approved credit to the intermediary organizations (GIE and CCAE), against invoices and proof of delivery. The payment consists of the non-subsidized portion of the fertilizer price since the subsidized portion is paid by the government once the provider has filed an application requesting the reimbursement of subsidized funds, with the caution techniques certified by the technical structure of each zone.

This process of fertilizer procurement and distribution under the subsidy program was originally envisioned and developed for the cotton zone; consequently, it is applicable almost in its entirety to the GIE. However, it is partially applicable to the CCAE and not applicable to the areas outside the cotton and rice zones since its application demands a minimum level of organization and more responsibility among individual farmers for credit and fertilizer acquisition, distribution and repayment of credit. In these zones, outside the rice and cotton zones and even with the non-organized farmers within the zones, the supply of fertilizer remains unpredictable. The access and use of mineral fertilizer are considered to be distant needs because of high cost, lack of credit and, in most cases, the precarious conditions of production. These precarious conditions explain in part the lack of interest for the acquisition of mineral fertilizers by producers and for the low or nonexistent demand and supply in these zones.

According to the programming schedule for procurement and distribution of fertilizer in Mali (Table 2), the first few steps of the process (from expression of needs to the granting of the tenders) are done early for the cotton zone relative to the other zones but there is not much difference in the delivery time with the rice zones. The reason for this disparity is because the CMDT, in charge of fertilizer distribution and collection of the harvested cotton, attempts to make efficient use of transportation by eliminating a step in the delivery of fertilizer and the collection of cotton. The CMDT combines both activities during the dry season, when rural roads are more accessible. This practice influences fertilizer prices to the farmers, since the importers procure fertilizer after they have been awarded the tender (in November-December) when prices of fertilizer in the international market are higher. The high cost of procurement in the international market is exacerbated by storage costs and losses when fertilizer is delivered early before the planting season.

For the non-organized farmers outside the cotton and rice zones (Segu, Mopti, some areas in Timbouctou) and even the non-solvent farmers within the cotton and rice zones, the delivery and availability of
fertilizer happens late in the season (July to August) after the needs of the producers in the organized cotton and rice zones have been met. Even if they have purchasing power, it is too late for the crops to make an effective use of fertilizer and, consequently, it is no longer needed. Since the optimal schedule is not applicable to these zones, there is a lack of interest by the banks to provide finance and credit, compounding the lack of interest by the producers to use fertilizer. Table 2 presents a typical schedule for procurement and distribution of fertilizer in Mali, for each of the existing supply structures.

Table 2.  Chronogram for the Provision of Fertilizer in Mali

<table>
<thead>
<tr>
<th>Phases/Activities</th>
<th>Cotton Zone: GIE</th>
<th>Office du Niger and Other Offices: CCAE</th>
<th>Rainfed and Natural Flooding Zones: DNA/DRA and Retail Network</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expression of needs</td>
<td>September (y-1)</td>
<td>December (y-1)/ January (y), during assessment of previous agricultural season</td>
<td>November/December (y-1)</td>
</tr>
<tr>
<td>Centralization, formulation and validation of needs</td>
<td>October (y-1)</td>
<td>January (y)/ February (y)</td>
<td>January (y)</td>
</tr>
<tr>
<td>Search for financing and readjustment of orders</td>
<td>October (y-1)</td>
<td>February (y)</td>
<td>February (y)</td>
</tr>
<tr>
<td>Launching calls to tender, analysis of offers, contracts elaboration, etc.</td>
<td>November/ December (y-1)</td>
<td>March (y)</td>
<td>March/April (y)</td>
</tr>
<tr>
<td>Delivery and receipt of fertilizer, sampling and quality control</td>
<td>March/April (y)</td>
<td>April/July (y)</td>
<td>June-July-August (y)</td>
</tr>
<tr>
<td>Distribution and placement of the fertilizer</td>
<td>April-May (y)</td>
<td>April/June (y)</td>
<td>July-August (y)</td>
</tr>
<tr>
<td>Payment to suppliers</td>
<td>March-April-May (y)</td>
<td>May-June-July (y)</td>
<td>June-July-August (y)</td>
</tr>
</tbody>
</table>

“y-1” is in reference to the agricultural season during the previous year; likewise “y” is in reference to the agriculture season in the current year.

Financing of the Fertilizer Supply Chain in Mali

Financing is an integral part of the fertilizer supply in Mali. Sources and methods of finance at different levels are described here.

Financing Fertilizer at Three Levels by the Banking System

a. Financing for the procurement of fertilizer to providers/wholesalers – Providers (e.g., Arc-en-Ciel, SOMADECO, Faso Jigi), responding to the calls to tender, are required to make bank deposits on behalf of the organization making the call (e.g., GIE or CCAE) to support their application and as an indication of their interest and good intentions to deliver. Consequently, these providers negotiate and request from their banks, or the banking pool led by the BNDA, the opening of a line of credit or overdraft. This is backed by and according to the contractual commitment with the producer organizations’ intermediary structures making the calls to tender (GIE or CCAE). In addition, for a provider to purchase fertilizer from foreign suppliers in the international market or from a foreign firm representative in-country, requires
supporting financing documentation endorsed by a bank, who issues a Letter of Credit (LoC). When the importation is done through a foreign firm representative in-country (e.g., Yara-Mali), the companies normally make use of their internal finance to import fertilizer in response to GIE or CCAE provision contracts, once a contract or a LoC has been issued on their behalf. Access to finance from the private banking system or from the banking pool is provided to Toguna Agro-Industries, backed by a government contract, in support of the government program to supply fertilizer to farmers eligible for credit-in-kind under DNA.

b. Financing to public structures based on the government guarantee – That is the case of financing the intermediary structures that represent farmer organizations like the GIE to make payments to fertilizer providers/importers once the product has been delivered as specified in the contracts. In the case of the GIE, the intermediary structure is responsible for borrowing funds on behalf of the affiliated farmer organizations and for repayment of loans. The GIE selects the providers based on the bids and issues contracts directly with them. The bank loans to the intermediary structures are backed by a government guarantee.

The selected providers, based on the tender and backed by a letter of credit, authorize the importation of fertilizer to be delivered at the locations specified in the contract (i.e., CMDT warehouses). Once fertilizer has been delivered, providers submit an invoice to the intermediary structures (GIE) with proof of delivery. In turn the intermediary structure gives the bank (Malian Solidarity Bank [MBS] or the BNDA) clearance to pay the provider, according to the previously negotiated credit between the intermediary structure and the bank. Then the providers make effective payment to importers through the LoC.

The recoup of the bank credit is typically done through the technical structures (CMDT) that support the GIE, which is also in charge of supervising the proper use of the fertilizer. In the cotton zone, the cooperative members of the UN-SCPC collect the harvested cotton from the farmers. The CMDT, with a credit line from the banking system and using its own transportation, collects the cotton from the cooperatives, processes it and sells it in the international market. The CMDT revenues are deposited in the MBS, which then deposits in the BNDA, after recovering the marketing credit provided to CMDT. The BNDA, after recouping the credit provided to the farmer organizations to finance the purchase of fertilizer, makes payment to the producer cooperatives, who eventually pay the differential to producers.

c. Direct financing to producer organizations for the acquisition of fertilizer is more generalized and common in the Office du Niger zones. In this case, financing is made directly by the main banks in the banking system: banking pool through the BNDA, MBS or through the re-financings of SFD (decentralized financial services formed by networks of local savings and loans). This last option is preferred by the banks since it represents less cost and risk to them.

In the rice sector, the CCAE pools the fertilizer needs of selected organizations based on their credit worthiness to achieve economies of scale and launches the calls to tenders with the intention of negotiating better prices. The CCAE also selects the providers based on the bids and issues the contracts specifying the products and various delivery points. However, although the contractual agreement is between the providers and the CCAE, it is not the CCAE but rather the selected producer organizations or co-ops that are responsible for requesting the credit to pay providers and repay credit to the lending institutions. The credit worthiness of an organization is based on the number of members with unpaid debts.

Once the fertilizer is delivered to the producer co-ops, they are responsible for paying the total cost of fertilizer (including the subsidized part of the price) to providers/importers with a previously negotiated line of credit from the SFD. The co-ops are also responsible for recouping the credit from the farmers and paying the loans back to the SFD. However, farmer organizations under the CCAE are only required to pay the non-subsidized component of the fertilizer price. Therefore, it is the responsibility of the SFD to recoup the government subsidy, incurring an additional financial cost, which the SFD transfers to the borrowers. The finance rate from the banking system to the intermediary structures is eight percent. They, in turn, lend to producers at a rate of 12 percent, which covers the administrative expenses for the intermediary structure.
**Through Special Government Programs**

Under the special government programs, there are two scenarios:

a. The provision of fertilizer has been dependent for many years on aid from Japanese donations (KRII). This fertilizer is distributed through the local distribution network for sale to the producers or by using a supervisory technical structure (CMDT or ON) to be provided on credit or against cash payment from the farmers.

b. The Rice Initiative (RI) is a new government program that expanded the subsidy on fertilizer for cotton, maize and wheat production. Under this RI, the government through the DNA also provides a subsidized credit for the out-of-pocket/cash component, in addition to the price subsidy, to farmers deemed eligible for credit by the DRA. This includes farmers producing under rainfed production systems within or outside the rice and cotton zones. Under this scheme, the DNA determines the needs of fertilizer to be subsidized based on the caution techniques, issues the call to tender, signs contracts with fertilizer providers and provides credit-in-kind to the selected producers, in the form of fertilizer.

The credit provided to eligible producers is equivalent to the differential between the government price subsidy and the fertilizer actual price. This credit does not have collateral and is made against producer/beneficiary promise and commitment to reimburse the loan amount, which can also be an in-kind payment. If reimbursed in kind, they have the obligation to deliver to the DNA office or to the Malian Office of Agricultural Products (OPAM) the quantity of product [i.e., maize or wheat] required to reimburse the credit in fertilizer (principal plus interest) at the prevailing market price.

Payments to fertilizer providers for the subsidized credit (the out-of-pocket/cash component paid by farmers) is made by the Ministry of Economics and Finance, channelled through the BNDA’s banking pool and authorized by the DNA. For providers to recoup the government-subsidized portion of the price, they must follow the same organized cotton and rice sector procedures, which consist of submitting an application to the DNA requesting reimbursement of subsidized funds with the caution techniques certified by the technical structure (DRA, in this case). In turn, the DNA gives clearance or authorizes the bank (BNDA) to pay the provider with government funds from the banking pool.

**Through Farmers’ Own Resources to Purchase Fertilizer in the Open Market**

In this method we have the following farmers:

a. Producers not organized either because of weak production capacity or because of the precarious production conditions (related to climatic variations) and/or the lack of financial resources.

b. Producer members of indebted farmer organizations, considered “not eligible for credit” by the banking system and the DRA.

c. Large producers who can purchase fertilizer on their own without bank finance.

In general, producers who are not eligible for credit and do not have their own funds are officially excluded from the price and supplemental credit subsidies and therefore do not have access to fertilizer. More recently there has been an interest in looking for ways to provide access to fertilizer to producers under this last category, through self-financing by providing incentives to saving.

**Analysis of the Fertilizer Supply Chain Cost Structure**

The analysis of the fertilizer cost structure presented in this section considers all the costs involved along the supply chain (according to the data and information gathered during the country visit late in 2009). This cost/price structure can be divided into two major components: international cost/price and domestic cost. Since the fertilizer market in Mali is relatively small and therefore cannot influence the international price, the country can be considered a price taker in the fertilizer international market, just as most WA countries. Consequently, from the country perspective, the domestic cost components become the most relevant since they can be influenced by government policies and actions. The domestic cost components, which include all charges from entry point at the border until reaching the point of final sale to farmers, will be analyzed in this section. Also, the GoM fertilizer subsidy program is briefly reviewed given its intricacy with the market and the effect on the fertilizer price farmers finally pay.

Fertilizer importers in Mali, as a result of the relatively small quantities imported, typically negotiate with providers for importation Free on Truck at the Dakar port (FOT - Dakar). At arrival, typically the product is already bagged, ready to be placed on importers’ trucks at port and distributed directly to the regional warehouses in the rice and cotton zones, according to specific contracts. Toguna Agro-Industries, using their own transportation,
move the bagged product from Dakar port to their Bamako storage facilities and blending plant to be re-distributed to regional warehouses or for blending. To blend the required formulations, the product is un-bagged and then re-bagged after blending and before being delivered to the storage facilities of CMDT or RO cooperatives, according to the specifications in their contracts. Occasionally, they transport the products in bulk from port to Bamako.

Yara’s process is different, since they receive most of the products in bulk via Abidjan port, where it is loaded into trucks and delivered to HydroChem in Côte d’Ivoire to be blended and bagged before being delivered to cotton and rice zones in Mali. Normally, HydroChem delivers Yara’s product directly to the recipient storages (RO cooperatives or CMDT), as specified in the contracts.

Fertilizer Subsidy

The fertilizer subsidy program in Mali, re-initiated during the oil and food crisis of 2007-08, is an integral part of the procurement and delivery of fertilizer, along with credit and other services. This subsidy program has been evolving in its delivery mechanism, originally with a coupon system that was discontinued due to pervasive corruption, to a direct price subsidy paid to providers, above the subsidized price of 12,500 CFA francs per 50-kg bag of fertilizer paid by farmers with cash or with individual or group credit if eligible. The subsidy control and regulation is done through the DNA and with the participation of the decentralized offices, the DRA, the CCAE and GIE, according to the production zones and crops.

All agricultural producers, whether organized or not, are expected to have access to subsidized fertilizer, provided they participate in filing a caution technique to determine their needs. However, in practice, whether they are organized or not, they may not have access to subsidized fertilizer if they lack cash and do not have access to credit because of unpaid debts. In addition, even the ones eligible for credit, may not be able to acquire the total amount of fertilizer needed according to their crops and planted areas. This may be due to adjustments made to the total needs based on the government production objectives for each crop, the estimated existing inventory of fertilizer in country and the availability of funds from the banking pool to finance the importation and use of fertilizer by farmers. To meet additional needs, these farmers must purchase fertilizer in the open market at a nonsubsidized price if it is available and if they have their own funds.

The latest evolution of the GoM fertilizer subsidy program was in 2009 with the Rice Initiative, which extends coverage to other crops and subsidized credit-in-kind (fertilizer) for the cash or out-of-pocket price component to a select group of farmers rejected by the financial system but considered eligible for credit, according to the DRAs. Under this initiative, the fertilizer subsidy was extended to crops other than rice, cotton and maize and consequently increased competition at the distribution and retail levels to supply fertilizer to those farmers who were not eligible for credit before the initiative.

The sale price to the final consumer varies, according to the products and production zones where the product is being delivered, based on the negotiated price in the tender by the representative farmer organizations (GIE and CCAE) and DNA. This price differential is expected to reflect the competitiveness of procurement under the tender-bid process. Table 3 shows the historical price evolution of selected fertilizer products for the last five years, with the respective percentage price change from one year to another. In addition, Table 4 presents the 2009 prices and the subsidy on a 50-kg bag for selected fertilizer products in Mali.

Table 3. Fertilizer Price Evolution in Mali

<table>
<thead>
<tr>
<th>Fertilizer Product</th>
<th>Price(^a) in US $/50-kg bag</th>
<th>Intra-Year Percentage Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPK 50 kg</td>
<td>$21.10</td>
<td>$25.10</td>
</tr>
<tr>
<td>DAP 50 kg</td>
<td>$19.70</td>
<td>$23.20</td>
</tr>
<tr>
<td>Urea 50 kg</td>
<td>$14.40</td>
<td>$16.10</td>
</tr>
</tbody>
</table>

\(^a\) The exchange rate considered for estimating product price is 461 CFA to US $1.00.

Source: IFDC data collected during country visits and interviews.
Table 4. 2009 Fertilizer Prices and Subsidy per Product and Production Zone

<table>
<thead>
<tr>
<th>Fertilizer Product</th>
<th>Production Zones</th>
<th>Averages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cotton/Maize (GIE)</td>
<td>Rice (CCMA)</td>
</tr>
<tr>
<td>Urea</td>
<td>$35.40</td>
<td>76.6%</td>
</tr>
<tr>
<td>DAP</td>
<td>$36.30</td>
<td>74.8%</td>
</tr>
<tr>
<td>NPK/T-15 (maize,</td>
<td>$42.30</td>
<td>64.2%</td>
</tr>
<tr>
<td>rice)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NPK-Cotton</td>
<td>$44.40</td>
<td>61%</td>
</tr>
</tbody>
</table>

a. The exchange rate considered for estimating the subsidy value and the product price is 461 CFA to US $1.00.
b. The percentage of farmer payment is estimated based on the differential between the market price and the government price of 12,500 CFA (US $27.15) per 50-kg bag, regardless of the fertilizer product.

Table 4 presents average prices for urea, DAP and NPK products: NPK/T-15 commonly used in maize and rice and NPK blend for cotton. These prices vary according to the crop, procurement and distribution structure in the production zones. For example, the market price for NPK-cotton was $44.40, for NPK-rice $40.10 and for independent farmers not organized within and outside the cotton and rice zones, NPK price was $40.50. Out of the market price, farmers paid a price of $27.15 (or 12,500 CFA francs) for each 50-kg bag of fertilizer regardless of the fertilizer product and production zone. The price differential was the government subsidy, above the $27.15 paid by farmers. As such, they received an average government subsidy (across zones and products) of between 17 and 39 percent, for an overall average of 30 percent. In monetary value, farmers received an average subsidy of $17 for NPK cotton complex to about $5.50 for urea. Therefore, the level of subsidy varied depending on the production zone and fertilizer product.

**Fertilizer Cost/Price Structure**

As previously described, the cost structure along the fertilizer supply chain can be divided into two general components: international cost and domestic cost. The international cost is typically composed of product (fertilizer) price/cost in the international market (typically free on board [FOB] price), plus insurance and freight or international shipping charges (Incoterm: Cost, Insurance and Freight or CIF). For this study, we also consider clearance charges as part of the international cost. Domestic cost is the additional inland cost incurred from the border to the point of final sale and includes port charges, vessel unloading and bagging, government charges, finance cost, domestic transportation costs and marketing or distribution margins, excluding inland transportation cost across neighboring countries.

Figure 6 presents the general cost/price structure of four typical fertilizer products imported and consumed in Mali: NPK blend, TSP, DAP and urea. The costs represented in this graph are the average CIF cost between Dakar and Abidjan ports, the in-transit average transportation cost across neighbor countries and the domestic cost components per metric ton (mt) of product. According to this figure, fertilizer costs in Mali increase by more than 40 percent relative to the CIF cost with the neighboring countries in-transit transportation cost included. This cost increase is attributed to (additional and cumulative) inland transportation cost from port to the Mali border plus marketing and distribution costs in the domestic market. The domestic cost contributes an estimated average of 31.7 percent (or $229.8/mt) with a range of 29 percent to 35 percent, of the total fertilizer costs (CIF plus domestic costs). However when considering all inland transportation cost from port outside Mali to a retail point in Mali, fertilizer cost increases by an average of 42.7 percent ($309.20/mt). The 11 percent cost differential is attributed to the in-transit additional transportation cost outside Mali, which is the additional cost for being a landlocked country.

Source: IFDC data collected during country visits and interviews.
Figure 6. Mali Fertilizer Main Cost Components per Metric Ton in US $/mt
Data Source: IFDC estimations based on data collected during country visits and interviews.

Figure 7 presents the sub-components of domestic costs. Based on these estimates in Figure 7, the largest domestic cost component across products (other than port charges and product handling related to vessel unloading and bagging) is finance cost followed by marketing cost and domestic transportation cost. Government charges are the smallest cost components along the whole domestic fertilizer supply chain.

Figure 7. Fertilizer Domestic Cost Components in Mali per 50-kg bag in US $/bag
Data Source: IFDC estimations based on data collected during country visits and interviews.
Finance Cost
In Mali, finance is the highest cost component along the fertilizer domestic supply chain, in spite of being subsidized through a government guarantee fund. Cumulative finance costs along the supply chain account for an estimated average of 27.1 percent across products considered in this assessment, with a range between 24.2 percent and 29.4 percent of the total domestic cost. In monetary terms, these figures represent an average of $3.13 across products, with a range between $2.61 for urea and $3.83 for NPK blend. As a result of government policies, finance is an integral component of the fertilizer subsidy and distribution system. In order for producers to have access to funds and reduce the lending costs and risks to individual banks, the banking system has created a banking pool where private and public banks contribute funds that are targeted to the agricultural sector. The BNDA is the chief bank through which the funds are being channeled. To further reduce this risk, the BNDA lending preference to producer organizations is through other intermediary financial organizations like the savings and loans, backed by some kind of guarantee or collateral, e.g., the assets of farmer organizations or a government guarantee.

In Mali, the interest rate increases depending on the number of intermediaries between the banking pool and the producers, the final beneficiaries of the finance. The interest rate can be as high as 12 to 13 percent for farmers, up from an interest of about 8 to 8.5 percent from the banking pool.

Marketing Cost
Marketing or distribution cost, which includes profit margin, is the second highest domestic cost component along the supply chain in Mali. This cost is typically set by the business owner as a percentage of the total transaction cost, including the product cost, added by each agro-input business owner along the distribution chain. This cost is to cover part of their unaccounted costs and profit or compensation for their entrepreneurial efforts. In Mali the average marketing/distribution cost for fertilizer has been estimated to contribute about 26.8 percent to the domestic cost, with a range between 24.2 percent and 28.8 percent. In monetary terms, these figures represent an average of $3.09 with a range between $2.61 and $3.75, respectively, per 50-kg bag, depending on the fertilizer product being imported and distributed. The breakdown of this cost along the domestic supply chain is not quite clear but, according to industry experts, it is believed that the share of importers is much larger than the share of the domestic distribution network. The estimated breakdown is 16.3 percent (out of 26.8 percent) for importers, while the 10.5 percent differential is shared between the wholesaler and retailers.

Domestic Transportation Cost
Domestic transportation cost, which includes trucks loading and unloading cargo at the point of origin and destination, respectively, is the third highest cost component along the domestic supply chain in Mali. This cost represents an estimated average of 25.1 percent of domestic cost, with a range between 22.1 percent and 26.6 percent. In monetary terms, these figures represent an average of $2.87 per 50-kg bag across all products. The estimated average inland transportation cost from Bamako to all the regions in Mali is US $0.087/mt/km (or about US $0.14/mt/mile), which could be further reduced if roads and transportation equipment are improved.

Most products that enter Mali incur additional land transportation costs across neighbor countries after the entry port. When considering all inland transportation costs from port to retailer point (including in-transit transportation outside Mali), transportation costs more than double relative to the domestic cost, to an average of $6.84 per 50-kg bag. This is becoming the highest inland additional cost along the fertilizer supply chain from import port outside Mali to retail point inside Mali, followed by finance cost and distribution cost. The $3.97 per 50-kg bag of transportation cost differential is attributed to the in-transit transportation from Dakar/Abidjan to the Malian border. This estimation corroborates other findings with respect to high transportation cost in Mali. Mali’s geographical position as a landlocked country results in higher costs. Rail transportation from Dakar to Bamako, when available, costs about 30,000 to 32,000 CFA francs/mt, compared to about 50,000 CFA francs by truck. This average transportation cost is highly influenced by transportation from Abidjan to Bamako, which includes additional non-official escort charges amounting up to 100,000 CFA per truck load of 40 to 60 mt. These charges were the result of the political turmoil in northern Côte d’Ivoire.

Port Charges
For the purpose of this assessment, port charges include vessel unloading and bagging. It is the fourth largest domestic cost component in Mali. Port charges, which can vary from port to port, are a function of port services efficiency and are the ones associated with the use of the port facilities including berth charges, wharf charges and pilotage service, among others. Vessel unloading/bagging is considered one activity, including
the costs of bags, bagging equipment rental and labor when necessary. These combined port charges average 11.8 percent across products, with a range between 8.8 percent and 17.6 percent. In monetary terms, these values represent an average of $1.34 with a range between $1.15 and $1.90 per 50-kg bag, depending on the product and port. As such, this cost may be an indication of port efficiency influenced mainly by the vessel unloading, since this activity can contribute to the increase in port charges, especially demurrage, according to the efficiency of the process. The bagging activity when incurred separately represents a very small proportion of the additional domestic cost for an estimated average of 2.3 percent or about $0.35 per 50-kg bag, which can also be an indication of the operational efficiency of the ports.

Mali imports fertilizer mainly through the two nearest ports in the neighbor countries of Senegal and Côte d’Ivoire. The entry port can be identified according to the importer: Toguna Agro-Industries’ main entry port is Dakar and for Yara, the main entry port is Abidjan since HydroChem, based in Côte d’Ivoire, is the main provider for Yara-Mali and other providers in Mali. However, perhaps given its location in the furthest point of WA and the political unrest and recent turmoil in Côte d’Ivoire, Dakar is the main entry port for much of fertilizer for Senegal’s neighboring countries: Burkina Faso, Mali and Niger.

**Government Charges**

Fertilizer imports in Mali are not fully exempt from taxes, despite being subsidized. Average government charges are about US $1.07 per 50-kg bag (or about US $21.4/mt) of domestic additional cost, with a range from $0.80 to $1.40, depending on the product. Taxes include the ECOWAS tax, an Acompte sur Divers Impôts et Taxes (ADIT) tax in Mali, shipper and council tax charges and a transit tax (by the importing port country – mainly Senegal). These charges represent a relatively small percentage of the domestic additional cost (around 9.2 percent of total domestic cost or about 2.9 percent of the total cost including CIF cost). Mali’s ADIT is a payment in advance on the estimated import taxes according to the importer declaration and the merchandise being imported, which is subject to revision and consequently can be adjusted in favor or not of the importer. There are no exceptions on the ADIT tax. However, in the case of fertilizer, according to the industry, the tax is expected to be reimbursed to importers, but in practice it never happens. Consequently, it is considered a real tax imposed on fertilizer. Figure 8 briefly summarizes the supply chain and cost components in Mali.
Figure 8. Performance of Supply Chain in Mali

a. The average total increase in fertilizer cost of 31.7% at delivery points includes 9.2% in government charges.

Note: Performance indicators are average percentages and monetary values across different products on a 50-kg bag basis.
Identifying Key Constraints and Bottlenecks

As previously shown, much of the high domestic supply costs of fertilizer in Mali can be associated with a number of factors from port to final point of sale. Figure 10 duplicates the supply chain of Figure 1, summarizing the key findings in the cost structure and performance of the fertilizer supply chain and marketing in Mali. Table 5 in Section 6 summarizes these findings focusing on constraints while considering a range of policy implications and recommendations for addressing them.

High Finance Costs and Poor Access to Credit

According to the main industry players, including ORIAM and corroborated in our findings, the main issue facing the development of the fertilizer distribution network and supply chain in Mali is the cost of finance and access to credit. This is in spite of Mali having a subsidy on finance and a more reasonable interest rate as compared to other countries in the region. Perhaps the main reason for the high cost of finance is the result of the structure for procurement and distribution, which introduces a larger number of layers relative to an open market system. This situation increases the cumulative cost of credit and at the same time introduces operational inefficiencies. Farmers do not have access to a low interest rate of 8 to 8.5 percent since this is the rate for lending to the intermediary farmer organizations (GIE and CCAE).

To fund procurement and distribution activities, domestic importing companies face a higher interest rate of up to 12 percent from the banking pool. In contrast, foreign companies’ subsidiaries of international corporations (i.e., Yara) have the advantage of accessing multiple sources of finance in international market, internal financing (allowing them to borrow at a low 3 to 4 percent interest rate in foreign currency, according to Yara) and in the local Malian market. Some national distributors and retailers, especially those serving producers outside of the organized cotton and rice zones, seldom have access to finance. Finance for importation and distribution, especially when sourced from the banking pool, is coupled with the subsidy program and for the organized zones’ tenders. This provides less incentive for the expansion of the private distribution/retail network within and outside the main production zones to bring fertilizer nearer to the farmer. Credit is limited to organized farmers located within the main production rice and cotton zones, neglecting those that are not organized and who are located within and outside the zones. This restrains the use of fertilizer by farmers outside the organized rice and cotton zones who are not eligible for credit, further restraining the expansion of the distribution and retail network.

High Marketing Cost and Margins

As previously explained, this cost is typically set by the business owner as a percentage of the total business transaction cost. This includes the product cost, added by each agro-input business owner along the distribution chain, to cover part of their unaccounted costs and their profit or compensation for their entrepreneurial efforts. Consequently, high marketing costs are perhaps the result of the number of layers and structural inefficiencies of fertilizer procurement and distribution in Mali. Therefore, it is important to point out that marketing costs and margin are influenced by the other cost components (finance, transportation, government and port charges, etc.), in addition to the inherent risk of agriculture-related business. In addition, distributors and retailers typically do not have an explicit interest rate for their own finances nor an explicit opportunity cost to account for the inherent risk of investing in agriculture activities; these are costs typically incorporated into the marketing margin. Furthermore, the highly politicized tender process may offer the opportunity for a greater marketing margin to the few providers that are typically selected to supply the fertilizer needs for the various production zones, increasing the marketing cost and margins along the domestic supply chain. Consequently, implementing policy measures to reduce the cost components along the supply chain will also help to reduce the marketing and margin costs.

Degraded Roads Infrastructure and Transportation Equipment

Transportation cost is another major issue which affects the profitability of fertilizer distribution networks while increasing the price paid by farmers. In Mali the most used mode for domestic transportation is by over-the-road trucks; however, as a consequence of poor and deteriorated road conditions and equipment and dependence on imported oil, high transportation costs prevail.

Mali and neighboring countries do not have any current restrictions on axle loads, contributing to a rapid deterioration of transportation infrastructure and equipment. These high transportation costs
add considerably to the overall domestic fertilizer supply chain costs, influencing the high price paid by consumers. Mali and the WA region potentially have an alternative inland transportation mode that could be cheaper than truck transportation – railroad. Mali imports fertilizer mainly through Senegal and Côte d’Ivoire. Both countries have a railroad system. There is a direct rail link from Dakar in Senegal to Bamako, but service has not been fully operational for a few years. There is no direct link from Abidjan in Côte d’Ivoire to Bamako except through Burkina Faso and then by truck to Bamako. This operation may not be efficient considering the loading and unloading activities to and from rails and trucks. Consequently, all fertilizer currently imported in Mali, whether from Dakar or Abidjan, has been transported by truck from entry ports in the neighboring countries.

**Lack of a Regulatory Framework and Enforcement Institutions**

Mali has a fertilizer quality control law, but deterring the increase in fertilizer consumption is farmer mistrust about the recommended quantity and formulation of fertilizer applied to their crops. These formulations are based on outdated/obsolete research. In terms of quality mainly related to blended fertilizer, there is a perceived low quality and dubious truth-in-labeling because fertilizer sold in the Malian market is not guaranteed, particularly in terms of nutrient content, net product weight and physical qualities. There is no rigorous testing program due to lack of institutions for enforcement and well-equipped independent laboratories. Performed testing is a reactive rather than proactive process.

Tests are expected to be performed at the import level; however, it is not done in practice unless there is a complaint from producers or farmer organizations. The respective authorities collect samples (after the fact) and send them to be tested in a laboratory in Burkina Faso. Normally there is no independent testing performed after the blending process at the wholesale or retail levels. Hence, a fertilizer that is stated to be NPK/T-15 may or may not actually contain these levels of nutrients. For example, in September 2007 in the Office du Niger zone, there was a formal complaint filed by producers about the low quality and possible adulteration of fertilizer. Litigation was overruled by the Soils-Water-Plants Laboratory-LaboSEP of Sotuba after analyzing samples taken late in the season. The laboratory did not have the proper equipment and personnel nor the authority to arbitrate.

It is important to point out that because of the marked dominance of the informal sector in the market, the implementation of any regulatory and enforcement system will bear heavily on the relatively smaller formal private sector; consequently, there is a need for the government to initiate a process to reverse the dominance of informal to a formal economy.

**Low Farmers’ Demand**

Although the subsidy program provides an incentive to increase consumption of fertilizer at the farm level, this policy does not seem to be achieving the intended purpose. Farmers are unwilling to purchase non-subsidized fertilizer at full market price because of production (weather related) and market risks. The lack of sufficient research and extension on farming practices and other input technologies make matters worse.

Crop responses to fertilizer applications are typically much higher when used in combination with other improved technologies and practices, such as the use of crop varieties highly responsive to fertilizer. Because the combination of technological packages and crops grown can be quite distinctive across different agro-ecological and climatic zones, the lack of agricultural research and extension in Mali, especially outside the rice and cotton zones, has become a critical binding constraint for increasing fertilizer demand among a majority of food staple crop producers. The same can be said about access to output markets and other agricultural and rural support services. Non-organized small farmers outside the main production zones face the risk of erratic weather conditions (lack of rain and/or high temperatures) during the cropping season and also market risk because they do not have access to physical markets nor to market information in terms of input or output price and demand.

**Undeveloped Domestic Distribution/ Retail Network**

The task of developing the distribution network down to the farmer has been left to a more competitive and weak domestic distribution private sector, national investors and small rural entrepreneurs. Instead of receiving the proper economic and financial incentives, these entrepreneurs are facing adverse conditions such as the lack of access to credit, logistics infrastructural constraints and a seemingly low profit margin. In the process, the expansion of the domestic fertilizer distribution network is further restrained.

These adverse conditions increase risk and costs faced by the domestic distributors and retailers
outside the main production zones. Unfortunately, the current policy framework in Mali has not addressed these constraints directly. Even if the fertilizer reaches some of the rural retailers, most still lack sufficient business managerial and technical skills and knowledge for marketing the products and advising producers on appropriate blends and dosages to be used on specific crops despite the work of international organizations to address this issue (e.g., CNFA).\(^1\) Moreover, lack of adequate access to market introduces additional risks and costs to the already high marketing and distribution costs agro-dealers must absorb. The lack of knowledge of retailers on the proper use and recommendation of fertilizer according to local crop and soil conditions also restricts expansion of demand for fertilizers.

### Other Constraints: A Non-Generalized Tender Process

The structures for acquisition of fertilizer in Mali are based on calls to public and private tender, activity that determines retail prices and requires a substantial amount of capital and logistics. This structure adds layers to the process, which brings inefficiencies to the system and increases the cost of procurement and distribution.

The tenders are not generalized since they are based mainly on the needs of the CMDT zone and the Office du Niger only. This excludes and neglects farmer organizations and individual farmers within and outside the organizations considered “not solvent” or ineligible for credit due to unpaid previous debt. Nearly half of actual total needs according to the caution techniques are represented in this group. Given the large potential unmet needs outside the main tenders, the GoM has addressed this issue through the DNA by issuing a complementary tender for those farmers eligible for “in-kind” credit, according to the DRA; however, much more must be done to have a greater coverage of these unmet needs. Under the tender processes, there are various issues that must be addressed:

a. Slow and perhaps bureaucratic tender bid process. Between the expressions of interest to the assignment of tenders for the provision of fertilizer, there may be a substantial price differential in the fertilizer international market compared to the lowest price of the year.

b. The tender processes and the subsidy program provide incentive to import all subsidized fertilizer and importers may or may not import extra quantities to supply unforeseen needs or the needs of those producers outside the tender and production zones. Some producers have been excluded because they are not organized and/or not eligible for credit. They may have their own purchasing power to acquire fertilizer, especially if it is subsidized. Those farmers whose needs have not been met must purchase fertilizer in the open market if available. This normally implies having to wait until it becomes available after the needs of the organized farmer beneficiaries of the tender have been met. Too often this happens late in the season when crops cannot make efficient use of it and therefore it is no longer needed.

c. In the cotton zone, the most important issue, which has financial implications, is related to the delivery of fertilizer to producers. This issue is the result of two factors:

1. The dual transport strategy from the CMDT, which delivers fertilizers to the farmer organizations while collecting the cotton for processing and marketing from the villages, avoiding a dead transport leg. The problem with this process is that the time of collecting the cotton does not coincide with the time fertilizer is needed for cotton production. Collecting the cotton happens during the dry season, after the harvesting and before the next cropping season. This practice causes a financial burden to farmers because of additional financial cost and other costs related to storage and losses from the time of fertilizer delivery to the farmer organizations’ warehouses to the time of delivery to farmers for crop application. Furthermore, the result of this practice of simultaneous fertilizer delivery and the collection of cotton for processing and marketing is late payment to fertilizer suppliers from the previous cropping season.

\(^1\) At the time of this assessment, CNFA was implementing a training program targeted to agro-dealers to improve their managerial and technical capacity to manage their businesses and link them with large commercial companies (e.g., Yara, Toguna, etc.) and financial organizations to better serve the farmer population.
and delays canceling debts to the financial institutions. Farmers must wait until the next cropping season for the revenues from the previous season to cancel their debts.

Farmer organization recipients of the fertilizer, who are responsible for farmers’ debts, do not deliver the new fertilizer to farmers nor issue new loans until all debts from the previous production season have been canceled. During the 2008/2009 production season, this practice caused a deficit of about 1 billion CFA francs ($2.2 million) to CMDT due to early fertilizer delivery and late payment to farmers.

2. The systematic practice of quality control by the CMDT is the weakest link in the delivery chain. This is due to the lack of laboratory equipment and an ineffective legislative framework, regarding norms and regulations, for quality control in Mali. CMDT has to rely on the competencies and laboratory of the University of Ouagadougou in Burkina Faso for quality control of fertilizers.

d. Delay in disbursement from the government to pay for the subsidy to importers and financial institutions, a process that is administratively cumbersome and lengthy, may take months or up to a year or more. This delay adds to the financial cost, which in the case of the savings and loans during the 2009 cropping season, meant an increase of about 175 CFA francs (US $0.38) per 50-kg bag. Section 3.4 provides a description of financing fertilizer procurement and the payments (including subsidy) to providers.

Policy Implications and Recommendations

As most countries in the WA region, Mali has a great potential to increase productivity through the use of fertilizer, especially along the Niger River and in the southern region of the country. However, as long as fertilizer and other input prices remain high, demand is expected to remain low and the government will be compelled to continue with subsidies, especially for fertilizer. Consequently, it is critical to consider other complementary policy interventions (including subsidy effectiveness and efficiency measures) not only to reduce fertilizer prices to farmers but also to reduce or eliminate unnecessary transaction costs along the input supply chain. This can be done by promoting broader policy reforms and longer term investments to stimulate sustained growth and commercialization of smallholder agriculture in Mali. This process can increase the effectiveness of the subsidy program in terms of delivery and outcomes.

Fertilizer alone will not bring about what seems to be a gigantic goal of doubling production and improving food security in two years, according to the GoM development program. In addition to fertilizer, it is also necessary to incentivize the use of improved vegetative material that will make more effective use of the subsidized input, coupled with an effective extension/education service to support the best use of these inputs. These measures are expected to improve the effectiveness and consequently the efficiency of the fertilizer subsidy program. These are minimum recommendations, in addition to development of road infrastructure, markets and the financial sector, to facilitate credit to further incentivize farmers to increase inputs use. In this section, we offer what we believe are the most critical actions needed given the key constraints and bottlenecks highlighted in the previous section. Table 5 also summarizes these recommended actions.

Providing a Conducive Policy Environment

Mali must continue with the stabilization of the macro economy to promote sufficient business confidence by creating an environment conducive to nurturing and developing the domestic fertilizer private distribution network. Entrepreneurs are unlikely to invest in the fertilizer and input distribution business if there are risks, unnecessary extra costs and the absence of a regulatory and enforcement system. Key to this expansion is the need to increase access to credit for input business development and fertilizer use by farmers. The restrictions on availability of credit for expanding the domestic distribution network and for usage by the farming population outside the main production zones, plus high cumulative financing costs along the supply chain, are greatly influenced by government policies. These policies include increasing the guarantee fund and providing incentives for saving among the farming population. It is important for the government to maintain macro-economic stability and increase the availability of funds while maintaining the interest rate. Promoting the demand (usage) and supply of fertilizer by reducing its costs and increasing investors’ and business confidence allow for greater competition in fertilizer importation and distribution. Consequently, there is a need to allow for a more open market, perhaps by eliminating the tender process and allowing importers and distributors to compete in an open market where producers have access to credit and the freedom to purchase fertilizer at the lowest market price possible.
related policy measure calls for the GoM to initiate plans to formalize the economic activities in the market.

Because of the volatility in global fertilizer prices, the GoM should re-evaluate the subsidy program and introduce mechanisms to tie the subsidy with the volatility in the fertilizer global market. Perhaps more important is to assess the affordability of continuously financing fertilizer subsidies vis-à-vis its current revenues and expenditures, which can result in an unsustainable fiscal imbalance. However, if the government is compelled to maintain or reintroduce a subsidy program, it should better target it to the needy farming population and to extend it to cover other inputs. This is in addition to the funding of complementary services like technical assistance and access to markets as well as financing. Targeting and setting a time limit on the subsidy program may help to make the subsidy more effective and reduce the chances of the government falling into a fiscal imbalance. However, these measures alone may not achieve the expected effect of increasing fertilizer consumption and boosting production unless the government implements policies at the micro level to complement macro policies.

**Increase Investments in Infrastructure and Transportation**

The undeveloped input fertilizer market in Mali is inherently tied to the problem of poor and deteriorated infrastructure (mainly inland roads and railroads), transportation equipment and availability of rural services (research and extension and financial services, among others). The improvement of roads and rail infrastructure and upgrading transportation equipment can have an impact in reducing overall costs of imports like fertilizer and providing access to local and foreign markets. It would also provide a competitive advantage for exports, especially for high value perishable goods. High inland transportation costs, domestic and otherwise, restrict the development of input and output markets. Better maintenance and upgrading of existing roads, construction of new rural feeder roads and enacting and implementing road usage laws and regulations (e.g., maximum truck axle load) are necessary to maintain the existing road conditions and extend the life of transportation equipment. As much as possible, the maintenance and construction of new rural feeder roads should generate employment in rural areas. With this measure, the typical problems of inadequate access to transportation (poorly maintained and damaged roads and construction of new roads) can be addressed. Policy measures to incentivize private-public partnerships (PPPs) should also be considered for the larger private sector traders to invest in rural infrastructure and upgrade transportation equipment. New rural feeder roads will help eliminate or at least reduce the isolation that characterizes the remote rural areas and will help to bring fertilizer to the end user and increase productivity and production. New roads will also allow farmers to have better access to local and urban markets and have the option to sell their production surplus to increase their income and will incentivize local entrepreneurs to expand their input retail business to rural areas nearer to farmers.

To take advantage of an available alternative transportation mode will require large investments to improve railroad infrastructure and equipment. Because railroad infrastructure connects various countries in the region and has the potential to facilitate intraregional trade, this recommendation calls for country specific and regional commitment, efforts and actions.

**Promoting and Improving Smallholder Agricultural Intensification**

Investments and policy reforms that lower fertilizer supply distribution costs, while improving market performance, do not guarantee a dramatic increase in demand for fertilizers without other complementary investments on the demand side. For example, a critical demand-side constraint is not having adequate access to rural support services such as extension, credit and market information. Complementary investments in research and extension programs to improve farming practices are necessary. Teaching the optimum use of fertilizer, use of improved varieties with higher fertilizer response rates, developing water conservation and irrigation techniques, improving and expanding the existing market information systems and developing adequate storage facilities (to hedge against seasonal price risks) will not only lead to greater agricultural intensification but also to an increase in the demand and supply of agro-inputs including fertilizer. These investments will ultimately lead to agricultural sector growth, especially among non-organized farmers and those located outside the main production zones. Therefore, an alternative or complement to the fertilizer subsidy program is a complete technological package, i.e., to include technical assistance, infrastructure development, access to market and incentives for purchasing other complementary inputs such as seeds, pesticides and minor equipment. Crop insurance instruments should also be considered as a part of the complete technological package.
Farmer involvement in the design and provision of both R&D, extension and support services is important to address their specific needs for technical and managerial skills and for an effective and efficient use of modern inputs suitable to their local agronomic and socio-economic conditions. Moreover, such a participatory approach not only creates better links between researchers, extension agents and farmers but also empowers farmers to participate more actively in the market place, both as buyers of inputs and sellers of output. The inclusion of agro-dealers, mainly retailers in the rural areas, in trainings related to business management on the use of inputs extends links between farmers and input dealers. For fertilizer use in particular, sufficient research should be dedicated to providing specific recommendations for different environments and cropping systems.

**Strengthening the Institutional and Regulatory Environment**

Certain institutional and regulatory reforms are also needed, particularly those that affect market competition and efficiency and restrict the expansion of the domestic fertilizer trade. For example, establishing a rule of law and enforcement in the rural sector is important to protect consumers, producers and merchants. In addition, it is important to recognize that quality control and truth-in-labeling are critical for proper market development, particularly when it is becoming more dynamic, as it is in Mali. The government needs to enact and pass a fertilizer regulatory system in support of the approved law, along with the proper institutions for enforcement (i.e., a well-equipped and staffed laboratory). Fertilizer users must be assured that the agricultural inputs they purchase are not nutrient-deficient, adulterated or sold in short-weight bags. In addition, to make any law and regulation effective and enforceable, it will be necessary for the government to initiate a process to formalize the business sector because most businesses, including input and fertilizer distribution businesses, seem to be operating in the informal sector of the economy.

**Financial Reform**

Reforms should also be explored in the area of finance to ease the availability of credit, especially among domestic entrepreneurs for input distribution and warehousing. Options include expanding the risk management fund to support trade and retail businesses in fertilizer and other agricultural inputs in neglected rural areas. Given the level of development and the participation of the financial sector in funding agricultural activities, mainly in the provision of inputs, it is necessary to strengthen local financial markets by supporting the development of human resources and infrastructure (for rural savings and loans institutions). Supporting the further development of local financial markets and institutions (i.e., local savings and loans institutions) and financial instruments (special savings accounts and loans for agriculture, crop insurance instruments, etc.) could go a long way in helping the growth of the domestic fertilizer retail industry. Similarly, it would also open the way for increasing the number of farmers to access credit for purchasing inputs and fertilizer. In addition to credit, the need to increase savings among small farmers is also critical. The government, therefore, should seek policy solutions that provide incentives for financial institutions to expand into rural areas. Such interventions should be intended to not only protect a bank’s own lending portfolio but also provide positive returns to famers who choose to use the credit. Because there are often high production risks associated with rainfall uncertainty – other complementary investments may also be needed to lower such risks, including weather insurance and investments in irrigation or other water management technologies.

Essential to this process is to enact and implement a micro financial institutions law and regulations to protect them and give confidence to investors and the farming population. Loan guarantee programs, coupled with proper private technical assistance to support agriculture production and market access, will provide a strong guarantee on returns to farmers and will increase confidence about the banks’ lending portfolios.

The Table 5 matrix summarizes the Mali fertilizer market constraints with their respective policy implications and recommendations.
## Table 5. Mali Fertilizer Market: Supply Chain Development Constraints and Policy Implications and Recommendations

<table>
<thead>
<tr>
<th>I. Ineffective Subsidy Program</th>
<th>Nature/Description of Constraints</th>
<th>Effect on Fertilizer Market and/or the Costs Along the Supply Chain</th>
<th>Policy Measures/Recommendations</th>
</tr>
</thead>
</table>
|                               | Although a well-integrated subsidy program with participation of key stakeholders (finance, private sector, technical assistance, etc.), it is neglecting non-organized small farmers within and outside the main production zones and those with no credit or own funds to take advantage of the subsidy.  
Lack of coordination among the different organizations that are integral parts of the subsidy program and distribution of fertilizer.  
Subsidized fertilizer is rationed according to government production objectives, estimated existing in-country inventory and available funds in banking pool. | Subsidy program is partially fulfilling in-country fertilizer needs, while neglecting complementary investments to increase supply and demand.  
Subsidy program does not provide incentive to importers to supply the targeted audience additional quantities of fertilizer beyond what the program demands and outside the main production zones, restricting the expansion of the market.  
The complexity of the subsidy program delivery process and the participation of the many organizations in a multiple tender, introduce ineffectiveness, contributing to an increase in fertilizer cost. | The government should use a combination of well-targeted time-limited subsidies and perhaps cover other inputs and services, i.e., seeds. More importantly, continue looking into innovative mechanisms to increase credit for farmers to incentivize the use and consumption of fertilizer/inputs.  
Multiple subsidies and investments that affect both the supply and demand sides are expected to have a multiplicative effect rather than a single subsidy on the supply side (e.g., infrastructure development).  
The level of subsidy must be set within the country budgetary constraints, in a way that will not cause a fiscal deficit that will disrupt the stability of the economy.  
The government should continue incentivizing private investment to revitalize the fertilizer domestic industry, based on domestic resources available, mainly phosphate rock. |

| II. The Tendering Process      | Tender adds risk and uncertainty in market development.  
Participation in the tender requires a monetary deposit on behalf of the organization making the call.  
The process seems to be highly politicized, benefiting companies with a strong rapport with the government, especially with the MoA and DNA. | Fertilizer prices are determined based on a multiple tender process apparently conditioned to finance, which requires access to the banking pool for deposit and payments to providers.  
Some subsidiaries of international corporations are unable to be certified and consequently discouraged from participating directly in the tender, reducing competition and giving room for rent-seeking opportunities at the import level.  
The deposit guarantee increases the cost of finance and consequently fertilizer cost.  
At times, fertilizer is delivered late as a result of delay in the tender, further discouraging farmers from using fertilizer. | Government should re-think the fertilizer price subsidy program, by better targeting the intended farming population and by developing the proper targeting instruments. In the process, eliminate the tender and favor a more open competition in the importation and distribution to increase the amount of fertilizer in the market and incentivize the expansion of the distribution network closer to farmers. |
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<td>III. Port Costs</td>
<td>Mali relies on neighbor countries’ ports, mainly Senegal and Côte d’Ivoire, for fertilizer importation.</td>
<td>Most fertilizer for Mali is imported in bags mainly through Dakar, Senegal. The unloading process is the only one capture as part of its efficiency. The bagging cost is not reflected in such costs, making the port cost operation apparently efficient and consequently not fully reflected on product cost.</td>
<td>Although port cost does not seem to be a major issue, Mali should lead and take a pro-active role on regional initiatives to improve or at least maintain the port’s level of performance and efficiency. Among the activities to be supported are: revise and update port regulations, according to current economic conditions, investments for its improvement to allow for more effective and efficient processes, eliminating unnecessary and/or obsolete and unjustified charges (e.g., transit tax).</td>
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<td>IV. Finance Cost</td>
<td>In spite of finance being supported by a government guarantee fund (subsidized), interest rates are relatively high given the multiple layers and complexity of the distribution structure. Rates could be lowered to more reasonable rates. Subsidized credit is used to support importation and a limited number of farmers who are organized and eligible for credit, neglecting a number of small farmers not organized and ineligible for credit, according to the banking system. Lack of alternative financial and risk management instruments for lending and investment in agriculture, especially for production activities.</td>
<td>The low access to even subsidized finance by farmers, which reflects the risk aversion of the financial system, reduces the demand for fertilizer. Producers not eligible for credit, must rely on their own limited finance (if any), reducing the amount of fertilizer use per farmer and planted areas, yielding poor results and further dis-incentivizing farmers to continue using fertilizer. High finance cost to distributors contributes to higher fertilizer cost especially if they rely on their own funding. The expected return on investors’ own capital is high as a result of the inherent risk involved in agriculture-related business.</td>
<td>Provide fiscal incentives for the development of financial risk management instruments to promote lending to the agriculture productive sub-sector. Envision mechanisms for alternative credit programs for farmers not eligible for credit, to provide a new opportunity to gain credit worthiness and increase the number of farmers’ eligible for credit and consequently the demand for fertilizer. Envision a subsidy and financing mechanism with less layers to attempt to reduce the interest rates.</td>
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| **V. Degraded Roads and Obsolete Domestic Transportation Equipment** | Roads in Mali are deteriorated.  
Existing alternative transportation mode (avi) is also deteriorated and obsolete.  
There is a lack of access and feeder roads in remote rural areas as well as a lack of building infrastructure for storage and business development (banks, offices, etc.), mainly in the areas outside the main production/organized zones. | Increase in transportation cost affecting marketing cost and fertilizer price to consumers, as a result of deteriorated road conditions and the obsolete and rapid deterioration of trucks and other transportation equipment.  
Limited or no access to remote rural areas for distribution and use of fertilizer, a disincentive to the expansion of the distribution network, which increases the cost of transportation for the end user: the farmer. | Invest in repairing/improving the current road network.  
Enact, approve and implement a road regulation aimed at maintaining good road conditions and to extend the useful life of transportation equipment.  
Provide fiscal incentives to invest in improving and upgrading transportation equipment.  
Create programs for building rural feeder roads while creating employment in the rural areas and providing better physical access to local markets.  
Look at the feasibility to invest in restoring and upgrading the railroad system, perhaps as a regional initiative to connect other markets and ports within the WA region. |
| **VI. Under-Developed Domestic Distribution/ Retail Network** | Private sector distribution network outside the organized production zones is small and undeveloped, in part because of the limited amount of fertilizer product demanded outside the zones, due to the incidence of farmers not eligible for credit.  
Private distribution network within the subsidy program, although seemingly functioning properly, is not well developed.  
In many cases the delivery of the product is too late or too early, according to the practice of the importer/distributor.  
Most agro-dealers lack managerial technical skills and product/input knowledge. | There is no incentive for the private distribution/retail network whether under the subsidy program or not, to expand their operations closer to the farmers, where the product is most needed, since there is no demand resulting from inaccessibility to credit.  
Under the subsidized/private tender, the product is typically delivered to regional warehouses and there is little incentive for the importers to support or expand their distribution closer to farmers, increasing the cost to the end user – the farmer.  
Early fertilizer delivery, as in the case of CMDT practices, causes losses in storage in addition to financial cost. Late deliveries are ineffective  
Because of the lack of managerial skills and technical knowledge, distribution network owners are not in the position of managing their businesses effectively nor providing much needed sound technical advice to small farmers. | Provide fiscal incentives for investing in physical infrastructure in rural areas, closer to farmers and for the development of financial risk management instruments to promote lending to the agricultural sector.  
Implement or reinforce extension and educational services oriented to agro dealers training programs to develop and improve their business managerial and technical skills to manage their businesses more effectively as well as to serve as de-facto private extension agents to make sound technical recommendations to smallholders outside the main organized production zones. |
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<td>VII. Low Farmer Demand</td>
<td>Farmers, especially smallholders not eligible for credit and outside the main organized production zones, do not make use of fertilizer due to the precarious conditions that characterize them, lack of funds and lack of technical knowledge in the use and benefits of inputs. Many smallholder farmers lack basic productive infrastructure, mainly access and feeder roads and water harvesting infrastructure, especially in the northern and southern rain dependent zones. Smallholders face unfavorable input/output price ratios especially for staple food crops, in part due to difficult or no access to local markets and/or market information.</td>
<td>Farmers are unable to access finance due to their poor credit history which makes them ineligible for credit, making them rely on their own finances (if any). Although the allegations of adulterated products and the violation of truth-in-labeling in terms of content, quantity and quality are not pervasive issues in Mali, it is important to ensure the truth-in-labeling among farmers to increase confidence and consumption. Farmers and other agricultural producers are not aware of new technologies, especially those outside the main production organized zones.</td>
<td>Continue envisioning innovating incentives for alternative credit programs (e.g., especially savings accounts, in-kind loans and repayment) for farmers not eligible for credit, to provide a new opportunity to gain credit worthiness and increase the number of farmers eligible for credit and consequently the demand for fertilizer and other inputs. Government must revamp and rethink/ restructure the R&amp;D and extension/educational services with a farmer's participatory approach, by farmers and for farmers to improve their technical skills and make effective and efficient use of inputs. Develop new research according to new crops and genetic materials, considering the current soil fertility to make the proper recommendations in terms of formulations and quantities to producers, whether for food or commercial crops. Better support the current National Committee for the monitoring of fertilizer quality. Enact, approve and implement a comprehensive fertilizer law and a clear regulatory system in support of the law and as a guide for enforcement. Establish fertilizer analytical laboratories to enforce the fertilizer laws and regulations with the mandate and authority to arbitrate. Train inspectors for policing and enforce the fertilizer law and regulations. Further develop and expand the existing input and output market information system to aid farmers’ decision making process.</td>
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References


