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Enhancing Growth through Regional Agricultural Input Systems (EnGRAIS) Project for West Africa

Structure of Logistics Costs and Fertilizer Import Procedures along 4 Corridors in West Africa

August 2019

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ENHANCING GROWTH THROUGH REGIONAL AGRICULTURAL INPUT SYSTEMS (ENGRAIS) PROJECT FOR WEST AFRICA

Structure of Logistics Costs and Fertilizer Import Procedures along 4 Corridors in West Africa

August 2019

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The Feed the Future Enhancing Growth through Regional Agricultural Input Systems (EnGRAIS) project for West Africa is one of the many assistance programs supported by the American people through the United States Agency for International Development (USAID).

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Preface

Under the "Feed the Future Enhancing Growth through Regional Agricultural Input Systems" (EnGRAIS) project for West Africa (2018-2023), Nitidæ was selected by IFDC to conduct a study on the costs and logistics involved in importing and marketing fertilizers from four ports – Dakar, Abidjan, Tema, and Lomé – and to six markets – Senegal, Mali, Côte d'Ivoire, Burkina Faso, Ghana, and Togo.

This study identifies the main bottlenecks and steps that can be optimized to mitigate marketing costs and resale prices to farmers.

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1. Executive Summary

Under the "Feed the Future Enhancing Growth through Regional Agricultural Input Systems" (EnGRAIS) project for West Africa (2018-2023), Nitidæ was commissioned by IFDC to conduct a study on the costs and the logistics involved in importing and marketing fertilizers from four ports – Dakar, Abidjan, Tema, and Lomé – and to six markets – Senegal, Mali, Côte d'Ivoire, Burkina Faso, Ghana, and Togo.

This study identifies the main bottlenecks and steps that can be optimized to mitigate marketing costs and resale prices to farmers.

The study reveals that the main issue affecting local fertilizer prices in West Africa continues to be the global prices of the three main nutrients used for mineral fertilizer production (Nitrogen [N], Phosphate [P], and Potash [K]). Over a period of just a few months, these prices can vary by +/- 50 USD/ton.

The optimization of logistics import costs can lead to savings of +/- 30 USD/ton. However, since the fertilizer market in West Africa is relatively competitive (more than ten importers share the market in each country except Mali, where the market is clearly oligopolistic), most importers aim to optimize their logistics costs with different strategies, depending on both their financing capacity (local or international) and land base (ownership of storage facilities or blending plants).

Therefore, to date, the main measures to improve import logistics have been reducing the waiting and unloading times at the port (to avoid incurring costs associated with failure to unload within the allotted timeframe, known as "demurrage") and increasing the size of port infrastructures (development of quays capable of quickly receiving and unloading very large bulk carriers) to encourage economies of scale.

Much of the possible logistical gains can be attributed to achieving economies of scale, but the main challenges in the West African fertilizer market can be summarized as follows:

- Market growth is limited by high resale prices to producers that discourage their investment in intensification.
- But a substantial drop in the cost of fertilizers seems possible only if the imported volumes are higher and the flow rates are accelerated, which would require a greater and better structured demand.

Instruments to improve fertilizer importation in West Africa are detailed in the conclusion of this report, but their impact will only be significant if the size of the market increases and the form of public support for intensification changes. This includes subsidies applied on demand rather than supply and support given for the resale price of agricultural commodities at the ECOWAS level and no longer only at the individual state level.

2. Background

2.1 The Background of the Study

The EnGRAIS Project

The Feed the Future Enhancing Growth through Regional Agricultural Input Systems (EnGRAIS) project for West Africa is a five-year (2018-2023) regional fertilizer development program funded

by the United States Agency for International Development (USAID) and implemented by the International Fertilizer Development Center (IFDC). It supports African regional institutions in addressing key issues that hinder the effective supply and use of agricultural inputs in West Africa.

The general objective of the project is to contribute to the improvement of sustainable agricultural productivity and inclusive growth for West Africans. Its strategic objective is to increase the regional availability and sustainable use of appropriate and affordable fertilizers in the region. More specifically, the EnGRAIS project aims at strengthening a competitive, inclusive, and private sector-led regional fertilizer market by strengthening the management capacity and sustainability of the West African Fertilizer Association (WAFA) and other relevant regional organizations/associations and industry stakeholders, as well as collaborating through multi-stakeholder platforms to improve supply chain efficiency and make fertilizers more affordable.

Nitidæ

Nitidæ is a nongovernmental organization (NGO) created in December 2017 by the merger of two international NGOs (ETC Terra and RONGEAD).

With a team of nearly 65 employees (economists, engineers, agronomists, foresters, soil carbon specialists, and GIS and remote detection experts), Nitidæ designs, develops, and implements projects that combine environmental conservation with strengthening of local economies. Nitidæ also provides technical expertise to agribusiness and cosmetics companies to improve the performance of agricultural value chains, mitigate environmental impacts (preservation of natural resources, energy efficiency of processing chains, carbon offsetting of activities), and stimulate local economic development jointly with producer organizations.

Nitidæ supports and assists N'kalô Service in Africa. N'kalô is the first independent business consulting service for the agribusiness sector in Africa, from agricultural production to end use. Since 2011, it has been providing strategic business intelligence, global market analysis, advice, and tailor-made trainings to stakeholders in the import and export sectors, by email and mobile phone.

Since 2015, N'kalô Service market analysts have collected information about the West African fertilizer market for the IFDC website www.africafertilizer.org.

N'kalô network was mobilized to complement the IFDC network (EnGRAIS and AfricaFertilizer.org staff, 33 WAFA members, and key stakeholders) to check and cross-check information along the fertilizer value chain and produce more accurate mapping and analysis of marketing costs in the four targeted trade corridors.

2.2 Objectives of the Study

General Objective of the Study

The objective of this assignment is to undertake a series of studies on the fertilizer cost build-up and the stages of the supply chain in the four main corridors connecting the dominant fertilizer-consuming basins in West Africa (notably cotton areas in the Sahel).

Specific Objectives

1. Understand the cost implications of each different key stage along the value chain on the final prices of fertilizers bought by the farmer.

2. Compare the costs of moving the commodity through different ports to a given region and understand the cost variations and the available choices.
3. Provide fertilizer chain stakeholders with tools to help estimate scenarios and trade transaction costs through different corridors for different products (simple, compound, blending).

Methodology

The methodology implemented by the Nitidæ team is as follows:

1. Conduct a full study in order to evaluate:
   - Incoterms used to import fertilizers into the respective ports (e.g., CFR, CIF, FOB).
   - International sea freight charges (from the manufacturer's port to the West African country's port).
   - Existence of manuals/guidelines on port tariffs in countries (by port managers, e.g., government and/or private organizations).
   - Taxes, levies, and transit fees imposed on fertilizers.
2. Conduct on-site and remote interviews with:
   - Ports and dry ports, shipping companies, freight forwarders, carriers, and rail operators.
   - Fertilizer producers, importers, blenders, and dealers.
   - Service providers in the fertilizer sector: bagging, warehouses, and quality control laboratories.
   - Customs: ports, hinterland borders, and joint borders.
   - Regional and national infrastructure and trade facilitation programs.
3. Hold advisory and validation meetings with key stakeholders:
   - One national meeting per country (six in total)
   - One regional meeting (at the West African Fertilizer Forum, April 2019)

Study Schedule

The study was initiated in February 2019 with a first meeting between IFDC and Nitidæ, followed by an inception report and the production of an Excel table for the breakdown of marketing costs to be submitted to fertilizer importers and dealers in West Africa, provided on February 25, 2019.

In March 2019, the Excel table used to collect information on the fees and main challenges in importing fertilizers into the six target countries was submitted to all WAFA members and to several transit/handling companies as well as fertilizer wholesalers and retailers. A few responses were collected in March and the first half of April, and several meetings were held with all stakeholders in the fertilizer value chain in the six countries. In parallel, based on the first feedback and studies already carried out by IFDC on the fertilizer value chain, the Nitidæ team developed a model to compare costs on the different corridors, entitled "The Fertilizer Matrix."

At the end of April, Nitidæ submitted a presentation on the costs of importing fertilizers for different products and the available choices at national validation meetings in the six countries. The validation meetings were held during April 17-24, 2019, in Dakar, Bamako, Bobo-Dioulasso, Abidjan, Accra, and Lomé.

The first results of the study were presented at the 4th West African Fertilizer Forum in Lomé, Togo, on April 25. A summary report was distributed to participants.

In May and June 2019, Nitidæ consolidated, processed, and formatted the data and information collected. In July 2019, Nitidæ submitted the final report, four port factsheets, and the finalized Fertilizer Matrix.

3. Overview of the West African Fertilizer Market

In the six countries of the study zone (Senegal, Mali, Côte d'Ivoire, Burkina Faso, Ghana, and Togo), between 1.5 and 1.7 million tons/year of mineral fertilizers were traded and consumed from 2015 to 2018.

However, local production of mineral fertilizers on the local market did not exceed 175,000 tons/year.

This means that at least 90% of the supply was imported from the main exporting countries on the international fertilizer market (Morocco, Russia, Ukraine, European Union, United States, China, etc.). This is why import logistics is a key driver in determining fertilizer prices in rural areas in West Africa.

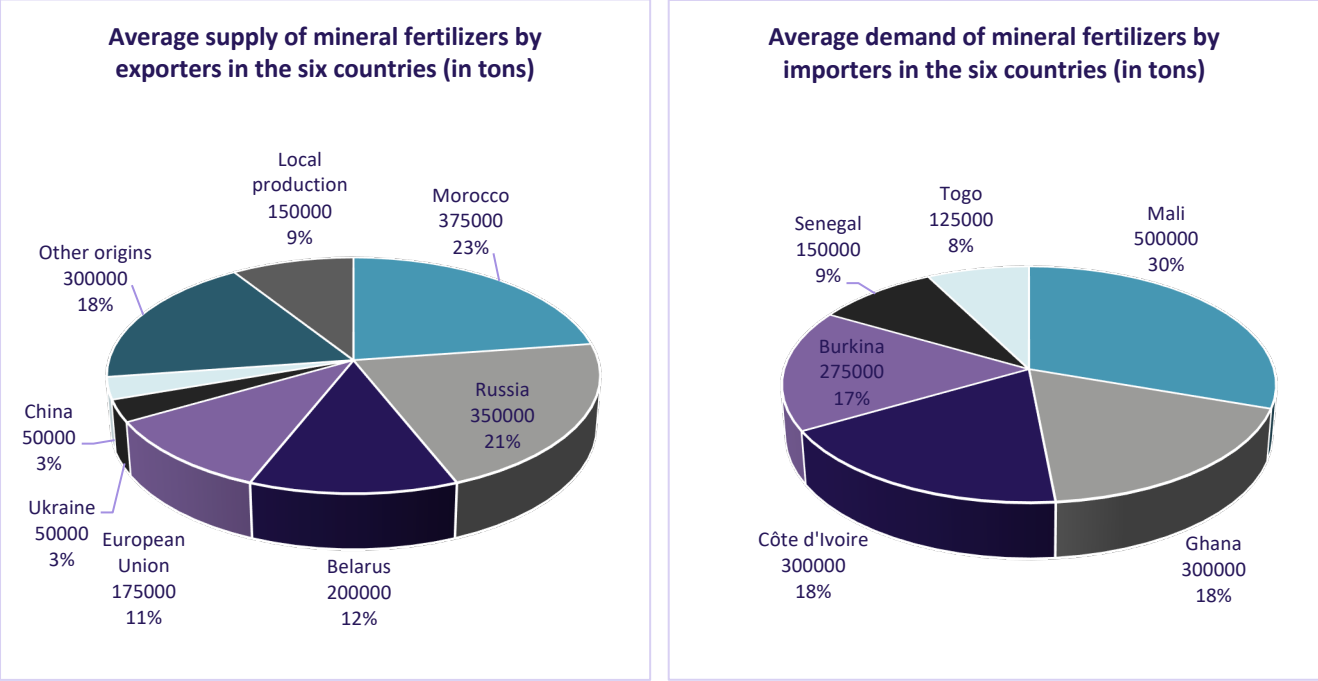

Figure 1: Mineral fertilizer supply & demand in the six countries of this study (Source: consultant, based on average order of magnitude from 2015 to 2018)

Today, these imports transit mainly through four ports (although other ports, such as San Pedro and Takoradi, are expected to play an increasingly important role in the coming years).

Abidjan (Côte d'Ivoire) is the main country with an average of 525,000 tons of fertilizers imported over the last five years, representing 32% of the region's total imports. Tema (Ghana) follows with about 450,000 tons/year and 27.3% of total imports. Imports through Dakar (Senegal) are estimated at about 325,000 tons/year. Finally, imports via the port of Lomé are estimated at around 175,000 tons/year. The remaining 25,000 tons/year are imported via San Pedro and Takoradi.

Each of these ports has an absolute advantage in supplying its domestic market, but they are also competing to supply the hinterland countries since Mali and Burkina Faso offer huge and fast-growing markets.

While the volumes transiting via the port of Tema to Burkina Faso have increased on average in recent years, the port of Abidjan has remained the leader for four of the past five years. The port of Tema only surpassed Abidjan in 2017.

Fertilizer flows change significantly each year depending on opportunities, importing companies' market shares, and tenders. The map below represents the main average flows in the sub-region, but each flow can vary significantly in one year or the other.

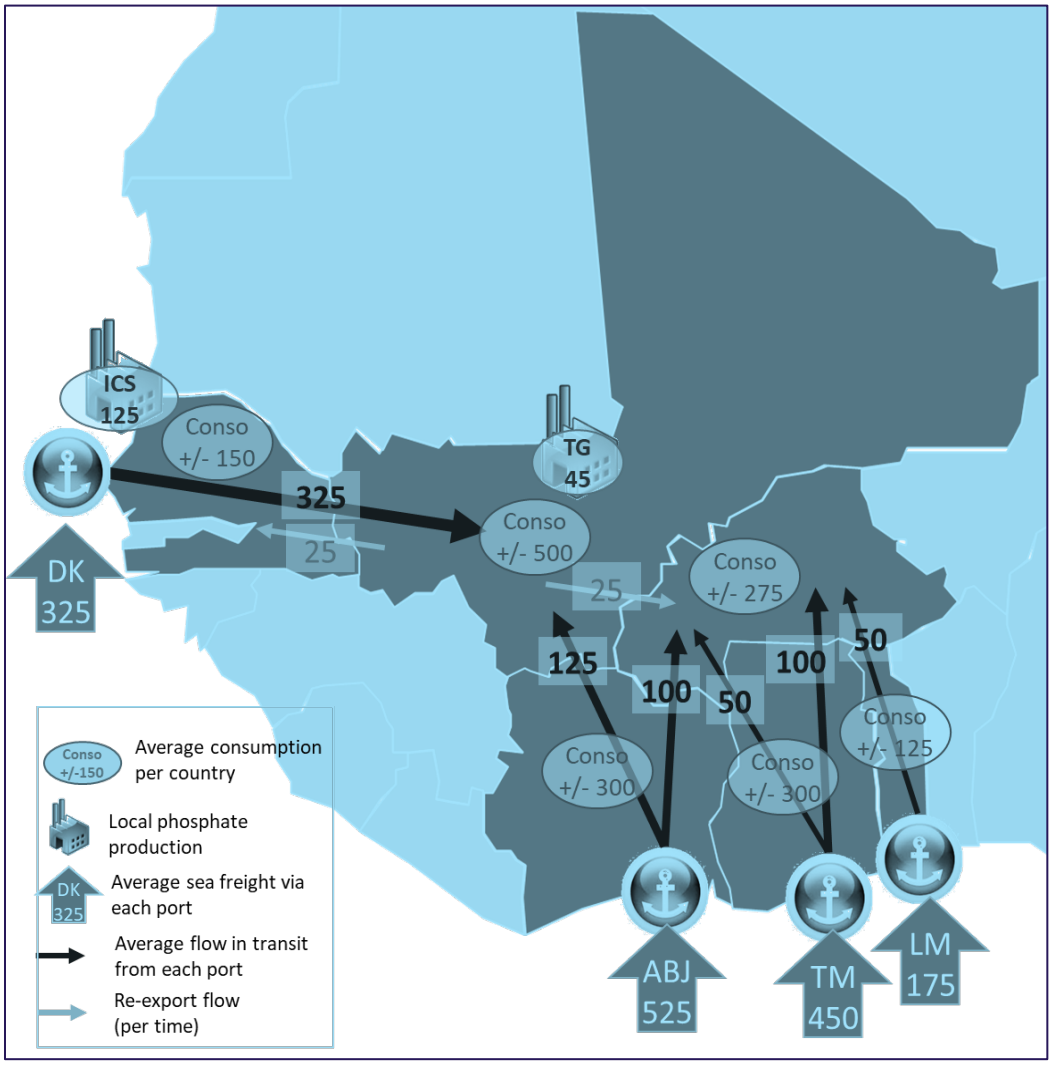

Figure 2: Fertilizer imports, flows, production, and consumption in the six countries of the study (Source: consultants, based on customs statistics. Figures are averages over 2015-2018 in thousands of tons.)

As shown in Figure 2, the market share of each port is closely linked to the distance between the port and the production areas. Land transport is one of the most important costs during the import and marketing process in landlocked countries. The evaluation of road transportation costs to each agricultural production basin is developed below.

4. Process Map of Fertilizer Import

4.1 Different Options and Diagram of Fertilizer Importation

To analyze the fertilizer supply chain in the six countries, this report distinguishes several products, market types, and intermediate levels that influence the costs and stages in each supply chain.

Different Supply Chains Depending on the Imported Product

With regard to products, we distinguish three types of imported mineral fertilizers.

Simple products (urea, diammonium phosphate [DAP], etc.) can be used as ingredients for blending and producing compound fertilizers and also can be applied directly on farms. This is why the report distinguishes between the supply chain that provides "straight fertilizers" directly to farmers and the supply chain in which "ingredients" are blended to provide farmers with "compound fertilizers" (NPK + micronutrients).

The last supply chain is the import of blended compound fertilizers "at source" (i.e., before export). The main difference between the three chains is that the first option, the import of "simple fertilizers," is not subject to any customs duties or processing steps. The second option is subject to the processing step, mixing or "blending," during which some of the ingredients are not imported. This is particularly the case for substrates such as shell powder or phosphates produced locally in Mali and Senegal. With the third option, compound fertilizer (usually a complex fertilizer in which all nutrients are integrated in the same solid or liquid form), no processing step is performed locally but a customs duty of 5% of the cost, insurance, and freight (CIF) value is applied on the imported product. This customs duty is applied by all ECOWAS countries under the Common External Tariff (CET) to promote local processing of fertilizers.

Different Types of End Markets

The diagrams below show the different end markets. Not all fertilizer imports have the same destination, and the cost of the supply chain can vary depending on the nature of the demand.

The different markets can vary widely from one country to another. Market types include institutional markets (public tenders), structured private markets (private tenders), large farms (direct negotiation with importers/blenders), and retail sales on the open market to small and medium-sized farmers. Table 1 shows the market share estimates for each type of end market in the six countries.

Table 1: Estimation of the value of each type of market per country

	Senegal	Mali	Côte d'Ivoire	Burkina	Ghana	Togo
Public tenders	75%	**90%**	5% (projects & programs)	5% (projects & programs)	75% (cocoa, corn, rice)	+/- 5% (projects & programs)
Private tenders	10% (SODEFITEX)		35% (4 cotton companies)	**80%** (3 cotton companies)	5% (3 cotton companies)	60% (NSCT and FUPROCAT)
Open market large farms and coops	7.5% (CSS, SOCAS, GDS, etc.)	5% (GMDB)	**40%** (Palmci, SCB SUCAF, SOGB, SIPRA, etc.)	5% (SOSUCO, Bagré & Die agricultural crops)	15% (palm, banana, etc.)	5% (pineapple, soy, etc.)
Open retail market (small and medium-sized farms)	7.5% (mainly vegetables)	5% (mainly vegetables)	20% (cocoa, vegetables, cereals)	15% (vegetables, cereals, sesame)	5% (vegetables, cereals)	**30%** (vegetables, cereals, cocoa)

Packaging and Intermediate Steps

The supply chain varies depending on the product packaging. If "bulk" transport represents around 80% of fertilizer imports, it is also possible to import fertilizers packaged in bulk (break bulk) or in containers.

Packaging has an impact not only on the cost of transport but also on the cost of handling operations at the port and at the factory or in the storage/warehouse.

Depending on the infrastructure at their disposal and/or the cost of storage space rental, importers can choose a longer or shorter storage period. Shorter storage time helps to reduce related costs but this option presents a higher risk of non-compliance with delivery times, particularly for large contracts.

Loading of bulk carrier with fertilizer (bulk, left) and packaged (break bulk, right)

(Source: alamy.com)

4.2 Fertilizer Imports into Coastal Countries

The diagram below shows the options available at each major stage of the fertilizer supply chain in coastal countries with its proportion of occurrence and a range of costs incurred at each stage. It focuses on the import process and does not include local production (such as phosphate in Senegal) or the local substrate used in local blending plants (shell, sand, etc.).

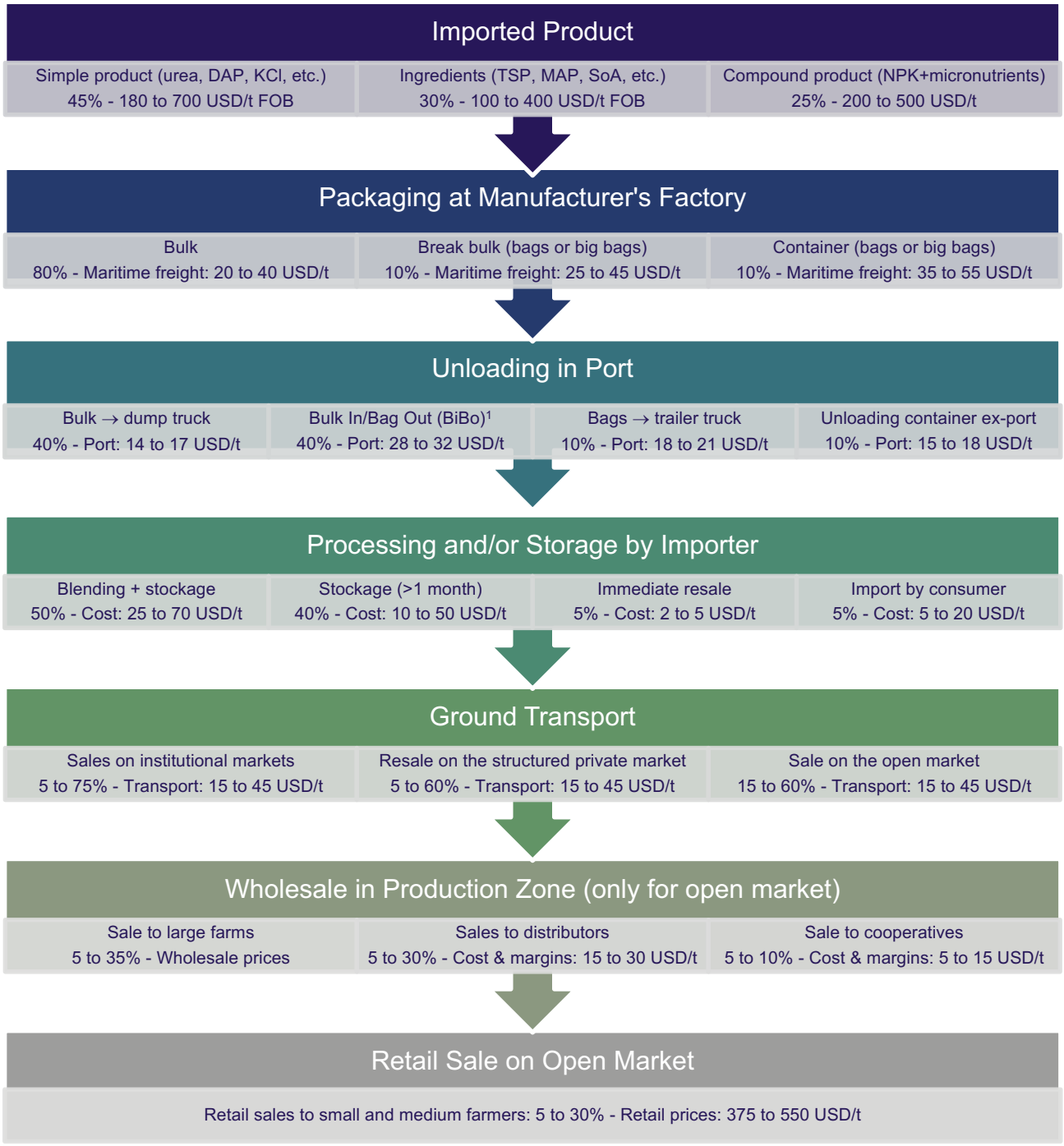

Figure 3: Diagram of the marketing process of imported fertilizers to coastal countries with the volumes (%) and cost range (USD/t) of each option at each stage.

[1] BiBo: *Bulk In Bag Out* is a technical term that refers to the act of making a bulk import with bagging on arrival within the port enclosure. Bagging is usually carried out on the quay (fertilizers are unloaded by a crane into a hopper, and bagging is carried out under the hopper). Some bulk carriers also allow the bagging to be done directly on the boat. Finally, the bagging can be done in a sub-customs port warehouse near the dock. This is the practice that prevails in Abidjan where, since 2017, bagging on the quay has been prohibited by the port authorities because it is considered too dirty. In the latter case, the product is transported by dump truck to the bagging store.

4.3 The Import Chain Toward the Hinterland Countries (Mali and Burkina Faso)

The import chain is quite similar in landlocked countries but an important step is added: transit. Transit can be direct (the product is transported by a freight forwarder to Burkina or Mali, and customs duties and royalties are paid in that country) or indirect (the importer based in the coastal country re-exports the fertilizer, or Malian/Burkinabe dealers come to buy fertilizer in the coastal countries). Due to the lack of suitable trucks (or bulk wagons on railways), transit is always with "packaged" products, which is why importers and blenders who have carried out bulk maritime imports must package at the port (BiBo). This represents a significant cost, especially when the product must then be unpackaged to be blended at the plant and then re-packaged after blending.

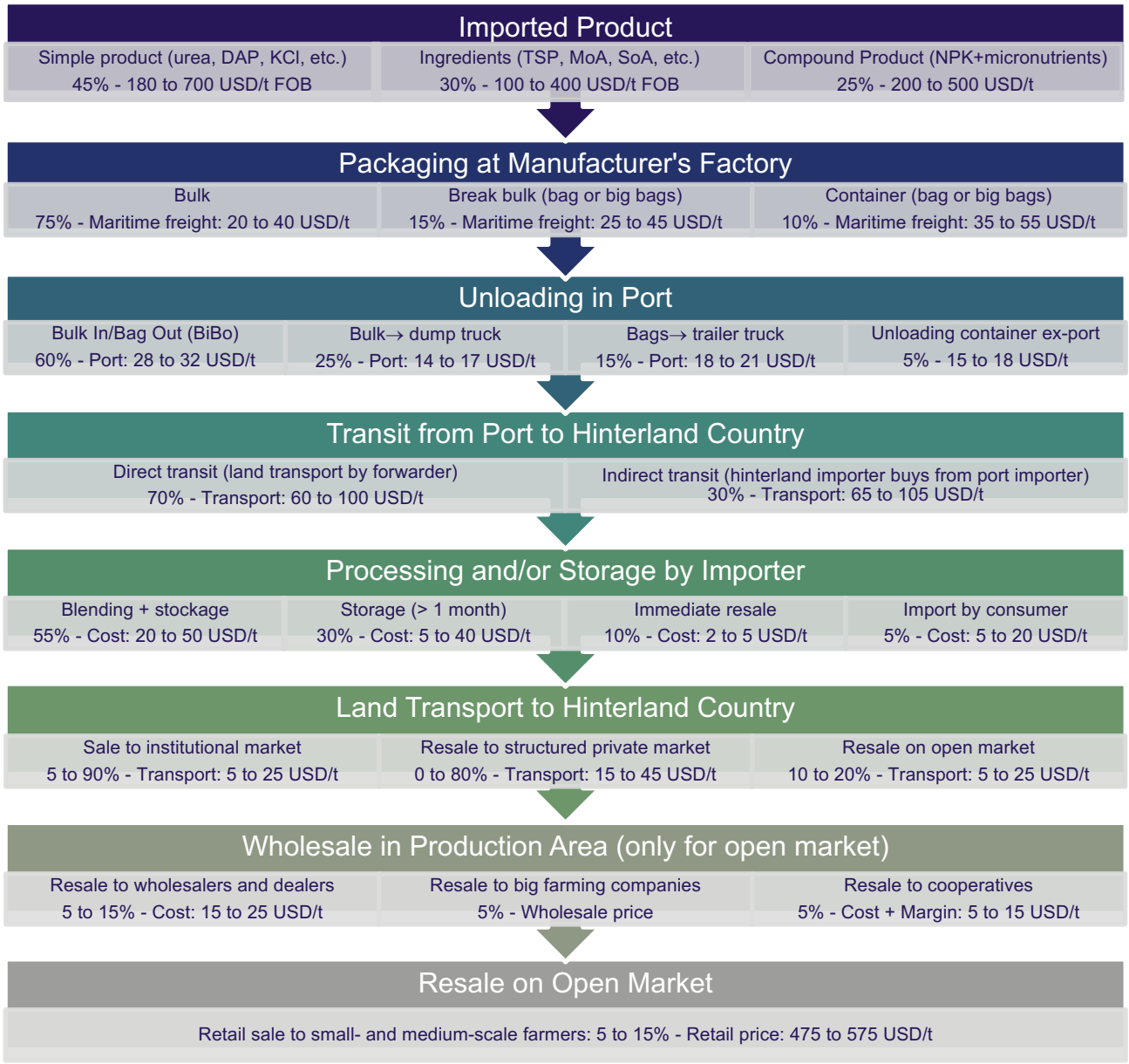

Figure 4: Diagram of the marketing process of imported fertilizers to landlocked countries (Burkina Faso and Mali) with the volumes (%) and cost range (USD/t) of each option at each stage.

5. Fertilizer Price Build-Up

5.1 Senegal

The table below provides the average values for the import of urea, NPK T15 compounded at source, and ingredients for the production of blended NPK T15 in Senegal.

Table 2: Detailed price build-up for urea and NPK T15 in Senegal (Source: consultant)

Values in USD/ton		Urea Origin Russia	NPK T15 Origin Russia	Ingredients for Blending				
				DAP Origin Morocco	KCl Origin Belarus	Urea Origin Russia	Dolomite Origin France	Non-Imported Substrate
				32.8%	25.1%	20.0%	11.0%	11.1%
FOB reference price		**275**	**275**	**390**	**260**	**275**	**50**	
Freight	Sea freight (bulk carrier 15,000 t) except dolomite (container)	39.0	39.0	25.0	39.0	39.0	52.0	
	Insurance (0.75%)	2.1	2.1	2.9	2.0	2.1	0.4	
Total freight		**41**	**41**	**28**	**41**	**41**	**52**	
Reference CIF price		**316**	**316**	**418**	**301**	**316**	**102**	
Port fees	Stevedoring, lifting, handling	29.0	29.0	14.0	14.0	14.0	18.0	
	Port charges	0.7	0.7	0.7	0.7	0.7	0.9	
	Purchase bag 50 kg (if BiBo)	8.0	8.0	0.0	0.0	0.0	0.0	
	Freight forwarding fees (HAD) 0.3% CIF	0.9	0.9	1.3	0.9	0.9	0.3	
	Port administrative costs	1.0	1.0	1.0	1.0	1.0	1.0	
	Demurrage	3.0	3.0	3.0	3.0	3.0	3.0	
Total port costs		**43**	**43**	**20**	**20**	**20**	**23**	
Customs fees	Customs duties	0.0	15.8	0.0	0.0	0.0	0.0	
	ECOWAS levy 0.5%	1.6	1.6	2.1	1.5	1.6	0.5	
	1% statistical fee	3.2	3.2	4.2	3.0	3.2	1.0	
	Solidarity levy 0.5%	1.6	1.6	2.1	1.5	1.6	0.5	
Total customs fees		**6**	**22**	**8**	**6**	**6**	**2**	
Price ex-port		**365**	**381**	**446**	**327**	**342**	**128**	**75**
Operations before end product warehouse	Port and warehouse transport	5.0	5.0	5.0	5.0	5.0	5.0	5.0
	Blending ingredient value			148.0	83.2	69.4	14.6	8.9
	Total blending ingredients NPK T15			**324**				
	Blending fees			17.5				
	Purchase bag 50 kg			7.5				
Warehouse receipt price (DDP)		**370**	**386**	**349**				
Import structure costs	Handling fees	2.0	2.0	2.0				
	Storage costs (3 months)	15.0	15.0	15.0				
	Frequency (storage and process losses)	1.9	1.9	3.5				
	Financial expenses (Interest 11% * 3 months)	10.2	10.6	9.6				
	Insurance (0.3% * DDP)	1.1	1.2	1.0				
	Administrative and financial expenses (0.5% * DDP)	1.9	1.9	1.7				
	Gross margin	30.0	30.0	30.0				
	Taxes	10.0	10.0	10.0				
Total import structure costs		**72**	**73**	**73**				
Price ex-port warehouse		**442**	**458**	**422**				
Transportation	Transport port → production area	20.0	20.0	20.0				
Price delivered to distributor store		**462**	**478**	**442**				
Distributor structure fees	Administrative and financial distributor costs	10.0	10.0	10,0				
	Distributor margin	15.0	15.0	15.0				
Farm gate retail price USD/t		**487**	**503**	**467**				
Farm gate retail price FCFA/50-kg bag		**14,124**	**14,600**	**13,543**				

5.2 Côte d'Ivoire

The table below provides the average values for the import of urea, NPK T15 compounded at source, and ingredients for the production of NPK T15 blended in Côte d'Ivoire.

Table 3: Detailed price build-up of urea and NPK T15 in Côte d'Ivoire (Source: consultant)

Values in USD/ton		Urea Origin Russia	NPK T15 Origin Russia	Ingredients for Blending				
				DAP Origin Morocco	KCl Origin Belarus	Urea Origin Russia	Dolomite Origin France	Non-Imported Substrate
				32.8%	25.1%	20.0%	11.0%	11.1%
FOB reference price		**275**	**275**	**390**	**260**	**275**	**50**	
Freight	Sea freight (bulk carrier 15,000 t) except dolomite (container)	41.0	41.0	27.0	41.0	41.0	54.0	
	Insurance (0.75%)	2.1	2.1	2.9	2.0	2.1	0.4	
Total freight		**43**	**43**	**30**	**43**	**43**	**54**	
CIF reference price		**318**	**318**	**420**	**303**	**318**	**104**	
Port fees	Stevedoring, lifting, handling	29.0	29.0	16.0	16.0	16.0	13.0	
	Port charges	1.5	1.5	1.5	1.5	1.5	1.9	
	Purchase bag 50 kg (if BiBo in bonded warehouse)	8.0	8.0	0.0	0.0	0.0	0.0	
	Forwarding fees (HAD) 0.3% CIF	1.0	1.0	1.3	0.9	1.0	0.3	
	Port administrative costs	2.5	2.5	2.5	2.5	2.5	3.4	
	Demurrage	4.0	4.0	4.0	4.0	4.0	4.0	
Total port costs		**46**	**46**	**25**	**25**	**25**	**23**	
Customs fees	Customs duties	0.0	15.9	0.0	0.0	0.0	0.0	
	ECOWAS levy 0.5%	1.6	1.6	2.1	1.5	1.6	0.5	
	1% statistical fee	3.2	3.2	4.2	3.0	3.2	1.0	
	Solidarity levy 0.5%	1.6	1.6	2.1	1.5	1.6	0.5	
Total customs fees		**6**	**22**	**8**	**6**	**6**	**2**	
Price ex-port		**370**	**386**	**454**	**334**	**349**	**129**	**75**
Operations before end product warehouse	Port and warehouse transport	4.0	4.0	4.0	4.0	4.0	4.0	4.0
	Blending ingredient value			150.1	84.8	70.7	14.6	8.8
	Total blending ingredients NPK T15			**329**				
	Blending fees			17.5				
	Purchase bag 50 kg			7.5				
Warehouse receipt price (DDP)		**370**	**386**	**354**				
Import structure costs	Handling fees	2.0	2.0	2.0				
	Storage costs (3 months)	12.0	12.0	12.0				
	Frequency (storage and process losses)	1.9	1.9	3.5				
	Financial expenses (Interest 11% * 3 months)	10.2	10.6	9.7				
	Insurance (0.3% * DDP)	1.1	1.2	1.1				
	Administrative and financial expenses (0.5% * DDP)	1.9	1.9	1.8				
	Gross margin	30.0	30.0	30.0				
	Taxes	10.0	10.0	10.0				
Total import structure costs		**69**	**70**	**70**				
Price ex-port warehouse		**439**	**456**	**424**				
Transportation	Transport port → production area	25.0	25.0	25.0				
Price delivered to distributor store		**464**	**481**	**449**				
Distributor structure fees	Administrative and financial distributor costs	10.0	10.0	10.0				
	Distributor margin	15.0	15.0	15.0				
Farm gate retail price USD/t		**489**	**506**	**474**				
Farm gate retail price FCFA/50-kg bag		**14,192**	**14,672**	**13,749**				

5.3 Ghana

The table below provides the average values for the import of urea, NPK T15 originally compounded, and ingredients for the production of NPK T15 blended in Ghana.

Table 4: Detailed price build-up of urea and NPK T15 in Ghana (Source: consultant)

Values in USD/ton		Urea Origin Russia	NPK T15 Origin Russia	Ingredients for Blending				
				DAP Origin Morocco	KCl Origin Belarus	Urea Origin Russia	Dolomite Origin France	Non-Imported Substrate
				32.8%	25.1%	20.0%	11.0%	11.1%
FOB reference price		**275**	**275**	**390**	**260**	**275**	**50**	
Freight	Sea freight (bulk carrier 15,000 t) except dolomite (container)	42.0	42.0	28.0	42.0	42.0	55.0	
	Insurance (0.75%)	2.1	2.1	2.9	2.0	2.1	0.4	
Total freight		**44**	**44**	**31**	**44**	**44**	**55**	
Reference CIF price		**319**	**319**	**421**	**304**	**319**	**105**	
Port fees	Stevedoring, lifting, handling	12.0	12.0	7.0	7.0	7.0	12.0	
	Port charges	2.4	2.4	2.4	2.4	2.4	4.5	
	Purchase bag 50 kg (if BiBo)	9.0	9.0	0.0	0.0	0.0	0.0	
	Freight forwarding fees (HAD) 0.3% CIF	1.0	1.0	1.3	0.9	1.0	0.3	
	Port administrative costs	2.8	2.8	2.8	2.8	2.8	2.8	
	Demurrage	1.0	1.0	1.0	1.0	1.0	1.0	
Total port costs		**28**	**28**	**14**	**14**	**14**	**21**	
Customs fees	Customs duties	0.0	16.0	0.0	0.0	0.0	0.0	
	ECOWAS levy 0.5%	1.6	1.6	2.1	1.5	1.6	0.5	
	GCNet 0.4% + VAT	1.4	1.4	1.9	1.4	1.4	0.5	
	CCVR fee 1%	3.2	3.2	4.2	3.0	3.2	1.1	
	Exim fee 0.75%	2.4	2.4	3.2	2.3	2.4	0.8	
Total customs fees		**9**	**25**	**11**	**8**	**9**	**3**	
Price ex-port		**356**	**372**	**447**	**326**	**342**	**129**	**75**
Operations before end product warehouse	Port and warehouse transport	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	Blending ingredient value			147.5	82.6	69.0	14.5	8.7
	Total blending ingredients NPK T15			**322**				
	Blending fees			17.5				
	Purchase bag 50 kg			9.0				
Warehouse receipt price (DDP)		**364**	**396**	**349**				
Import structure costs	Handling fees	2.0	2.0	2.0				
	Storage costs (3 months)	10.5	10.5	10.5				
	Frequency (storage and process losses)	1.8	2.0	3.5				
	Financial expenses (Interest 20% * 3 months)	18.2	19.8	17.4				
	Insurance (0.3% * DDP)	1.1	1.2	1.0				
	Administrative and financial expenses (0.5% * DDP)	1.8	2.0	1.7				
	Gross margin	30.0	30.0	30.0				
	Taxes	10.0	10.0	10.0				
Total import structure costs		**75**	**77**	**76**				
Price ex-port warehouse		**440**	**474**	**425**				
Transportation	Transport port → production area	20.0	20.0	20.0				
Price delivered to distributor store		**460**	**494**	**445**				
Distributor structure fees	Administrative and financial distributor costs	8.0	8.0	8.0				
	Distributor margin	10.0	10.0	10.0				
Farm gate retail price USD/t		**478**	**512**	**463**				
Farm gate retail price FCFA/50-kg bag		**13,859**	**14,843**	**13,427**				

5.4 Togo

The table below provides the average values for the import of urea, NPK T15 originally compounded, and ingredients for the production of NPK T15 blended in Togo.

Table 5: Detailed price build-up of urea and NPK T15 in Togo (Source: consultant)

Values in USD/ton		Urea Origin Russia	NPK T15 Origin Russia	Ingredients for Blending				
				DAP Origin Morocco	KCl Origin Belarus	Urea Origin Russia	Dolomite Origin France	Non-Imported Substrate
				32.8%	25.1%	20.0%	11.0%	11.1%
FOB reference price		**275**	**275**	**390**	**260**	**275**	**50**	
Freight	Sea freight (bulk carrier 15,000t) except dolomite (container)	42.0	42.0	28.0	42.0	42.0	55.0	
	Insurance (0.75%)	2.1	2.1	2.9	2.0	2.1	0.4	
Total freight		**44**	**44**	**31**	**44**	**44**	**55**	
Reference CIF price		**319**	**319**	**421**	**304**	**319**	**105**	
Port fees	Stevedoring, lifting, handling	24.0	24.0	12.0	12.0	12.0	12.5	
	Port charges	1.0	1.0	1.0	1.0	1.0	1.3	
	Purchase bag 50 kg (if BiBo)	8.0	8.0	0.0	0.0	0.0	0.0	
	Freight forwarding fees (HAD) 0.3% CIF	1.0	1.0	1.3	0.9	1.0	0.3	
	Port administrative costs	1.0	1.0	1.0	1.0	1.0	1.3	
	Demurrage	2.0	2.0	2.0	2.0	2.0	2.0	
Total port costs		**37**	**37**	**17**	**17**	**17**	**17**	
Customs fees	Customs duties	0.0	16.0	0.0	0.0	0.0	0.0	
	ECOWAS levy 0.5%	1.6	1.6	2.1	1.5	1.6	0.5	
	1% statistical fee	3.2	3.2	4.2	3.0	3.2	1.1	
	Solidarity levy 0.5%	1.6	1.6	2.1	1.5	1.6	0.5	
Total customs fees		**6**	**22**	**8**	**6**	**6**	**2**	
Price ex-port		**362**	**378**	**447**	**327**	**342**	**125**	**75**
Operations before end product warehouse	Port and warehouse transport	3.0	3.0	1.0	1.0	1.0	1.0	1.0
	Blending ingredient value			146.8	82.3	68.7	13.8	8.4
	Total blending ingredients NPK T15			**320**				
	Blending fees			17.5				
	Purchase bag 50 kg			7.5				
Warehouse receipt price (DDP)		**365**	**381**	**345**				
Import structure costs	Handling fees	2.0	2.0	2.0				
	Storage costs (3 months)	12.0	12.0	12.0				
	Frequency (storage and process losses)	1.8	1.9	3.5				
	Financial expenses (Interest 11% * 3 months)	10.0	10.5	9.5				
	Insurance (0.3% * DDP)	1.1	1.1	1.0				
	Administrative and financial expenses (0.5% * DDP)	1.8	1.9	1.7				
	Gross margin	30.0	30.0	30.0				
	Taxes	10.0	10.0	10.0				
Total import structure costs		**69**	**69**	**70**				
Price ex-port warehouse		**434**	**451**	**415**				
Transportation	Transport port → production area	20.0	20.0	20.0				
Price delivered to distributor store		**454**	**471**	**435**				
Distributor structure fees	Administrative and financial distributor costs	10.0	10.0	10.0				
	Distributor margin	15.0	15.0	15.0				
Farm gate retail price USD/t		**479**	**496**	**460**				
Farm gate retail price FCFA/50-kg bag		**13,897**	**14,378**	**13,334**				

5.5 Burkina Faso

The table below provides the average values for the import of urea, NPK T15 originally compounded, and ingredients for the production of NPK T15 blended in Burkina Faso.

Table 6: Detailed price build-up of urea and NPK T15 in Burkina Faso (Source: consultant)

Values in USD/ton		Urea Origin Russia	NPK T15 Origin Russia	Ingredient for Blending				
				DAP Origin Morocco	KCl Origin Belarus	Urea Origin Russia	Dolomite Origin France	Non-Imported Substrate
				32.8%	25.1%	20.0%	11.0%	11.1%
FOB reference price		**275**	**275**	**390**	**260**	**275**	**50**	
Freight	Sea freight (bulk carrier 15,000t) except dolomite (container)	42.0	42.0	28.0	42.0	42.0	55.0	
	Insurance (0.75%)	2.1	2.1	2.9	2.0	2.1	0.4	
Total freight		**44**	**44**	**31**	**44**	**44**	**55**	
Reference CIF price		**319**	**319**	**421**	**304**	**319**	**105**	
Port fees	Stevedoring, lifting, handling	12.0	12.0	12.0	12.0	12.0	12.0	
	Port charges	2.4	2.4	2.4	2.4	2.4	4.5	
	Purchase bag 50 kg (if BiBo)	5.0	5.0	0.0	0.0	0.0	0.0	
	Freight forwarding fees (HAD) 0.3% CIF	1.0	1.0	1.3	0.9	1.0	0.3	
	Port administrative costs	2.8	2.8	2.8	2.8	2.8	2.8	
	Demurrage	1.0	1.0	1.0	1.0	1.0	1.0	
Total port costs		**24**	**24**	**19**	**19**	**19**	**21**	
Transit costs via Tema	Transit fees (FGR. GPS. CBC)	1.0	1.0	1.0	1.0	1.0	1.0	
	Transit transport Tema-Bobo	60.0	60.0	60.0	60.0	60.0	60.0	
Total transit costs		**61**	**61**	**61**	**61**	**61**	**61**	
Customs fees	Customs duties	0.0	16.0	0.0	0.0	0.0	0.0	
	ECOWAS levy 0.5%	1.6	1.6	2.1	1.5	1.6	0.5	
	1% statistical fee	3.2	3.2	4.2	3.0	3.2	1.1	
	Solidarity levy 0.5%	1.6	1.6	2.1	1.5	1.6	0.5	
Total customs fees		**6**	**22**	**8**	**6**	**6**	**2**	
Price ex-warehouse or factory		**411**	**427**	**510**	**390**	**406**	**189**	**75**
Blending charges	Blending ingredients value			167.2	97.9	81.1	20.8	8.3
	Total blending ingredients NPK T15			**375**				
	Blending fees			17.5				
	Purchase bag 50 kg			8.0				
Bobo store entry price (DDP)		**411**	**427**	**401**				
Import structure costs	Handling fees	2.0	2.0	2.0				
	Storage costs (3 months)	9.0	9.0	9.0				
	Frequency (storage and process losses)	2.5	2.6	4.4				
	Financial expenses (Interest 11% * 3 months)	11.3	11.7	11.0				
	Insurance (0.3% * DDP)	1.2	1.3	1.2				
	Administrative and financial expenses (0.5% * DDP)	2.1	2.1	2.0				
	Gross margin	30.0	30.0	30.0				
	Taxes	10.0	10.0	10.0				
Total import structure costs		**68**	**69**	**70**				
Bobo store exit price		**479**	**495**	**471**				
Transportation	Transport BMK → production area Dédougou	18.0	18.0	18.0				
Price delivered to distributor store		**497**	**513**	**489**				
Distributor structure fees	Administrative and financial distributor costs	10.0	10.0	10.0				
	Distributor margin	15.0	15.0	15.0				
R Farm gate retail price USD/t		**522**	**538**	**514**				
Farm gate retail price FCFA/50-kg bag		**15,128**	**15,609**	**14,892**				

5.6 Mali

The table below provides the average values for the import of urea, NPK T15 originally compounded, and ingredients for the production of NPK T15 blended in Mali.

Table 7: Detailed price build-up of urea and NPK T15 in Mali (Source: consultant)

Values in USD/ton		Urea Origin Russia	NPK T15 Origin Russia	Ingredients for Blending				
				DAP Origin Morocco	KCl Origin Belarus	Urea Origin Russia	Dolomite Origin France	Non-Imported Substrate
				32.8%	25.1%	20.0%	11.0%	11.1%
FOB reference price		**275**	**275**	**390**	**260**	**275**	**50**	
Freight	Sea freight (bulk carrier 15000t) except dolomite (container)	39.0	39.0	25.0	39.0	39.0	52.0	
	Insurance (0.75%)	2.1	2.1	2.9	2.0	2.1	0.4	
Total freight		**41**	**41**	**28**	**41**	**41**	**52**	
Reference CIF price		**316**	**316**	**418**	**301**	**316**	**102**	
Port fees	Stevedoring, lifting, handling	27.0	27.0	27.0	27.0	27.0	17.0	
	Port charges	0.6	0.6	0.6	0.6	0.6	0.8	
	Purchase bag 50 kg (if BiBo)	8.0	8.0	0.0	0.0	0.0	0.0	
	Freight forwarding fees (HAD) 0.3% CIF	0.9	0.9	1.3	0.9	0.9	0.3	
	Port administrative costs	1.0	1.0	1.0	1.0	1.0	1.0	
	Demurrage	3.0	3.0	3.0	3.0	3.0	3.0	
Total port costs		**41**	**41**	**33**	**33**	**33**	**22**	
Transit fees via Dakar	Transit fees (FGR. GPS. EMASE)	1.0	1.0	1.0	1.0	1.0	1.0	
	Dakar-Bamako transit transport	60.0	60.0	60.0	60.0	60.0	60.0	
Total transit costs		**61**	**61**	**61**	**61**	**61**	**61**	
Customs fees	Customs duties	0.0	15.8	0.0	0.0	0.0	0.0	
	ECOWAS levy 0.5%	1.6	1.6	2.1	1.5	1.6	0.5	
	1% statistical fee	3.2	3.2	4.2	3.0	3.2	1.0	
	Solidarity levy 0.5%	1.6	1.6	2.1	1.5	1.6	0.5	
Total customs fees		**6**	**22**	**8**	**6**	**6**	**2**	
Price ex-warehouse or factory		**424**	**440**	**520**	**400**	**416**	**188**	**75**
Blending charges	Blending ingredient value			170.6	100.5	83.2	20.6	8.3
	Total blending ingredients NPK T15			**383**				
	Blending fees			17.5				
	Purchase bag 50 kg			8.0				
Bamako store entry price (DDP)		**424**	**440**	**409**				
Import structure costs	Handling fees	2.0	2.0	2.0				
	Storage costs (3 months)	9.0	9.0	9.0				
	Frequency (storage and process losses)	2.5	2.6	4.5				
	Financial expenses (Interest 11% * 3 months)	11.7	12.1	11.2				
	Insurance (0.3% * DDP)	1.3	1.3	1.2				
	Administrative and financial expenses (0.5% * DDP)	2.1	2.2	2.0				
	Gross margin	30.0	30.0	30.0				
	Taxes	10.0	10.0	10.0				
Total import structure costs		**69**	**69**	**70**				
Price ex-warehouse Bamako		**493**	**509**	**479**				
Transportation	Transport BMK → production area (Segou)	18.0	18.0	18.0				
Price delivered to distributor store		**511**	**527**	**497**				
Distributor structure fees	Administrative and financial distributor costs	10.0	10.0	10.0				
	Distributor margin	15.0	15.0	15.0				
Farm gate retail price USD/t		**536**	**552**	**522**				
Farm gate retail price FCFA/50-kg bag		**15,530**	**16,008**	**15,131**				

6. Cost Comparison between Corridors

6.1 Sea Freight

Sea freight varies according to the origin of the fertilizer (Black Sea, Baltic Sea, Morocco, Asia), the type of packaging (bulk, break bulk, or container), and the size of the bulk carrier if imports were not made in containers.

The cost of sea freight also varies according to the supply and demand for maritime freight and fuel prices. As this is a cost that changes regularly, the price range shown below is only indicative based on the freight market during the first quarter of 2019.

Table 8: Indicative range of sea freight costs between the Baltic Sea and West Africa in the 1st quarter of 2019

These are values from Baltic Sea (Russia, Norway) in USD/ton	Bulk carrier Handymax (30,000 to 60,000 tons/vessel)		Bulk carrier Handysize (15,000 to 30,000 tons/vessel)		Mini bulk carrier (1,000 to 10,000 tons/vessel)		Container (24 to 25 tons/container of 20')	
	Min	Max	Min	Max	Min	Max	Min	Max
Dakar	20	24	26	30	37	41	49	54
Abidjan	22	26	28	32	39	43	51	56
Tema	23	27	29	33	40	44	52	57
Lomé	23	27	29	33	40	44	52	57

The differences between West African ports are negligible, although the port of Dakar enjoys a slight advantage of +/- 2 USD/t due to its geographical position. The biggest differences lie in economies of scale, which are vital with larger vessels.

The importation of packaged fertilizers in break bulk and not in free bulk increases the cost from 3 to 5 USD/t due to the reduction in the weight loaded in the bulk carrier.

However, as presented in the following paragraph, the cost of unloading the breakbulk product is also less than the cost of in-port packaging.

6.2 Port Fees

Port charges, and in particular handling costs, make a huge difference based on the packaging, handling operations, and port. Below is the average cost of the main options in each port.

These are average costs. Depending on the imported quantities, port congestion, weather conditions (especially for bulk cargo), and negotiations with the shipping company (some of which may bag on the vessel) or the handling/transit company, these costs may vary by +/- 3 USD/t.

Table 9: Comparison of port fees according to port operations (handling)

USD/ton	***Bulk In Bag Out*** *(Bagging on the dock or in the bonded warehouse)*	***Break Bulk*** *(Packaged in bags in a bulk carrier)*	***Container*** *(20 to 25 tons/20' container)*	***Bulk in Dump Truck*** *(only made to supply a blending plant near the port)*
Dakar	39	20	20	16
Abidjan	41	24	18	20
Tema	30	17	16	12
Lomé	34	17	16	14

In a nutshell, Tema is the most competitive port; Abidjan is the least competitive but remains more competitive than Dakar in terms of containers.

Tema's competitiveness is slightly reduced by higher bond levies applied to imports on the Ghanaian market.

In Senegal, Mali, Côte d'Ivoire, Burkina Faso, and Togo, import duties are limited to 2% of the CIF value (0.5% for ECOWAS, 0.5% for the solidarity levy, and 1% for customs statistics).

In Ghana, the total duties amount to 2.65% due to additional customs charges (1% of the CCVR levy and 0.75% of the EXIM levy), though the statistical duty is lower (0.45%).

However, for imports destined to Burkina Faso via Tema, these levies are not applied since customs clearance is carried out at the Burkinabe customs. As a result, the Tema corridor is particularly competitive in supplying Burkina Faso.

Additional Fees due to Congestion

When ships spend more time in port than the "laytime," which is the maximum unloading time contracted with the transport company (usually 3 to 10 days), the transport company charges daily detention penalties, called "demurrage," for its vessel.

These fees vary slightly among shipping companies but, on average, are equivalent to USD 1/t per day after the maximum unloading time.

Feedback from industry stakeholders and maritime traffic statistics indicate that demurrage for bulk imports often is not applied in Tema. It is applied at a medium rate in Lomé, but is significant in Abidjan and Dakar.

In Dakar, the probability of paying the extra costs for an importer that assigns 10 days of "laytime" with a transport company is 44%, whereas it is only 12% in Tema.

In the worst scenarios, with a waiting time of more than 20 days, additional costs of more than 10 USD/t occurred only in Abidjan and Lomé. Some importers based in Abidjan pointed out that during this period, they lost money importing fertilizers.

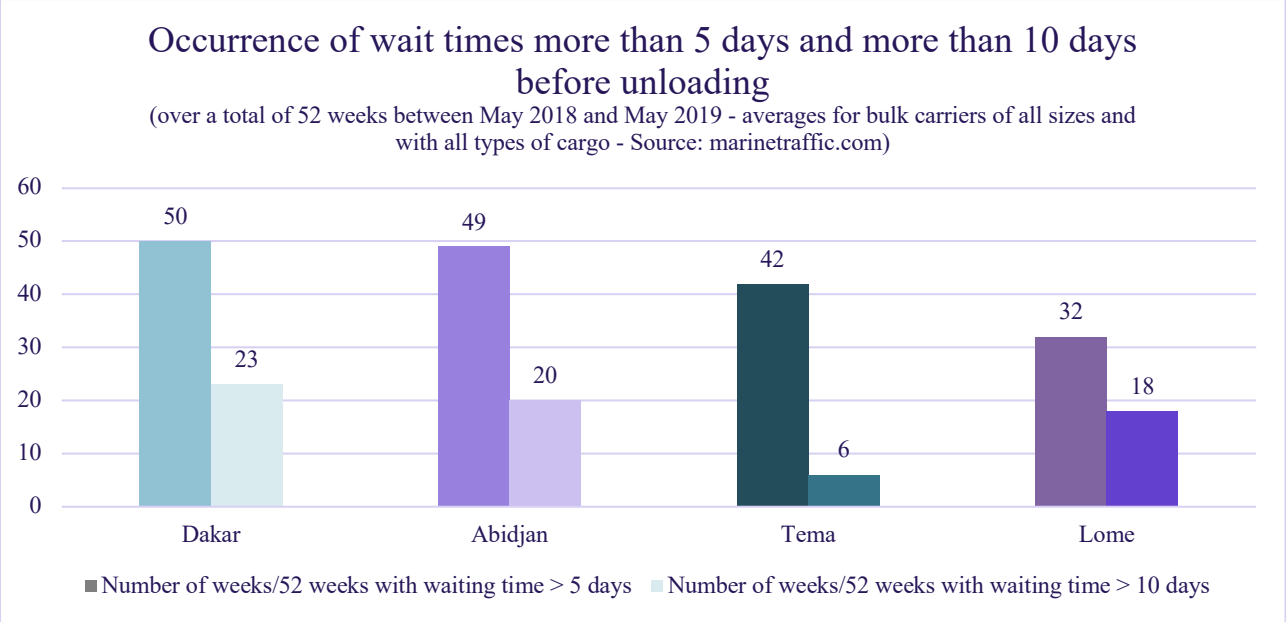

Figure 5: Number of weeks in which newly arrived bulk carriers waited more than 5 days and more than 10 days before unloading

Table 10: Minimum, average, median, and maximum waiting time for bulk carriers between the berthing request and the end of unloading - in waiting days at anchor, in port, and in total. (Source: www.marinetraffic.com)

Waiting time in days	Dakar			Abidjan			Tema			Lomé		
	Anchorage	In Port	Total	Anchorage	In Port	Total	Anchorage	In Port	Total	Anchorage	In Port	Total
Minimum	0.1	0.3	0.4	0.6	0.7	2.1	0.1	1.0	2.5	0.2	0.1	2.3
Average	4.2	5.6	9.7	6.3	5.3	11.5	2.1	4.8	6.8	6.6	5.4	11.3
Median	2.9	5.4	8.6	3.0	5.4	8.8	1.6	4.6	6.1	2.8	4.9	7.7
Maximum	15.4	11.0	20.9	37.1	8.7	41.2	14.2	9.0	18.4	26.5	22.2	39.2

This issue of congestion increases the competitiveness of the port of Tema compared to the other three ports. This has aroused interest from some of the fertilizer importers to concentrate their import logistics in Tema.

6.3 Land Transport

Land transport is one of the highest costs in the fertilizer supply chain. The average cost of land transport in West Africa is about 0.07 USD/ton/km, which is relatively high compared to other regions of the world. For example, in Europe, the average cost is almost half, i.e., 0.035 USD/ton/km.

This high cost induces a close link between the competitiveness of a corridor and the distance between the port and the production area.

The cost table below is based on compliance with Regulation 14 of the West African Economic and Monetary Union (WAEMU) for a truck classified as a 4-axle truck with a load of 38 metric tons.

It should be noted that the application of Regulation 14 has slightly increased the cost of transport in the sub-region by reducing the maximum permissible payload per truck. In addition, according to fertilizer carriers and dealers, its application would imply an increase in racketing on weighbridges in 2018 and 2019, even for trucks that are not overweight.

Table 11: Land transport costs for the most common fertilizer marketing routes in West Africa in the 1st quarter of 2019 (in USD/ton - Source: carriers and importers)

From		Dakar	Abidjan	Tema	Lomé	Bamako	Bobo	Ouaga
To		USD/t	USD/t	USD/t	USD/t	USD/t	USD/t	USD/t
Senegal	Thiès	16						
	Matam	26						
	Kaolack	21						
	Saint-Louis	21						
	Ziguinchor	43						
Mali	Kayes	69	95	112	121	17	60	86
	Bamako/Koulikoro	74	78	103	112	9	52	78
	Sikasso	78	69	95	103	17	43	69
	Ségou	83	86	95	103	17	52	60
	Mopti	91	95	103	103	22	60	60
Côte d'Ivoire	Gagnoa		22					
	Daloa		22					
	Bouaké		22					
	Korhogo		28					
	Bondoukou		34	43				
Burkina Faso	Banfora		55	66	74	60	16	21
	Bobo-Dioulasso	103	60	60	69	55		17
	Dedougou		69	66	67	60	17	17
	Ouagadougou		78	57	52	69	17	
	Fada N'Gourma		95	60	48	78	34	17
Ghana	Kumasi			16				
	Techniman			17				
	Tamale			31				
	Tumu			40				
	Paga			40				
Togo	Notsé				16			
	Atakpamé				17			
	Sotouboua				24			
	Sokodé			43	26			

6.4 Structural Costs in Ports and Big Cities

The structural costs (handling, storage, financing) vary according to the place where importers or industrial blenders are located.

Handling Fees

Handling costs are relatively similar among port cities but are less expensive in inland cities.

Generally, the cost of handling operations in port (in particular the loading/unloading of trucks) is set within 50 to 100 FCFA/50-kg bag, which equals 1.7 to 3.5 USD/ton. In landlocked cities, this

cost is often lower and ranges from 0.9 to 1.7 USD/ton. In rural areas, the cost can be even lower and as low as 0.7 USD/ton.

It is also important to note that, when converted to dollars, handling costs have been slightly lower (-0.25 to -0.5 USD/t) in Ghana in 2019 due to the depreciation of the Ghanaian Cedi (GHS) against the U.S. dollar over the last few years. This depreciation has generally reduced the cost of the country's labor force converted in U.S. dollars.

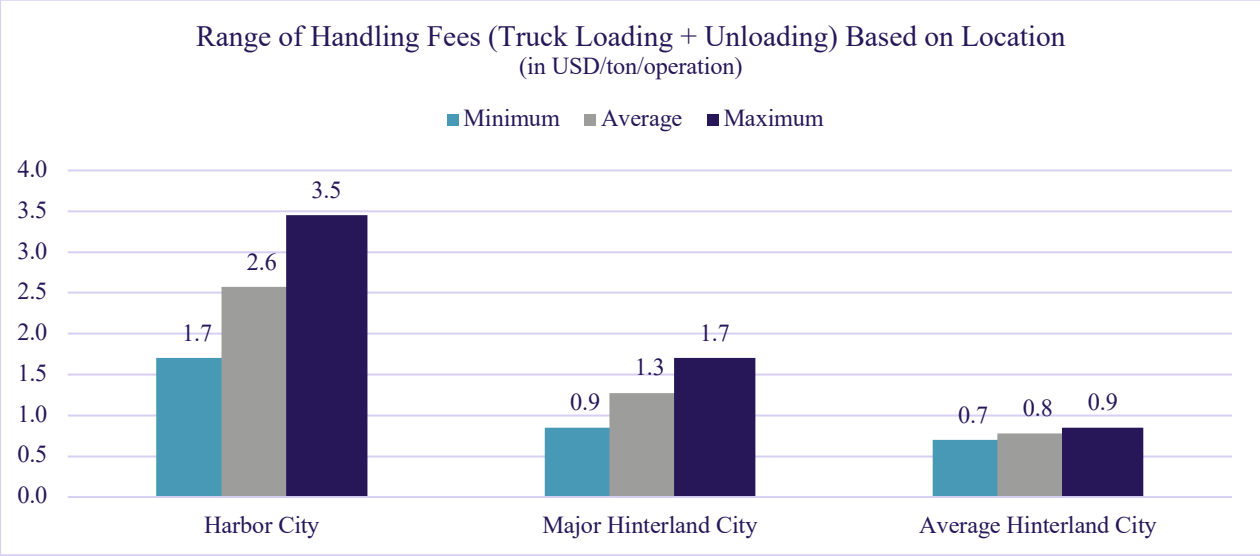

Figure 6: Comparison of handling costs in port and landlocked cities

Storage Fees

The cost of storage also varies greatly. The first difference is between importers who have owned their warehouse for several years, paid off most of their investments, and spend only 1 to 2 USD/ton/month on maintenance and the importers who rent a warehouse at a higher cost.

The cost of storage warehouse rental varies depending mainly on the warehouse's location in port cities (from 4 to 12 USD/t/month) or landlocked cities (1.5 to 3 USD/t/month).

Renting warehouses near the port is very expensive in Dakar (8 to 12 USD/t/month) as the port is surrounded by a densely populated downtown area; it is relatively cheaper in Abidjan and Lomé (4 to 6 USD/t/month).

The case of the port of Tema is very distinct. There is good availability of land around the port area, but there is a lack of storage facilities constructed and roads are in poor conditions in the city and around the port area. Therefore, it may be cheaper and easier for a new importing company to build its own warehouse in Tema than in other ports, but renting a warehouse is often more costly than in Abidjan or Lomé and ranges from 5 to 10 USD/t/month.

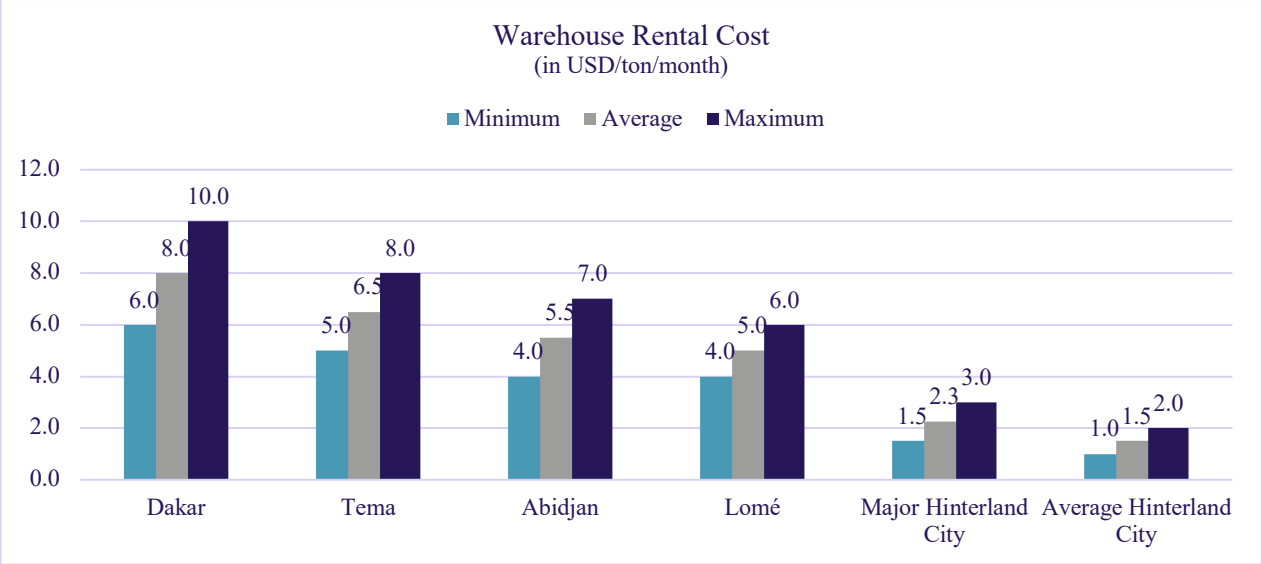

Figure 7: Comparison of storage cost (storage renting) in different cities

Financial Expenses

Bank interest is another important burden in the fertilizer import process. Financial charges depend largely on the importer's ability to borrow money on the international financial market.

While international companies have access to loans through their headquarters or subsidiaries located in Europe and/or the United States at an interest rate from 4% to 6% per year, West African companies that borrow from domestic banks generally have an interest rate between 10% and 15% per year. The situation is worse in Ghana, where the fluctuation of the Ghanaian Cedi and high inflation are leading local banks to lend money at rates ranging from 18% to 23% per year.

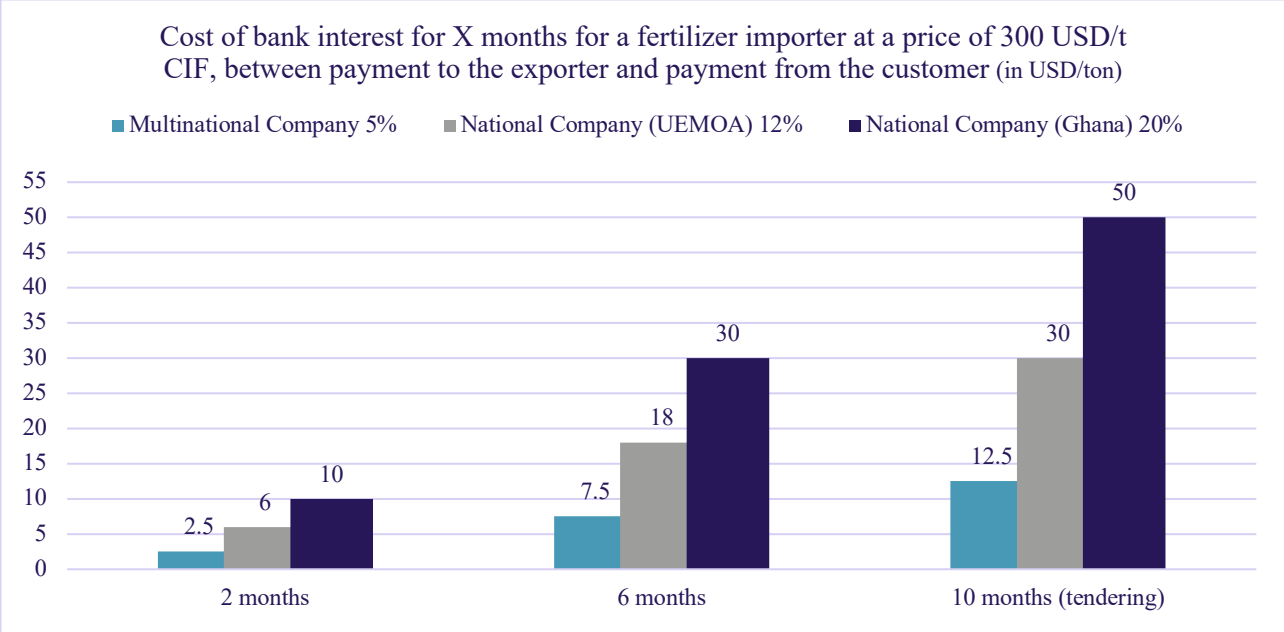

Figure 8: Comparison of financial expenses per source of financing and duration between payment to the supplier and payment by the customer

Other operating costs, such as administrative costs, losses, bag costs, or taxes on activities and profits are quite similar in each port and country.

Finally, in terms of operating costs, importers based in Burkina Faso, Mali, or landlocked cities of coastal countries enjoy a slight advantage over importers based in port areas due to lower handling and storage costs.

But importers that have their own storage facilities in the port area and are sister companies to large multinational groups may have even lower storage costs and bank interests.

6.5 Advantages and Disadvantages of Each Corridor

Although the port of Tema appears to be the most competitive port in 2019, differences in land transport costs make each port and corridor competitive in several regions and countries.

The map below gives an estimate of the most competitive port in supplying each region with a simple product (e.g., urea) or an already compounded product. For blended products in the sub-region, the competitiveness of port-based blending facilities is relatively similar.

However, the blending plants based in Mali and Burkina Faso are the most competitive in supplying their local markets with NPK of all kinds. The availability of local production (phosphate in Senegal and Mali) also improves the comparative advantage of local blending plants that strive to gain market share in other countries of the sub-region along the years.

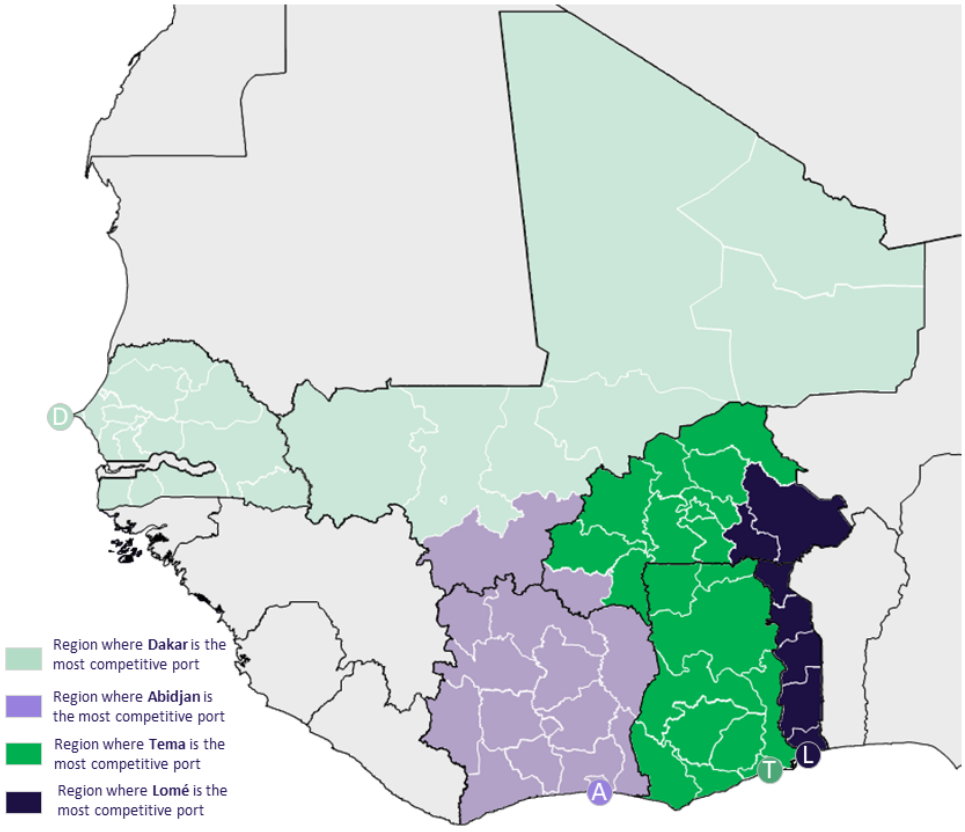

Figure 9: Competitiveness map of the four ports in the regions of the six countries per region (Source: consultants)

As shown on this map, each port is competitive in some regions of landlocked countries. The port of Tema is the most competitive port to supply Burkina Faso, and the port of Dakar is the most competitive port to supply Mali.

But Abidjan still has a strategic interest because of its position, which allows it to supply the southern regions of these two countries, representing important cotton and agricultural basins in general.

Each port therefore has its advantages and disadvantages. The table below summarizes these, while the four port factsheets produced in addition to this report include more details and analysis.

	Advantages	Disadvantages	Possible Changes in the Coming Years
Dakar	- Lower cost and duration of freight from Europe and the Mediterranean - Geographical proximity to Eastern and Central Mali - Berths dedicated to transit to Mali - Availability of a mineral quay dedicated to the export of phosphates	- Very high traffic congestion - Low land availability/high cost of storage - Too far away from Burkina Faso - Relatively high port fees	- New bulk carrier quay to be built soon on the new outer port of Dakar: congestion and land availability problems solved
Abidjan	- Geographical position to serve both southern Mali and southern Burkina Faso - Higher export rate than other ports (easier to fill bulk carriers on the return journey) - Availability of a railway line in the event of inflation in the price of road transport (which remains more competitive)	- Higher port fees - Very heavy maritime and road congestion - Prohibition of dockside bagging (classic BiBo)	- The extension of the port to Yopougon and Boulet Island could reduce current congestion in the long term.
Tema	- Lower port fees than in other ports - Reduced port and road congestion - Land availability - Most competitive port for Burkina Faso's supply	- Poor road infrastructure in part of the port area - English language that hinders the link with the hinterland countries - Less efficient customs cooperation for transit - Currency volatility, high bank interest rates	- Recent opening of the new container terminal which should further reduce congestion at the current port - Growing cooperation between customs and institutions in Burkina Faso and Ghana
Lomé	- The only deep-water port with a bulk carrier dock capable of accommodating Handymax vessels (up to 60,000 tons payload) - Correct land availability - Advantageous geographical position to serve Eastern Burkina Faso - Existence of a free zone	- Port very oriented toward container traffic and under-equipped for bulk unloading - Relatively small local market - Administrative burden that has so far limited the interest of the free zone	- Administrative and logistical facilities for transit to Burkina Faso and Niger → the port's desire to be a hub for transit to these two countries - Port investments to reduce road congestion.

7. Conclusion and Recommendations

7.1 Conclusion

Although the port of Tema offers lower costs, logistic efficiency, and a significant comparative advantage to supply Ghana and Burkina Faso, the cost difference among the four ports is quite insignificant, allowing each importer to be competitive in several of the six markets of the study zone.

Fertilizer costs in West African production zones depend mainly on the global fertilizer costs, which can vary by +/- 50 USD/ton in the space of a few months.

With such strong competition in the West African market, all stakeholders in the fertilizer value chain are already working toward optimizing their logistics.

Smaller importers remain competitive by limiting their storage time while larger importers achieve economies of scale by importing tens of thousands of metric tons in bulk and borrowing a large part of their financing needs on international financial markets.

While there are still ways to make profits, such as reducing the ship's waiting time in ports and developing bulk docks to allow larger ships to be unloaded, the main challenge today to further optimize logistics remains the structure of the market.

With about 50% of the demand related to public tenders[2] for subsidized fertilizer sales programs, logistics is highly dependent on the uncertainty of tender procedures and on political situations.

Tenders create uncertainty for importers regarding the volume they will have to import during the season. This prevents importers from planning their logistics on the basis of a slowly changing market share as they would have done in an open market.

Sometimes public tenders force importers to store fertilizer over a long period of time, and other times they have to hurry to import large quantities in a short period of time.

It also generates a high financial cost as importers will receive payment long after the import and distribution process.

Finally, it is even difficult to plan sales on the open market, as the demand for unsubsidized fertilizers depends largely on the availability or unavailability of subsidized fertilizers during the growing season.

7.2 Recommendations to Improve Fertilizer Import in West Africa

7.2.1 Build a Logistics Monitoring System

According to several sources (Argus, Marine Traffic, communications with importing companies and freight forwarders), WAFA should draft a monthly report on the logistics situation in West African ports. The report should monitor waiting times, traffic, administrative changes, sea freight rates, land transport costs, and all parameters that cause congestion and increase logistics costs.

[2] According to our estimates, public tenders represent 800,000 to 900,000 tons.

This report would help all importers to optimize their import strategies, prevent any major risk of cost increases, and avoid losses when importing and distributing fertilizers.

Due to a good network with transport companies, freight forwarders (at ports and borders), and WAFA members, an analyst working only four days a month should be able to write and publish this report.

This logistics report can also be part of a broader analysis report on the fertilizer market in West Africa.

7.2.2 Invest in Better Port Logistics for Bulk Cargo

Within the fertilizer import supply chain in West Africa, ports are the most challenging bottlenecks noticed to date. The current processing capacity of bulk-imported foodstuffs in the four ports is insufficient to meet the growth in demand for raw materials imported to the sub-region (construction materials, rice, wheat, sugar, fertilizers).

With high and growing congestion of bulk quays, importers are now facing a dilemma:

- Reduce the size of ships used for imports (5,000 to 15,000 tons) in order to reduce unloading time. The latter significantly increases the cost of ocean freight.
- Import on medium-size vessels (25,000 to 30,000 tons) and take the risk of assuming significant demurrage with very slow and sometimes interrupted discharges back into the sea at the port authority's request to make way for a priority vessel.

However, the logistical economy for an importer that could import a 30,000-ton vessel without delay and demurrage is more than 15 USD/ton compared to an importer with a 15,000-ton vessel.

To reduce import costs and fertilizer costs in the sub-region, several solutions must be proposed.

Improve Bulk Unloading Infrastructure

This includes increasing the draft of bulk carriers' docks and creating new ones but also building large storage and packaging areas near the docks to increase the rate at which ships are unloaded.

It is recommended to promote the implementation of a barge system to unload 30,000-ton vessels into several 5,000 ton-sub barges, which can be used as short-term buffer storage and unloaded as quickly as possible.

The main issue is that these necessary improvements alone will not be sufficient to sustainably meet the needs of fertilizer importers, as they will be overtaken very quickly by competition from other bulk import stakeholders (cement manufacturers, food importers) whose economic and political positions help them achieve priority to use every infrastructure.

Negotiate Two Priority Seasons for Fertilizer Imports

Complementary to the previous recommendation, this would ensure that regardless of the evolution of infrastructure and demand for bulk imported products, fertilizer importers would have priority of berthing for one month each during two seasons. These pre-planned periods, based on the seasonality of fertilizer demand, will encourage other bulk importers to organize their import logistics by taking into account fertilizer importers who are now relegated to the background.

One priority season should be before the start of the rainy season, and the other should be before the start of the off-season; they should be aligned with the timing of public tenders. The choice of these seasons will first have to be negotiated internally in each country by national stakeholders and those of neighboring countries under the aegis of WAFA.

Then, a negotiation will have to be launched with the states and the port authorities, insisting on the seasonality of the demand for fertilizers and its strategic power to rebalance the agricultural and food trade balance in the sub-region.

The impact of these priority import seasons could be to reduce freight, port, and storage fees by an average of USD 15 per ton. Multiplied by a consumption of 1,600,000 tons of imported fertilizer, such a measure in the four ports would result in a gain of 24 million USD for the agricultural sector of the six countries.

Negotiate Priorities and Dedicated Quays with Secondary Ports

The sub-region's secondary ports, in particular those of San Pedro in Côte d'Ivoire and Takoradi in Ghana, have made significant investments in recent years to improve their infrastructure and their connection with the sub-region. It would be possible to negotiate the allocation of a dedicated quay or a longer seasonal priority as many fertilizer importers commit to base their operations there. Again, a group negotiation under the aegis of WAFA and supported by its partners will have a much greater chance of success than several small individual negotiations.

Develop a Contract Template for Order Pooling and a Mediation Offer

In order to facilitate economies of scale, WAFA could develop interest for group orders. Today, the main difficulty encountered when orders are placed in a group by several importers is the distribution of demurrage fees. A group order contract template that fairly stipulates commitments and responsibilities in case of delays should be developed. Following discussions with small- and medium-sized importers who have a vested interest, this could be an important service provided by WAFA to its members. A mediation offer to help solve disputes and delay management problems could accompany this contract template and facilitate collaboration between stakeholders.

7.2.3 Changing Public Policies to Promote More Efficient Import Logistics

Advocate for Changes in Public Support for Fertilizer Prices

In 2019, most of the fertilizer price support, particularly in Senegal, Mali, and Ghana, comes from public tenders that often require fertilizer dealers to build up large stocks long before the agricultural season; this makes it difficult to optimize import logistics. These supply-side support policies considerably increase the logistical costs from distribution to producers.

At the same time, the availability of huge quantities of subsidized fertilizers in production areas often reduces farmers' interest in unsubsidized fertilizers during the agricultural season even if they are better suited to their crops. In general, the subsidy mechanism jeopardizes the logistics of supplying the free market and also makes the demand for unsubsidized fertilizers very unpredictable.

Fertilizer subsidies would be much more effective through a voucher-type pre-order/reduction voucher system, unrelated to a specific formulation and allowing importers and dealers to optimize their logistics according to their market share, distribution network, and investment strategy. A voucher system could even help improve logistics by providing more predictability at the request of farmers and encouraging order pooling.

With a voucher program, fertilizer traders would be able to better anticipate demand and plan their import and distribution logistics in each country. Such a change in agricultural policies would lead to lower fertilizer prices through a reduction in storage time and better import and distribution logistics. The short-term gain is estimated at around 20 USD/ton. Applied to a subsidized consumption of 900,000 tons in the three countries, it would reduce fertilizer costs by 18 million USD for small and medium farmers. Indirect effects on improving and boosting sub-regional fertilizer supply and demand would lead to additional sub-regional gains and consumption growth.

Ideally, in the medium term, this mechanism should be upscaled across ECOWAS to ultimately create a single market with significant economies of scale for fertilizer producers, importers, and distributors.

Partnering With Producer Organizations to Demand More Ambitious and Productive Agricultural Market Regulation Policies, Especially for Food Commodities

Fertilizer consumption and intensification of practices in West Africa are clearly limited by price inflations, particularly in the food production sector (particularly for rice and corn).

The majority of West African policymakers remain focused on short-term pro-consumer policies aimed at keeping food prices low, particularly for cereals. These policies encourage the maintenance of large imports of rice and corn at very low prices that compete with local production.

With farmgate prices of paddy rice below 150 FCFA/kg and corn grain below 100 FCFA/kg, as observed in 2017, 2018, and 2019, producers have a clear incentive to de-intensify their production and to apply fertilizers only when they are subsidized.

In order to support the growing demand for inputs, the fertilizer industry stakeholders' association (WAFA) must work together with agricultural federations and unions (often too weak and divided to make a strong and coherent appeal) to defend a minimum cost or price stabilization policy that guarantees the interest of intensification in the sectors that have the greatest potential for fertilizer use and yield increases.

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