# Value Chain Analysis for Strategic Sectors in Mozambique

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## Table of Content

## Executive Summary

## Cotton Farming

Cotton farming was once a thriving sector in Mozambique, but war, internal politics, fluctuating international prices, and other factors have hindered its growth until recently when the sector began to show some signs of recovery. It is estimated that 350,000 smallholder farmers with a total economic dependence base of 1.5 million people (10% of the total population) make their livelihood through cotton farming.

In cotton growing regions in the north, particularly in Nampula and Cabo Delgado, cotton farming accounts for 52 – 84 percent of household income. While cotton is grown widely in Mozambique, these two provinces account for over 75% (118,866 ha) of all cotton production in Mozambique.

Total production of seed cotton in 2004 reached approximately 92,000 tons, and it is anticipated that 2005 will yield as much as 120,000 tons. But this is far short of the production potential, which is estimated to be as much as 400,000 – 600,000 ton of raw cotton per annum. But taking into account that nearly 98% of cotton is grown by 350,000 smallholder farmers who view cotton farming as a low-input, low-output cash crop, continuing production using the existing market structure and farming practices is unlikely to support an increase in yield rates for the country to realize its full potential in the cotton sector.

In addition to poor on-farm practices, poor use of agricultural inputs such as fertilizers and sprays are also to blame for the low yield rate. When compared with West African cotton producers like Mali (now the largest producer of cotton in Africa), the Mozambican cotton farmers achieve yield rates which are less than one-third to one-half of its competitors.

At the beginning of each season, the National Commission for Price and Wages (Comissão Nacional de Salãrios e Preços) define a minimum price for raw cotton for the entire season. The price is generally negotiated between MADER and IAM, cotton companies, and smallholder representatives. While the concession and a minimum pricing system was useful in stimulating the revitalization of the cotton sector, the prevailing market systems has had a negative effect on stimulating growth and efficiency in the cotton industry.

An average seed cotton yield in Mozambique ranged between 415 – 600 kg/ha, which is low even in Africa. In the two scenarios analyzed for this study, average yield rates ranged from a low of 297 kg/ha to 450 kg/ha. According to field interviews and data collection, average per hectare production costs among cotton farmers ranging between \$26.66/ha to \$41.15/ha. This translates to a production cost of \$0.06 - \$0.14/kg, which is extremely low, even compared to a number of companies outside the region.

The overall findings from the value chain analysis suggests that in both case studies, harvesting, chemical spraying and seeding constituted the three highest value adding activities for Mozambican cotton farmers. Seeding was consistently the third highest value adding activity, while harvesting and spraying were found to be either the highest or the second highest value adding activity, depending on the concession.

Key constraints identified in the value chain for cotton farming include the following:

- High collection costs (high cost of transport) and poor extension services;
- High cost of accessing agrochemicals; and
- Poor access and consistent use of quality seeds.
- Other issues: poor institutional representation; high cost of finance; and poor system of cotton grading.

## Accessing Agricultural Chemicals

High cost of agrochemicals, namely fertilizers and insecticides, and its lack of use as a result, is a chronic problem contributing to low yields. It is estimated that 9 out 10 smallholder farmers do not use fertilizer, principally due to the high costs. Similarly, while standard spraying regime for untreated seeds is five applications per season, smallholder farmers spray 2 or 3 times on average. As a consequence, cotton fiber quality and yield rates are constantly compromised.

Given the small market demand for fertilizer, dealer/distributors are generally unable to negotiate a discount. For example, minimum order for fertilizers from Saudi Arabia is 10,000 tons per order. At this volume, the delivered price of Urea in Beira is approximately $295/ton. Given that even the largest dealer/distributors in Mozambique only order between 3,000 – 7,000 tons of Urea per year, local companies are generally unable to purchase fertilizers at competitive prices.

Import transaction costs are approximately $0.10/kg or 27% of the initial cost of fertilizer, of which the cost of transport constitutes nearly 80% of the total cost of accessing fertilizers. While the import transaction costs, particularly with respect to transport costs is high, interviews with fertilizer importers suggests that the time lag between issuance of a purchase order and delivery is extremely long, particularly taking into account the cumbersome clearance procedures. It is estimated that between the issuance of a purchase order and delivery, the time lapse is between 27 – 36 days. As a result of the relatively long time lapse, dealers/distributors are forced to keep stock on hand to accommodate fluctuating market demand. This in turn introduces additional warehousing costs which must then be past on to farmers.

Banking charges and fees paid at the terminal constitute an additional 10% to the cost of accessing fertilizer.

### *High Cost of Importing Insecticides*

Similar to fertilizers, the time lapse between the issuance of a purchase order and delivery is long, thus causing dealer/distributors to hold substantial inventory to accommodate demand fluctuations in Mozambique. Specifically, it takes up to 3 months to negotiate and place an order, and another 3 months for delivery.

Taking into account all of the transaction costs, including freight, duty and service charges, the spread between the FOB and delivered price ranges between 61% - 76%. Excluding the actual cost of purchasing the insecticide, three factors adding to the cost of importing insecticides include:

- High dealer/distributor mark up (25% - 35%);
- High cost of freight (1.7% - 5.5%); and
- High financing charges (2.5%).

### *Cost of Delivering Insecticides to Farmers*

Because of high costs associated with agrochemicals, farmers tend to spray their crop only two to three times per season rather than the prescribed 5 applications. According to interviews, minimum difference in yield between 3 and 5 applications is as much as 150kg/ha.

According to this case study, the combined cost of insecticide and hardware per hectare per application ranges between 50,606 Mts – 63,775 Mts ($2.17 - $2.73). Based on these figures, three applications costs approximately 151,819 Mts/ha ($6.50/ha), while the prescribed 5 application costs approximately 253,032 Mts/ha ($10.84/ha).

Taking into account that a network of rural stockists and other support infrastructure for farmers are not available in Mozambique, cotton farmers have no other option but to rely on concession holders to supply them with agricultural inputs. In this context, there is some possibility that the absence of competition in the agrichemical market is contributing to a market distortion that results in dampening the revenue generating potential of cotton farmers.

## Cotton Ginning

Given the relatively low production and yield rates, the ginning sector in Mozambique is characterized by over capacity and poor productivity. The ginning sector has experienced an active turnover of players in the market, as reflected in the number of companies exiting and entering the sector. It is estimated that there are approximately 17 operational ginneries with an installed capacity ranging from 150,000 – 230,000 tons/year.

With capacity utilization of less than 50%, ginneries continue to face high fixed costs. Two large ginners account for about 60% of all ginning capacity in Mozambique, of which the JFS Group, the largest operator with two joint venture companies, control over 40% of domestic production.

The ginning outturn (GOT) ratio (the conversion ratio from raw to lint cotton) in Mozambique is estimated at approximately 34%. This is slightly below average compared to other countries in Africa. While poor seed quality is a major culprit contributing to the poor GOT ratio, interviews with ginners highlight other critical issues that hinder ginners from achieving greater yield rates.

- Low moisture content of cotton due to late planting and late harvest;
- Dirty cotton due to poor on-farm techniques, resulting in an additional 2% loss;
- Use of mixed seed varieties resulting in inconsistent fiber quality;
- Cotton mixing when bulking resulting in inconsistent fiber quality.

The two ginneries reviewed for the value chain analysis had a GOT ratio of 34.0% - 34.4%, which is representative of the sector. Based on a delivered price of seed cotton ranging between $0.09 - $0.14 per kg, estimated cost of ginning one kg of lint cotton ranges from $0.15 - $0.26 per kg of lint. According to the value chain analysis, 47% to 69% of the total value of lint cotton comes from seed cotton, while 20% - 26% of value comes from administrative activities, and 5% - 8% from transport of lint cotton.

***Administrative Charges***

Interest charges (48.1%), depreciation (25.9%) and overhead costs (13.5%) were the highest cost components associated with administrative costs. Interest charges are related to the high cost of financing agricultural inputs for smallholder farmers.

One notable difference between the government-private joint venture ginnery and the purely private ginnery was that IAM levy (collected under the MARD), and port clearing payments (collected under the Port Authority and Customs) were substantially lower for a joint venture company (2.7% and 2.1% respectively), when compared to a private company where the distribution of costs for IAM levy and port clearance was 31.9% and 10.2% respectively.

Other issues identified by the value chain analysis include:

- **Poor quality of electricity:** Ginners continue to face fluctuations in their power supply or even complete blackouts. As a result, a number of ginners cited that during one season (81 days of ginning), power surges contributed to 35 equipment breakdowns (jams in the gin stand and lint cleaner), which accounted for a total of 4.6 – 4.8 days of work lost per season. As a consequence, some ginners have installed a parallel power supply, principally using diesel generators where the cost of electricity is approximately $0.085/Kwh, as opposed to $0.035/Kwh on the grid.
- **Sampling requirement:** A number of ginners have voiced their concern regarding this system as IAM does not retain the samples, but in fact sells them off in the market to generate additional revenue. It is estimated that

approximately 73.6 tons of samples per annum are being sold in the market by IAM.

- **Dirty Cotton:** Lack of on-farm support due to the lack of access to transportation for extension works, ginners continue receive dirty cotton from its farmers, which not only increases the cost of cleaning cotton, but also contributes to a 2% loss rate.
- **Absence of Qualified Ginning Mechanics:** It is estimated that there are only 5 qualified ginning mechanics in Mozambique.
- **Absence of Metrology and Calibration Capacity:** In addition to the lack of trained ginning mechanics, the absence of metrology and calibration capacity is limiting the operational capacity of existing ginning equipment due principally to the inability to accurately calibrate equipment.

### Transport and Infrastructure Support Services

The average cost of sea cargo from Asia to Mozambique is between $2,550 - $3,250 per container, and $2,650 - $2,950 per container to and from Europe. The principal challenge facing Mozambique is to attract more international shipping lines to its ports. Majority of shipping lines continue to use the Port of Durban (South Africa) as a hub with feeder services to ports in Mozambique. Consequently, the Port of Maputo only receives regular calls from six international shipping lines for break bulk and six for container cargo.

The three principal ports are connected by road and rail. Mozambique has a total of 25,000 km of roads, of which only 4,300 km can be classified as primary road.[1] In addition, Mozambique and its neighboring economies are supported by a 3,048 km railway infrastructure network, which is divided into four geographic areas.

Although railways serve an important role in linking the east-west corridor, Mozambique Railway's rolling stock has decreased considerably during the last ten years. The number of locomotives has declined by as much as 41%, where the current operational locomotives number less than 50. Similarly, the number of operable wagons has declined by 55% (less than 2,300 wagons are currently in operation).

In the Maputo Corridor the border controls at Ressano Garcia (South Africa) and Namaacha (Swaziland) are weak and lack proper infrastructure including communication facilities. Trucks importing goods to Mozambique are required to go through customs clearance through the Matola Cargo Terminal (FRIGO), a privately owned inland clearance terminal on the outskirts of Maputo. Interviews suggest that traders are concerned with the long waiting times (refer to an earlier table outlining the time lapse associated with customs clearance) and the fact that these tariffs are extremely high, especially for valuable goods.

As far as customs clearing agents are concerned, traders feel that there is a lack of competition in Mozambique. The largest agent is ADENA, the state-owned national

[1] 50% of the roads are tertiary roads and not suitable for heavy truck traffic.

clearing agent with offices in Maputo, Beira, Nacala and Tete. The clearance process continues to be highly centralized around Maputo. This process added more than one week and $155 ($110 for clearance and $45 for certificate of origin) to a clearing process which should only take one to two days.

Given the state of the existing internal infrastructure, Mozambique's economy is defined according to the three distinct geographic regions: south, central and north, where market integration, particularly with respect to value added production, is virtually unrealizable due principally to the lack of access to a viable north-south transport corridor.

For a trader to use road transport to move a product from Pemba to Maputo, a truck would be required to use of the east-west corridors to travel through Malawi, Zambia and Zimbabwe to travel south and eventually use the east-west corridor to re-enter Mozambique. As Table 17 indicates, it costs nearly $7,000 to transport a 22 – 24 ton container from Maputo to Pemba, which is nearly 2.5 times the amount it would take to ship the same container from Dubai ($2,550) or Guangzhou, China ($2,550).

Similarly, given the infrequent service routes and poor quality of shipping service, shipping cargo from Nacala to Maputo costs $2,500, which is nearly 3 times the cost of shipping a container from Maputo to Dar-es-Salam, Tanzania ($845), and approximately the same cost as shipping a container from Dubai or Guangzhou to Maputo.

## Textile

Historically, Mozambique has had a number of operational textile mills, but since 1993, most mills have closed down with the exception of Riopele, which closed in early 2003. Until 1973, companies were prohibited from spinning cotton as all lint cotton was exported to Portugal. But in 1975, the new government allowed private mills to spin and weave cotton. While none of the mills are currently operating, what is evident in Mozambique is that there is a wide range of operable and repairable equipment sitting idle in the country. Operationalizing existing companies, however, will require substantial debt restructuring, technical improvements, and a realignment of the current labor regulations to help reduce the burden of idle labor.

Based on an estimate developed by one recently closed textile mill, it would cost approximately $2.53/meter to produce synthetic material using current equipment, which includes the cost of raw material. Alternatively, taking into account that the equipment set up at one of the textile mills is based on the use of synthetic material rather than lint cotton, the estimated cost of production excluding material costs, is estimated to be approximately $1.34/meter.

Taking into account that the delivered price of lint is extremely low compared to other countries, there is potential for textile mills in Mozambique to produce competitively priced cotton yarn, which in turn would open up opportunities for Mozambique to revitalize its spinning and weaving operations, and thus position itself to develop a competitive integrated textile and garment industry.

## Garments

As a late comer to AGOA, and the limited garment production in Mozambique, the country fills a mere 0.08% of total AGOA apparel exports to the U.S. measured in square meter equivalent. Lesotho, a landlocked country without in-country cotton resources, continues to be the largest exporter of textiles and apparel under AGOA to the United States.

This poses the question why a country like Mozambique which is able to produce cotton and lint and with a history of textile production, is unable to take advantage of AGOA to generate employment and income not only for selling garments into the U.S. market, but also to become a supplier of yarn and fabric to other African countries, like Lesotho, which must import input materials to continue to enjoy its quota status under AGOA.

Generally, input material, namely fabric, is imported from China and India, or alternatively, the parent company outside Mozambique supplies all the inputs as is often the case in cut, make and trip (CMT) operations. The CMT value added for the garment company currently operating in Mozambique is estimated to be $0.69/T-shirt. The three highest value adding activities include, sewing/assembly (30.5%); finishing (22.8%); and administrative overhead (16.0%).

***Sewing and Assembly:*** The sewing and assembly function within the value chain is divided into three value adding activities: labor (88.5%), utilities (4.3%), and depreciation and maintenance (7.2%). A closer scrutiny of labor productivity reveals that due to poor labor skills, the labor productivity in production of T-shirts per person per day is approximately 10 - 11.2. A similar comparison with Kenya and Lesotho show that labor productivity in Kenya for the production of a similar T-shirt was 20 – 24 T-shirts/person/day.

Labor skills are clearly a problem, but so too is the value added for depreciation and maintenance, which is estimated at 7.2%. Generally, garment factories add between 17% - 32% value for depreciation and maintenance, which indicates that a factory is investing in regular maintenance of its equipment. However, in this case, the relatively low value added suggest that the factory may not be keeping up with regular maintenance activities of its equipment, which would lead to equipment breakdown and lost operational time. This, in part, would help explain the defect rates and low labor productivity rate.

***Finishing:*** The second highest value added activity is finishing, which constitutes 22.8% of the overall value added. The distribution of value added activities are somewhat similar to the situation found in sewing and assembly, specifically, high labor input (82.5%), and low depreciation and maintenance (6.5%). Here again, low labor productivity and limited investment in regular maintenance helps to explain the low labor productivity and high defect rates.

***Administrative Overhead Costs:*** The third area of high value added is administrative overhead costs (16%), of which 100% is accounted for by labor inputs. A closer scrutiny of this figure reveals that the factory relies on a large number of expatriate staff. Specifically, the factory uses 16 expatriate staff, of which 12 are line supervisors for sewing/assembly and finishing operation, and front office functions (business managers, accountants, etc). This figure is reflective of the fact that there are few well trained local line supervisors and workers with middle management skills in Mozambique.

***Other Critical Issues:***

- Labor absenteeism;
- Poor physical infrastructure;
- Slow order-to-delivery sequence time due to poor infrastructure support services and long custom clearance procedures; and
- Anticompetitive labor regulations.

## I. Background and Methodology

Mozambique has been successful in attracting foreign direct investment in "mega-projects" that have been the catalyst of economic activity and fueled remarkable growth estimated at 14 and 9 percent for 2001 and 2002, respectively. The Mozal project was the first major foreign investment project in Mozambique, at a time when the country was struggling to attract investment after two decades of civil war. While there has been some impact on employment and on both backward and forward linkages to the domestic economy, the project has also had a positive impact on growth and level of exports. Over the last four years Mozambique has seen its level of exports increase steadily and achieve an unprecedented US$1 billion in 2002 (at which time there was limited growth in exports outside of Mozal). The country has also registered a significant growth in the level of FDI dominated by technology-intensive investment and other "mega projects". In addition to the already mentioned $2.2 billion investment from Mozal in a state of the art aluminum smelter, other "mega-projects" include the Pande gas fields and pipeline development in which is a $1.1 billion began, the Corridor Sands Titanium Dioxide project and the Moatize Coal/Zambezi Valley Transport corridor.

Overall, Mozambique's macroeconomic performance since 1992 has generally been good. However, the economic performance is far from generating the 3.7 million new jobs that need to be created between now and 2010 if poverty is to be halved, as envisaged under the Plano de Acção para a Redução da Pobeza Absoluta (PARPA). Consequently, the country now has an increasing need for better prioritization and management of public expenditures to eliminate absolute poverty and to focus its resources where it would have greater returns. These public resources would need to be allocated to their best use, so as to establish the enabling environment necessary for the private sector to be the main engine for economic growth.

The efficient allocation of resources is important since outside of the "mega projects" and a few select enterprises, the economy has remained non-competitive. Of particular concern is the weak state of the local private sector, which has not been able to take advantage of opportunities in the domestic market, and whose range and quality of services and products remains narrow. Owing to economic inefficiencies, prices in Mozambique tend to be extremely high in comparison with South Africa, for example. This fact is well captured in the "Nelspruit phenomenon" which is based on the fact that $30 million[2] is spent on a monthly basis by Mozambicans in a small South African town located some 90 kilometers away from the Mozambican boarder. Though helped by the favorable exchange rate between the Metical and Rand up until mid-2002, this phenomenon also reflects the lack of competitiveness of Mozambican firms.

Gaining competitiveness and generating a broad-based private sector-led economic growth strategy poses considerable challenges and will take time and significant resources. Among the challenges that would need to be addressed during the coming years, and which are worth noting, are the inadequacies of the financial system, the constraints of the business climate, the deficiencies in level of infrastructure services, as

[2] Financial Mail – December 6, 2002. This amount is based on the tax receipts at the Komatipoort border.

well as the inadequate supply of skilled labor. The impact of these factors is even more prominent on small firms in Mozambique, which constitute the majority of the private sector in this country, as is the case in many other African countries.

## 1.0 Objectives of the Value Chain Analysis

The competitiveness of the private sector depends on how well the market is organized and whether it maximizes productivity along the entire chain of activity from inputs of raw materials to marketing of final goods. To support the Government of Mozambique's (GOM) strategy to increase the competitiveness of the private sector, the World Bank Group is providing support through a Private Sector Development (PSD) Strategy/Economic and Sector Work (ESW), of which this analysis will be a major part. This study will provide a better understanding of the characteristics and inefficiencies of specific value or supply chains[3]. It will help the Government, and the private sector to identify the measures needed to minimize impediments and improve the environment for private investment and thus, strengthen the competitiveness and growth potential of the private sector so that it plays its role in promoting a broadening of the base for economic growth in Mozambique.

## 2.0 Scope of Work

The study focuses on four specific key sectors and products:

- Cotton-to-garments
- Wood transformation;
- Banana; and
- Mango.

The principal objective of the value chain analysis is to compile indicative data at the product level to achieve the following three goals: (i) quantify the effects of the inefficiencies of logistics, current infrastructure network, supporting services and regulatory impediments on firm's competitiveness/productivity in the four sectors as identified above; (ii) prioritize policy, procedural and physical constraints along the supply chains; (iii) compare with internationally recognized benchmark/standard; and (iv) recommend policies and interventions to reduce inefficiencies and improve competitiveness of the firm. The data compiled reflects cost, time and reliability factors in obtaining inputs (where applicable) and delivering final products to final markets.

For each identified sector/product the value chain analysis characterizes the product market including the sourcing of raw materials, buyers, mechanisms for information flow within the chain, key supporting services (energy, transportation, etc), the importance to the economy, and the extent to which the lessons from this sector are applicable to other sectors. Specifically, analysis provides a cost and time estimate of the major steps in the supply chain of each product. The analysis includes, but is not limited to, the following:

[3] The term "supply chain" will include the measurement of value added at various key segments along the supply chain of a product from sourcing of inputs to marketing.

- Segment the supply chain into major value-added activities;
- Estimate cost of supplying value-added at each segment of the supply chain;
- Identify major bottlenecks that apply to each section of supply chain in the areas of physical infrastructure, logistics (including customs procedures and facilities, technical barriers to trade, such as standards for product quality and testing, certification processes, etc); other supporting services; business/investment climate issues (policy and regulatory impediments, administrative requirements, etc.), and availability and cost of finance and skilled, semi-skilled and unskilled labor;
- Measure cost and time along the entire supply chain of a product (including logistics costs and time in moving the products on selected routes both within the country and in the region, as well as international markets) and quantify the impact of these costs on firm level competitiveness in responding to markets, demand and competition;
- Benchmark Mozambican costs against similar value-chains in similar markets (regionally and internationally) to identify specific areas where Mozambican production is less efficient;
- Identify causes – policy distortions, administrative procedures, nature and level of skills, access to capital equipment, access to capital – that raise costs in the value chain segment;
- Monetize the cost of policy interventions/regulations (cost of compliance, hidden cost of compliance – cost of internal resources used by each company to comply).

Further, the study makes recommendations on the institutional and policy linkages between the supply chain performance and specific policies, regulations and standards originating from either the public or private sector. The analysis also identifies specific institutional and policy measures that help enhance the private sector's ability to improve supply chain performance. Finally, based on the findings of the analysis, the study makes recommendations on policy and institutional measures that will improve productivity and performance along the supply chain.

## II. Cotton Farming: Background

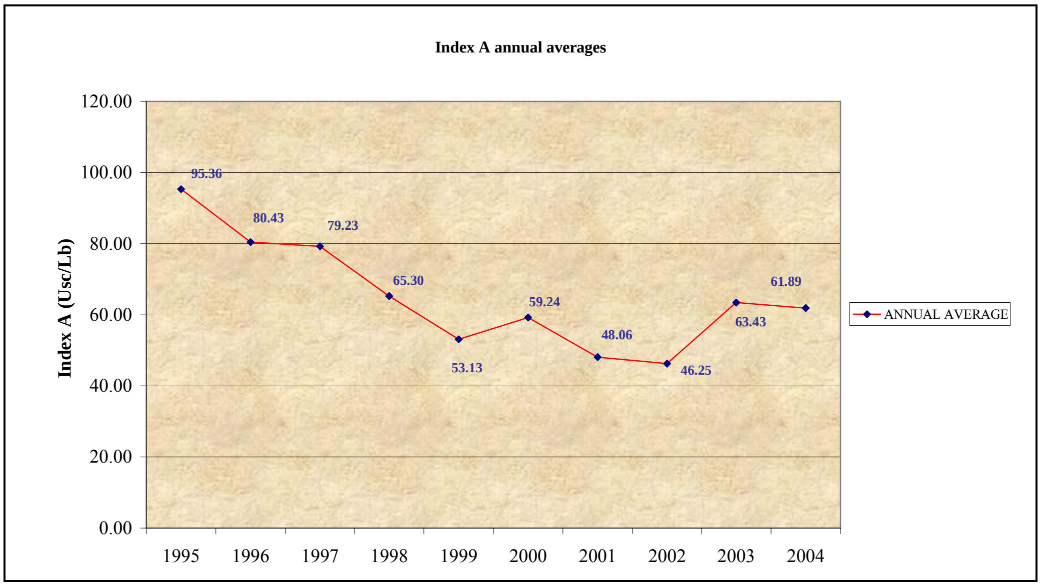
Cotton farming was once a thriving sector in Mozambique, but war, internal politics, fluctuating international prices, and other factors have hindered its growth until recently when the sector began to show some signs of recovery. It is estimated that 350,000 smallholder farmers with a total economic dependence based of 1.5 million people (10% of the total population) make their livelihood through cotton farming. The average size of smallholder farms is generally between 0.25 and 1 hectare, while medium size farms, of which there are not many, can be as large as 10 hectares.

Taking into account that there have not been adequate investments in R & D to help identify and cultivate suitable seed varieties, farmers are limited to a narrow selection of seed varieties, which is partly to blame for the low yield rates achieved by most farmers. Most popular varieties used by farmers are Remu 40, CA 324, Stam 42, and A637-24. An average smallholder farmer is able to achieve yield rates between 415kg/ha and 600kg/ha, using seeds with a yield potential over 2,000kg/ha. A profile of Mozambique's cotton sector is provided below (refer to Table 1).

| **Table 1: Mozambique's Cotton Sector Profile** | |
|---|---|
| **1.0 Land under cotton production** | |
| 1.1 Growing area | 150,000 - 200,000 ha<br>(Nampula: 72%; Cabo Delgado: 17%) |
| **2.0 Production level** | |
| 2.1 Peek production level (1973) | 144,061 tons |
| 2.2 2003 | 54,000 tons |
| 2.3 2004 | 92,000 tons |
| 2.4 2005 estimated production level | 120,000 tons |
| **3.0 Farmers in cotton production** | **350,000 small holder households** |
| **4.0 Cotton variety** | **REMU 40; A637-24; CA 324, STAM 42** |
| **5.0 Farm size (average)** | |
| **5.1 Smallholder farm** | **0.25 – 1.0 ha** |
| **5.2 Small and medium farmers** | **2.0 – 10.0 ha** |
| **6.0 Yield rate (average)** | |
| 6.1 Seed cotton | 415 – 600 kg/ha |
| 6.2 Lint cotton | 191 kg/ha |
| 6.3 Seed-to-lint Conversion ratio | 0.34 – 0.42:1 |
| 6.4 Yield potential | 2,000 kg/ha |
| 6.5 Realized yield | 30% - 33% |
| **7.0 # of Smallholder farmers (families)** | **265,000 families (85 -90% of total production)** |
| **8.0 Cotton export (value)** | **$18.3 million (2.6% of total exports)** |
| *Source: Global Development Solutions, LLC™* | |

The annual average Index A price for cotton has been on a steady decline since 1995. However, a slow recovery beginning 2002 is beginning to slowly rebuild the confidence of cotton farmers. But 2004 also saw a slight decline in Index A prices, which suggests that cotton producers to be mindful of continuing to push for the production of higher quality cotton (refer to Diagram 1)

**Diagram 1: Average Annual Index A Prices**




In cotton growing regions in the north, particularly in Nampula and Cabo Delgado, cotton farming accounts for 52 – 84 percent of household income. While cotton is grown widely in Mozambique, these two provinces account for over 75% (118,866 ha) of all cotton production in Mozambique (refer to Table 2).

**Table 2: Cotton Production by Province (2003)**

| | Area | | Production | | @ Yield rate |
|---|---|---|---|---|---|
| | **Ha** | **% of Total** | **Tons** | **% of Total** | **kg/ha** |
| Cabo Delgado | 29,265 | 18.5% | 13,376 | 24.7% | 457.06 |
| Nampula | 89,601 | 56.6% | 21,029 | 38.8% | 234.70 |
| Niassa | 9,913 | 6.3% | 1,850 | 3.4% | 186.62 |
| Zambezia | 6,111 | 3.9% | 1,889 | 3.5% | 309.11 |
| Tete | 10,233 | 6.5% | 2,209 | 4.1% | 215.87 |
| Sofala | 13,111 | 8.3% | 11,061 | 20.4% | 843.64 |
| Manica | <1 | | 2,595 | 4.8% | na |
| Inhambane | <1 | | 101 | 0.2% | na |
| Gaza | <1 | | 34 | 0.1% | na |
| Maputo | <1 | | - | 0.0% | na |
| **Total** | **158,234** | **100.0%** | **54,144** | **100.0%** | **342.18** |

*Source: IAM (Institute of Cotton, Mozambique)*

Total production of seed cotton in 2004 reached approximately 92,000 tons, and it is anticipated that 2005 will yield as much as 120,000 tons. But this is far short of the production potential, which is estimated to be as much as 400,000 – 600,000 ton of raw cotton per annum. But taking into account that nearly 98% of cotton is grown by 350,000 smallholder farmers who view cotton farming as a low-input, low-output cash crop, continuing production using the existing market structure and farming practices is unlikely to support an increase in yield rates for the country to realize its full potential in the cotton sector. As evident from Table 2 above, average yield rates continue to be low.

In the absence of effective extension services, poor on-farm management practices, yield rates have declined by nearly 50% since the early 1990s (refer to Table 3).

| **Table 3: Yield Rate Differential Between 1991 and 2003 by Province** | | | |
|---|---|---|---|
| **Province** | **kg/ha** | | **Yield Differential** |
| | **1991** | **2003** | |
| Cabo Delgado | 881 | 457 | 51.9% |
| Gaza | 1,838 | na | |
| Inhambane | 961 | 101 | 10.5% |
| Manica | 427 | na | |
| Maputo | 1,700 | na | |
| Nampula | 357 | 235 | 65.8% |
| Niassa | 166 | na | |
| Sofala | 1,138 | 844 | 74.2% |
| Tete | na | 216 | |
| Zambezia | 224 | na | |
| **Average** | **854.67** | **370.60** | **43.4%** |
| *Source: IAM* | | | |

In addition to poor on-farm practices, poor use of agricultural inputs such as fertilizers and sprays are also to blame for the low yield rate. When compared with West African cotton producers like Mali (now the largest producer of cotton in Africa), the Mozambican cotton farmers achieve yield rates which are less than one-third to one-half of its competitors (refer to Table 4). With this said, however, the average fiber length is very good. According to interviews, between 63% – 77% of production achieve fiber length of 2.8575 cm, while 21% - 35 % of production results in fiber length of 2.7781 cm. Taking into account that many African cotton producers are only able to achieve fiber length of less than 2.6 cm, the quality of cotton fiber produced in Mozambique is considered competitive.[4]

| **Table 4: Cotton Yield Benchmark (2003)** | | | |
|---|---|---|---|
| **Country** | **Yield (kg/ha)** | **Country** | **Yield (kg/ha)** |
| Kyrgyzstan | 2,450 | United States | 745 |
| Israel | 1,700 | Kenya | 572 |
| Australia | 1,600 | Pakistan | 500 |
| China | 1,270 | **Mozambique** | **415 – 600** |
| Cambodia | 1,200 | India | 315 |
| Mali | 1,100 – 1,200 | Africa Average | 300 – 379 |
| Mexico | 1,000 | World Average | 589 |
| *Source: Global Development Solutions, LLC™* | | | |

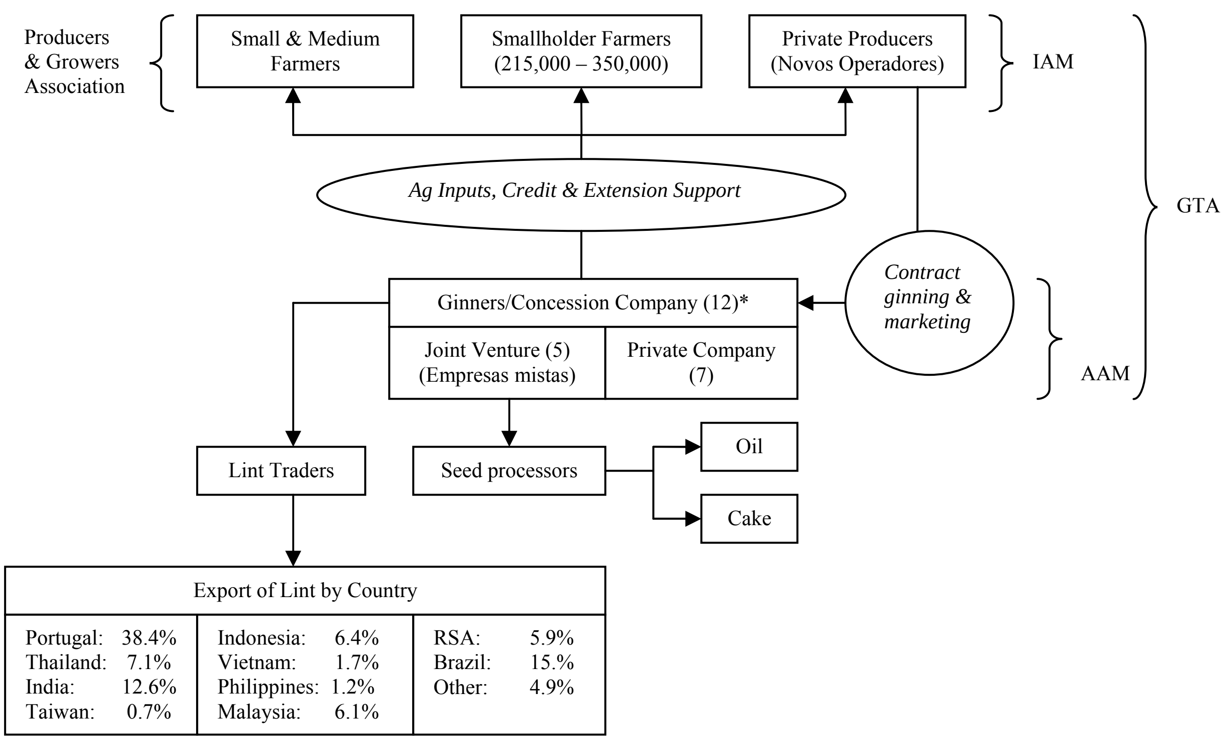
[4] Some producers in Egypt, for example, can achieve fiber length of 3.0 and higher, but generally, this would be considered more of an exception rather than the rule.

Even though yield rates are low, cotton exports command over 40% of agricultural exports from Mozambique, and depending on international cotton prices, generates between $10 - $30 million in export revenue.

Although cotton farming is dominated by smallholder farmers, the cotton sector is divided into three producer groups, namely small and medium farmers, smallholder farmers, and private producers. Given the high cost of agricultural inputs and the absence of effective extension services, ginners/concession companies, of which there are currently 12 in operation, provide support to farmers as a part of an off-take agreement to purchase 100% of cotton produced by a participating farmer (refer to Diagram 2).

Cotton farmers and ginners/concessionaires are represented by three organizations, namely, Instituto do Algodão de Moçambique (IAM) – Mozambique Cotton Institute; Mozambique Ginners Association (Associação de Algodoeiŕos de Mozambique) – working group within Min. of Agriculture (AAM); and Grupo de Trabalho do Algodão (GTA) – members from AAM, IAM, DAP. Generally, the private sector view these organizations as lacking adequate technical and support capacity, and feel that they do not necessarily serve the interest of its constituents.

**Diagram 2: Structure of the Cotton Industry in Mozambique**




Producers & Growers Association: Large associations could be a grouping of more than 3,000 farmers
IAM: Instito de Algodão de Mozambique
AAM: Mozambique Ginners Association (Associação de Algodoeiŕos de Mozambique) – working group within Min. of Agriculture
GTA: Grupo de Trabalho do Algodão – members from AAM, IAM, DAP
* Installed capacity of 176,000 – 224,000 tons/year (33% - 43% capacity utilization)
*Source: Global Development Solutions, LLC*

## 1.0 Institutional Profile

***The Mozambique Cotton Institute (IAM)***: Established in 1991 under the Ministry of Agriculture and Resource Development (MARD), IAM is tasked with coordinating the production of seed cotton, to perform marketing functions on behalf of the cotton sector, and to ensure proper processing of raw cotton. In 1994, IAM in collaboration with the Provincial Directors of Agriculture and the private sector formulated a regulatory framework (Regulamento para a Cultura do Algodão) to help classify companies engaged in the cotton sector into six categories, namely:

- Smallholder farmers (family sector);
- Non-autonomous farmers;
- Independent farmers (medium scale farmers)'
- Concessionaire companies;
- Ginners; and
- Lint traders.

In addition to the role played by the IAM in company classification, IAM is also tasked with a wide variety of functions, including:

- Statistical monitoring and analysis;
- Market supervision;
- Cotton lint classification;
- Conflict resolution;
- Marketing and promotion of cotton production throughout the country; and
- Advising MAP on awarding new concessions.

IAM's activities are funded through a 2.0 - 3.5% export levy on cotton produced by smallholder farmers (family sector), and through the state budget. Given the broad mandate, IAM is overburdened and lacks the capability to respond effectively to support the cotton sector.[5] Furthermore, activities undertaken by the IAM are viewed by the private sector as lacking focus on critical issues such as R&D, particularly as they relate to the development and distribution of new seed varieties

A stakeholder meeting held in 2001 amongst IAM members identified the following issues as critical factors inhibiting the development of the cotton sector, and areas where capacity building is required for IAM to effectively support its constituents.

- Passive R&D in the agricultural sector;
- Inadequate seed development;
- Weak infrastructure to sell cotton;
- Antiquated cotton grading system;
- Poor imagine;
- Ineffective cotton support infrastructure system;
- Inadequate minimum price fixing system;
- Weak smallholder farming sector; and

[5] Currently, IAM has 110 staff 'inherited' from the State Secretariat for Cotton, which some consider to be of low quality and under trained to perform most of the tasks it is mandated to undertake.

- Poor institutional framework to support the cotton sector.

In addition to these issues, IAM also raised concerns regarding the high cost of agricultural inputs, particularly agro-chemicals. Taking into consideration that a distribution channel, particularly in rural areas, through rural stockists have not evolved in the market, the only means of accessing agricultural inputs for many smallholder farmers is to become a part of a concession. While joining a concession is not viewed as a particular problem, it was felt that these concessions exercised monopolistic pricing behavior, and often charged a premium to farmers who had no alternative sources of accessing agrichemicals.

***The Mozambique Ginners Association (Associação de Algodoeiŕos de Mozambique - AAM)***: The AAM was launched in 1998, to represent concessionaires, ginning companies, and autonomous cotton producers. AAM's mandate is to promote coordination between members, develop dialogue between government and civil society, and to undertake initiatives to help develop the cotton sector. To help ensure coordination with the cotton farming sector, AAM also sits on the board of the IAM.

AAM continues to face difficulty obtaining full participation amongst its member, and similarly, difficulties in attracting funding to address issues associated with varietal research, cotton quality, grading procedures, and other critical factors impacting the performance of the cotton sector. Infighting and the lack of consensus among members, however, has limited the Association's ability to respond to these critical issues. In this context, AAM's principal function has been limited to the maintenance of the closed concession system and on negotiating the annual pricing of cotton.

## 2.0 Key Market Players

Taking into account that the concession system defines the market dynamics of the industry, ginners are the key focal point and the driving force in the cotton industry. Similarly, as concession companies are generally the sole source of agricultural inputs, extension services and a link to markets, they play a critical role in defining the direction of the industry.

It was not until the 1990s when government policies were liberalized to allow joint ventures to be formed with private sector firms, where economic concessions were awarded to joint venture companies. This system of market allocation provided monopsonistic rights to joint venture companies, thus allowing companies to purchase all of the cotton grown in a concession area. In fact, three large joint ventures account for nearly 50% of all cotton production in Mozambique (refer to Table 5).

Given the collapse of the textile industry in Mozambique, nearly 100% of all lint cotton is exported with a dominate share going to Portugal. Taking into consideration the ownership structure of the joint venture companies, it is understandable that the bulk of lint cotton is exported to Portugal. While very few Indian companies have financial interests in cotton production, given the active textile and garment sector in India, and geographic access to Mozambique, Indian companies import a reasonable share (over 12%) of Mozambique's lint cotton.

| **Table 5: Market Share and Ownership Structure of Cotton Producers in Mozambique** | | | |
|---|---|---|---|
| | **Ownership (%)** | | **Market Share (%)** |
| | **GoMzb** | **Private** | |
| **JV Companies** | | | |
| Plexus | 49% | UK (51%) | 12.2% |
| SODAN | 49% | Port (51%) | 21.6% |
| CANAM | 25% | Port (75%) | 16.0% |
| **Private Companies** | | | |
| San/JFS | | Port | 6.6% |
| CAN | | Port/Fr/Other | 13.1% |
| SAAM | | Mzb | 1.3% |
| Agrimo/Dunavant | | Port | 4.0% |
| Moctex | | S. Africa | 0.4% |
| SANAM | | Mzb | 16.0% |
| Novos Operadores | | | 7.7% |
| Other Associations | | | 1.1% |
| **TOTAL** | | | **100.0%** |
| *Source: IAM (Institute of Cotton, Mozambique)* | | | |

## 3.0 Market Price Setting Mechanism

At the beginning of each season, the National Commission for Price and Wages (Comissão Nacional de Salãrios e Preços) define a minimum price for raw cotton for the entire season. The price is generally negotiated between MADER and IAM, cotton companies, and smallholder representatives. The underlining principal behind the price setting is to avoid price fixing and market abuses, particularly by those who have been granted a monopsonistic position in the market. And secondly, a minimum price is guaranteed to farmers to avoid underproduction.

The pricing scheme continues to come under severe criticism, particularly as government intervention in price setting does not accommodate for exchange rate fluctuations, nor does it take into account prevailing quality differences between the various growing regions. In the absence of a satisfactory system of classification, and a functional monitoring system to reward quality, the existing pricing mechanism continues to contribute to creating distortions and financial distress within the sector.

While the concession and a minimum pricing system was useful in stimulating the revitalization of the cotton sector, the prevailing market systems has had a negative effect on stimulating growth and efficiency in the cotton industry.

In an effort to limit 'pirated sales'[6] attempts were made to partially liberalize the sector during the 2000/2001 season by allowing farmer associations and/or communities to

[6] There were increasing incidents where farmers under a concession that received agricultural inputs from its concessionaire sell their harvest to a third party.

contract directly with a cotton company of their choice. While in principal, the approach was novel, it was not successful in eliminating "pirate buying". Lobbying by ginners resulted in a return to clearly demarcated geographic concessions for all ginners, where farmer associations were once again denied their right to negotiate with companies outside the concession.

Taking into consideration that the cotton sector is beginning to show signs of revitalization, government interventions in price setting and restricted market access by farmers, is viewed by many as limiting the potential dynamism in the cotton sector. In addition, as much of the debate and resources of both the private and public sector is devoted to resolving conflict between ginners and policymakers, it has detracted from needed investments in technology and R&D which focuses on accessing alternative sources of input supply, the introduction of new hardier seed varieties, and new farming techniques to help boost the low yield rates which have now stagnated between 300-400 kg/ha. Although organizations such as the Agence Française de Developpement has been supporting two companies in varietal development and strengthening farmer associations, no new varieties have been released.

## 4.0 Value Chain Analysis for Cotton

An average seed cotton yield rate of 415 – 600 kg/ha is low, even in Africa. To highlight this point, the project performed a value chain analysis for two types of companies: a local joint venture company; and a fully private company. In addition, to show the vulnerability of cotton farming in Mozambique, the analysis selected a concession in an area where farmers faced a critical food shortage due to a cassava crop failure.

In the two scenarios, average yield rates ranged from a low of 297 kg/ha to 450 kg/ha. According to field interviews and data collection, average per hectare production costs among cotton farmers ranged between $26.66/ha to $41.15/ha. This translates to a production cost of $0.06 - $0.14/kg, which is extremely low, even compared to a number of companies outside the region (refer to Table 6). While the per hectare yield rate is low compared to the rest of the world, production costs associated with Mozambique seed cotton measured in kilograms is highly competitive.

**Table 6: Cotton Farming Cost and Yield Comparison**

| | yield/ha (kg) | cost/ha | cost/kg |
|---|---|---|---|
| **Kyrgyzstan** | 2,450 | $ 393.63 | $ 0.16 |
| **Kenya** | 572 | $ 184.00 | $ 0.32 |
| **Cambodia** | 1,200 | $ 415.00 | $ 0.35 |
| **China** | 1,270 | $ 752.00 | $ 0.59 |
| **Mozambique** | 415 – 600 | $41.15 | $0.06 – 0.14 |

*Source: Global Development Solutions, LLC™*

The value chain for cotton production can be divided into eight key value adding activities:

- Land preparation;
- Planting;
- Seeding;

- Thinning;
- Weeding;
- Chemical spraying;
- Fertilizing; and
- Harvesting.

The overall findings from the value chain analysis suggests that in both case studies, harvesting, chemical spraying and seeding constituted the three highest value adding activities for Mozambican cotton farmers. Seeding was consistently the third highest value adding activity, while harvesting and spraying were found to be either the highest or the second highest value adding activity, depending on the concession.

Either due to high costs, lack of access or even adulteration, cotton farmers in developing countries tend not to apply fertilizers. Generally, farmers that do use fertilizers tend to use inadequate amounts, thus not have meaningful impact on yield rates. Such was the case in Mozambique, where virtually no fertilizer was applied by farmers. The lack of fertilizer application was related to the high cost of access. Only in one case were farmers actually utilizing fertilizers, but the volume used was generally inadequate.

In countries like Kyrgyzstan where yield rates reach as high as 1,200 – 2,000 kg/ha, fertilizers constitute as much as 15% of the overall value added. In the case of Mozambique, when fertilizers were used, it constituted less than 4% of the overall value added. The low or non-use of fertilizers is clearly reflected in the poor yield rates.

Another overall finding is that generally areas under concession were very large (>10,000 ha), with equally large numbers of family farmers. Large geographic distribution and large numbers of farmers posed an infrastructure and logistics challenge to cotton companies, which required consistent and constant contact with farmers to support the production process, as well as to ensure that harvest losses and pirated sales are minimized. At the same time, however, the lack of infrastructure and the complete absence of publicly available support services were found to be a crippling burden to cotton companies, often contributing to increasing the operational overhead costs.

### 4.1 Value Chain Analysis of a Local Private Cotton Company

We begin the value chain analysis first with a local private cotton company located in Nampula where over 34,000 families are involved in farming 37,000 ha. The private company purchases cotton from 135 associations, where the total yield for 2003 – 2004 was approximately 13,514, 548 kg of cotton, which translates to an estimated 450kg/ha.

Given a yield rate of 450 kg/ha, the three highest value adding activities include: harvesting (31.8%); spraying (29.3%); and seeding (18%). As with most cotton farms operating in Mozambique, farmers are provide with agricultural inputs such as seeds, and sprays, which are later deducted from the payment to a farmer when harvest is brought in (invoice discounting method). In this particular case, given food shortages often faced by cotton farmers, the private company distributed 700 tons of maize to its farmers to keep them engaged and to help secure the sales of their cotton to the sponsoring company.

### 4.1.1 Harvesting: High Collection Costs and Poor Access to Extension Services

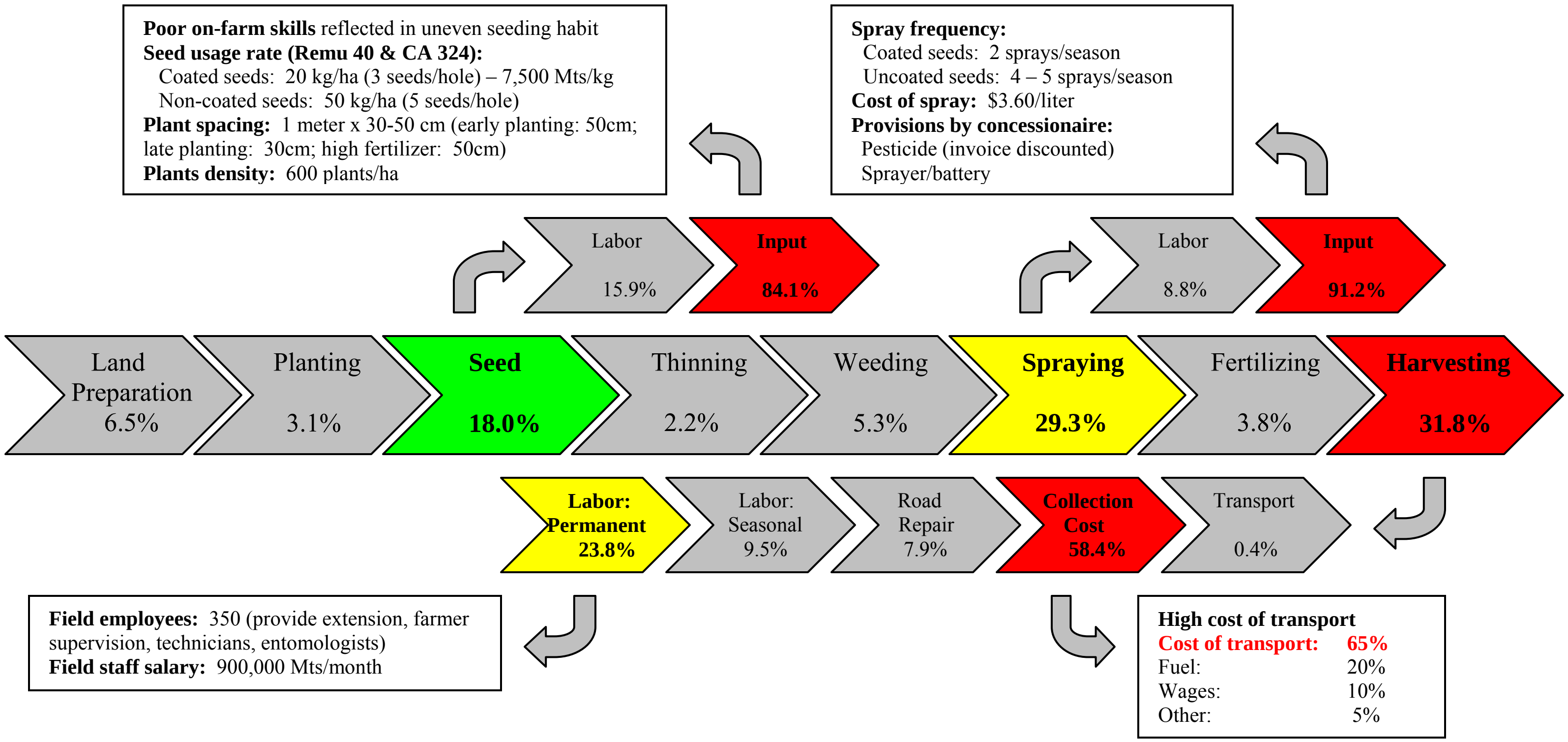
This stage of production consists of 5 different input costs, namely, permanent labor, seasonal labor, road repair, collection costs and transport. In this case study, collection costs (58.4%) and permanent labor (23.8%) constituted over 82.2% of the total value added. This suggests that controlling the major input components in these two value adding activities would have the largest impact on improving the delivered cost of cotton by farmers.

***Collection Costs:*** A bulk of harvesting cost comes from the collection cost, which includes cost of transport, fuel, wages and other miscellaneous costs. Of these, the cost of transport dominates (65%) this portion of the value chain. The lack of availability of transport services, and thus, the lack of competition in the transport sector was a common challenge facing all cotton companies. Taking into account that an organized competitive freight and trucking services have not evolved to support commercial activity in Mozambique, most cotton companies are required to purchase, operate and maintain their own trucks. While some trucking services are available, they are generally informal and the type of equipment available in the market was often not adequate to support the volume and weight haulage required during the harvest period (a separate section in this report will address transport and infrastructure issues).

***Permanent Labor:*** The private company analyzed for this exercise employs 350 field employees, who are paid approximately 900,000 Mts/month. These employees include extension workers, farm supervisors, technicians, and entomologists. It was noted that in the absence of a publicly available extension service, each company is required to develop their own extension service, which often vary in quality, capability, and outreach. In this case study, the sponsoring company must reach out to over 34,000 farming families spread out over a wide geographic area, most of which have poor road access. Where one would expect to find regional extension services that respond to the needs of farmers in a designated geographic area, the absence of an organized farmer support structure requires each cotton company to establish and maintain their own extension services, which is a clear overhead cost burden for cotton companies.

Secondly, given that each extension worker also needs to be trained, additional costs must be incurred by cotton companies to develop training-of-trainer activities to have on hand adequate number of extension workers capable of supporting cotton farmers. Interviews suggest, however, that this is not the case, and in fact cotton companies suffer from a lack of capable extension service workers. But to meet the minimal needs of farmers, quality of service is often compromised in order for cotton companies to deliver the most basic services to cotton farmers.

**Diagram 3: Cotton Production Value Chain for a Local Private Company**




Source: Global Development Solutions, LLC

### 4.1.2 Spraying: High Cost of Accessing Insecticides

Adequate fertilizer and spray applications generally improve cotton yield rates by at least 100%, or not more. But as it is the case in most countries, the cost of accessing agricultural inputs is prohibitive for many farmers, which is often reflected in low yield rates. Mozambique is no exception to this rule. For the private farm, the use of insecticides constituted approximately 29.3% of the total value added.

In the case of farmers associated with the private cotton company, some farmers used treated seed which require approximately 2 sprays per season, while farmers using untreated seeds required the standard 5 sprays. In the case of farmers using untreated seeds, which represent a majority of farmers, the average number of sprays per season was 3 per season rather than 5.

Field research conducted by the cotton company found that farmers that used treated seeds, and followed a strict regime of fertilizing and sprayed 2 times were able to achieve yield rates between 900 – 1,000 kg/ha. But virtually no farmer followed this practice, and thus suffered from low yields.

Given the high cost of agrochemicals, labor constituted only 8.8% of the total value of spraying, while the cost of insecticides constituted 91.2% of the remaining value. While cost of sprays is clearly an issue, the lack of on-farm discipline, and knowledge about benefits associated with regular spraying, generally as a result of poor extension services, continues to be a problem facing cotton farmers working with private cotton companies.

### 4.1.3 Seeding: Poor Access to Quality Seeds

Seeding costs represented the third highest value adding component in this case study, where 18% of the overall value is accounted for by seeding. Farmers operating under the private cotton company generally used Remu 40 and CA324 (treated). Labor associated with seeding accounted for a mere 15.9% while the remaining 84.1% was accounted for by the value of seeds.

A common challenge faced by most cotton companies was associated with the lack of access to affordable high quality cotton seeds. Currently, only two or three private operators have their own seed program where seed breeding and bulking is conducted. Where it is the responsibility of IAM to take leadership in the development and distribution of new seed varieties, the lack of capacity and support has limited farmer access to affordable quality cotton seeds.

### 4.1.4 Other Issues

In addition to the challenges identified in the value chain analysis, other issues found to be problematic for the private cotton company was the high default rate of its farmers and the high cost of finance.

***Weak Institutional Representation:*** According to interviews, farmer default rates due to pirated sales ranged between 20 – 30%, which translated to a cost of approximately $336,000 per season. Even though food support was provided, given the competitive market environment, and the lack of cohesiveness within the cotton farming and ginning sector, pirate sales continue to be critical problem among cotton companies. Interviews suggests that while cotton companies continue to express their wishes to limit the role of the public sector in cotton farming and processing, representative associations in both sectors continue to be weak, as reflected in the absence of a Code of Conduct, and a general lack of consensus among companies operating in the cotton industry. The lack of strong industry representation and dialogue has limited the ability for players in the cotton industry to promote self-regulating mechanisms, to address issues such as pirated sales.

***High Cost of Finance:*** Yet another underlining challenge commonly shared by cotton companies is the high cost of capital. Taking into account that farmers are provided agricultural inputs from the cotton company, the 'sponsoring' company must finance these inputs. According to interviews, financing through commercial banks for such an activity is extremely expensive, where interest rates are as high as 39%. The high cost of finance is a bit of a 'Catch-22' as the cotton company has to absorb the initial cost, but the actual cost is past on to the farmer upon delivery of the harvest. In this context, it is the cotton farmer who must ultimately carry the burden of the high cost of finance.

## 4.2 Value Chain Analysis of a Joint Venture Company

The joint venture company selected for this case study is located in the north outside Nampula and works with as many as 55,000 outgrowers, generally with less than 0.7 ha per farm. The Company current has 178 permanent employees and 3 seasonal workers.

During the 2003 – 2004 season, the outgrowers produced over 5,191 tons of cotton spread out over 17, 470 hectares. The principal challenge faced by cotton farmers during this period was the cassava blight, which wiped out nearly all food crops farmed by cotton farmers. In this context, farmers spent more time trying to secure sources of food rather than tending to the cotton farm. As a consequence, the average yield rate was extremely low. Specifically, the average yield rate for farmers operating under the joint venture company was 297 kg/ha. This translated to $41.15/ha.

Unlike the private cotton company, the highest value added was spraying (36.9%), followed by harvesting (31.2%) and seeding (15.1%). As mentioned earlier, cotton farmers affiliated with the joint venture company faced chronic food shortage due to the cassava blight. As a consequence, not only was the yield rate low, but the production cost per kg was more than twice ($0.14/kg) that of the private cotton company.

### 4.2.1 Spraying: High cost of Accessing Insecticides

According to interviews, only 5% of all outgrowers sprayed 5 times per season – the prescribed number of applications to ensure good yield. Farmers that sprayed 5 times enjoyed yield rates between 800 – 900 kg/ha, while the remaining 95% sprayed only 2 to 3 times per season. Labor comprised of only 6.6% of the total value added, while the remaining 93.4% constituted the cost of insecticides, which on average cost approximately 313,800 Mts/ha.

### 4.2.2 Harvesting: High Collection Costs and Poor Access to Extension Services

Harvesting constituted 31.2% of the overall value added. Of this amount, collection cost (66.4%) and permanent labor (23.0%) made up over 89% of the total value added for harvesting.

***Permanent Labor:*** The joint venture company employs 150 extension workers, and 2 in-house and 3 external trainers. The average wage per worker is high compared to the private cotton company, particularly as the joint venture company employed a number of specialized expatriate staff. With this said, however, the joint venture company faced similar challenges as most other cotton company, which is to deliver the necessary extension service to its outgrowers to help ensure adequate yield rates.

In the case of the joint venture company, the 150 extension workers are required to cover 55,000 outgrowers, which is approximately 366 outgrowers per extension worker. The geographic distribution and the sheer number of outgrowers make it virtually impossible for extension workers to deliver the extension support needed by farmers. This is reflected, not only in the poor yield rate, but also in poor seeding practices, as it will be discussed below. In this context, the absence of a regionally based extension and outreach program continues to place substantial overhead cost burden on cotton companies.

### 4.2.3 Seeding: Poor Seed Quality and Lack of Uniformity in Seed Usage

Given the lack of capacity to deliver extension service, cotton companies like the joint venture company profiled here continue to face problems with farmers that lack know-how of proper seeding practices. Consequently, interviews revealed that there were a number of instances where farmers were found to be planting as many as 100 seeds in a single planting hole where only 4 to 5 seeds would have been adequate. Such wasteful practices continue to erode the cost structure of cotton companies in Mozambique.

The joint venture company currently prescribes Remu 40 to its outgrowers, but interviews suggest that the Company is keen on shifting to a newer higher yield variety. Taking into account that publicly sponsored seed programs are weak, the prospect for developing an in-house seed program that can accommodate the volume and quality of seeds required by its outgrowers would take 5 to 6 years to set up.[7]

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[7] Assuming that the Company received 2kg of breeder seeds, this would need to be multiplied to about 50kg before it can be bulked up to about 1,500kg of basic seeds, which in turn would need to be multiplied further to accommodate a seed usage rate of 20kg/ha (approximately 4 – 5 seeds/planting hole).

In addition to the long term investment required to initiate an in-house seed program, the joint venture company also faces the challenge of managing the transition between the elimination of an old variety and the introduction of a new one. One problem that most cotton companies face, including the joint venture company profiled here, is that outgrowers in a concession area do not necessarily use the same seed variety. While this in of itself is not a problem, poor post harvest handling practices, particularly during collection, results in batch mixing, where cotton from different seed varieties are mixed into a single batch. As a consequence, uniform fiber quality is virtually impossible to achieve, which becomes a problem during the ginning phase.

In the region where the joint venture company is currently located, there are at least five cotton companies operating concessions, where 5 to 10 different varieties of cotton seeds are used. This inevitably leads to batch mixing, which in turn contributes to lack of uniformity in fiber quality.

In addition, some farmers use retained hybrid seeds from the previous year rather than to use fresh seeds each growing season. This further compromises fiber quality. Recalling that fiber classification to differentiate cotton quality continues to be a weak feature of the government price guarantee scheme, poor seeding practices, the lack of access to high quality seeds, combined with a single fixed price for raw cotton places cotton companies in a position of substantial comparative disadvantage.

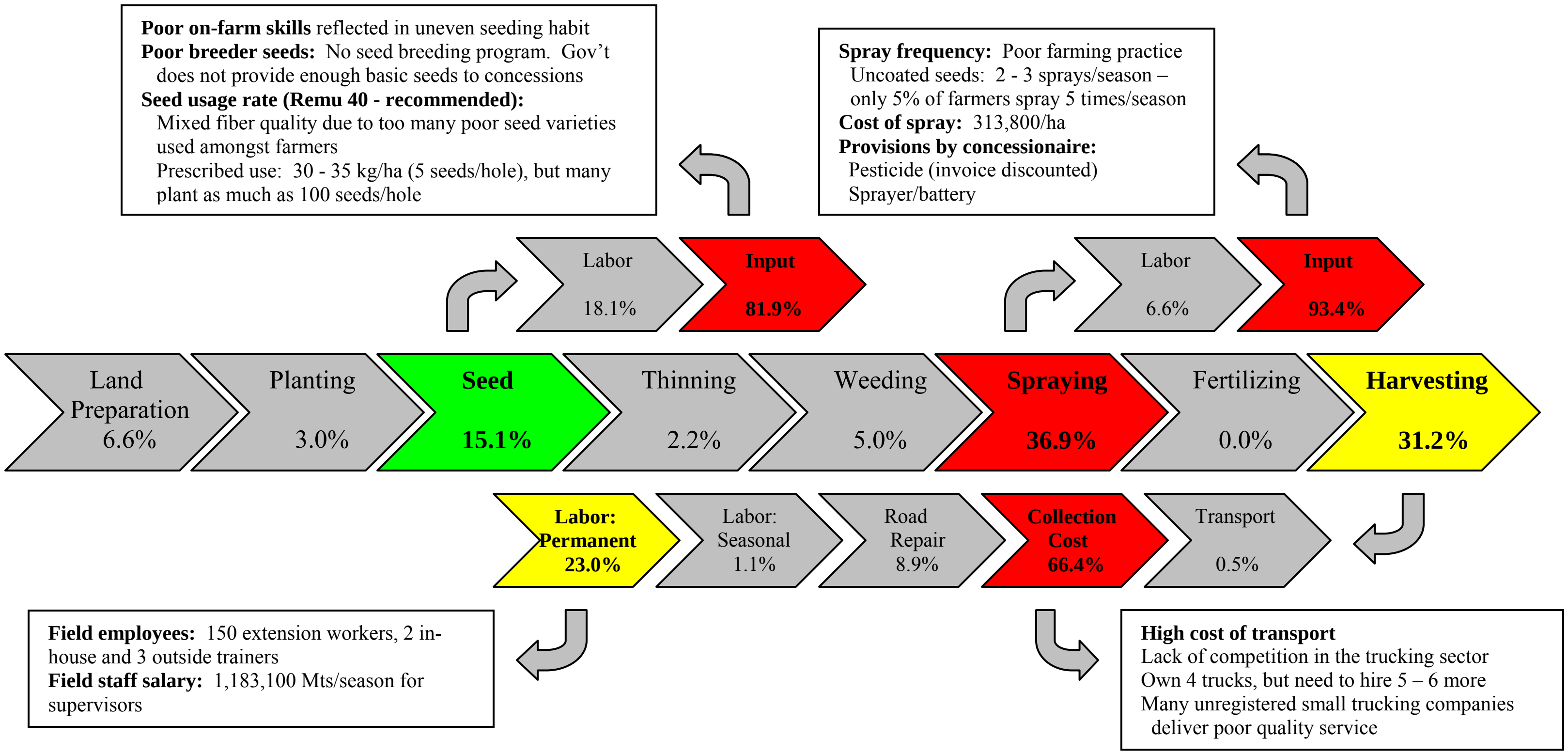
### 4.2.4 Other Issues

***Poor System of Cotton Grading:*** The quality control mechanism in place to grade cotton is inadequate and is undermining the revenue potential of cotton companies. Currently the grading system requires raw cotton to be classified into two grades, grade 1 and grade 2.[8] As a result of the batch mixing and poor grading system, 99% of cotton purchased by cotton companies are graded between grades 1 and 2; however, when cotton is ginned, the resulting lint is a grade 4 or even a grade 6. At the same time, the cotton companies are required to pay the cotton farmer the fixed price for grade 1 cotton.

While it is the role of the government to provide a systematic grading system, cotton companies, including the joint venture company profiled here, feel that the industry lacks a code of conduct to allow for self regulation, particularly in the context of establishing a two-tiered grading system where cotton farmers would grade their own cotton at harvest, and the grading scores would then be reconfirmed again prior to being packed. In the absence of discipline and consensus within the cotton sector, self-regulation is unlikely to become a reality. At the same time, however, the current grading system has had the effect of slowly draining revenue from the cotton companies, as well as creating a system of disincentives for cotton companies to provide additional technical support to cotton farmers.

[8] Grade 1 is the highest while grade 6 represents the lowest quality.

**Diagram 4: Cotton Production Value Chain for a Joint Venture Company**




Source: Global Development Solutions, LLC

Problems revolving around the current grading system needs to be tackled through further public-private dialogue, but both IAM and AAM lack capacity to help mobilize the private sector, particularly as it lacks the confidence of the private sector, and lacks capacity and capability to respond to key challenges facing the cotton sector.

## III. High Cost of Accessing Agrochemicals

As evident from the value chain analysis, the high cost of agrochemicals, namely fertilizers and insecticides, and its lack of use as a result, is a chronic problem contributing to low yields. It is estimated that 9 out of 10 smallholder farmers do not use fertilizer, principally due to its high costs. Similarly, while standard spraying regimes for untreated seeds is five applications per season, smallholder farmers on average spray 2 or 3 times. As a consequence, cotton fiber quality and yield rates are constantly compromised.

To have a better understanding of the cost structure and the dynamics of the agrochemical sector, an import transaction analysis and cost of access analysis was conducted for fertilizers and insecticides.

### 1.0 Fertilizers: High Transport Costs and Its Impact on Accessibility

Urea was selected for this analysis. It should be noted that fertilizers are an internationally traded commodity, and thus prices are relatively standardized depending on where fertilizers are sourced. In this context, cost and accessibility of fertilizers has everything to do with the cost of transport and related import transactions costs. As there are no producers of agrochemicals in Mozambique, all products are imported by a small number of dealer/distributors.

It should be noted that given the small market demand for fertilizer, dealer/distributors are generally unable to negotiate a discount. For example, minimum order for fertilizers from Saudi Arabia is 10,000 tons per order. At this volume, the delivered price of Urea in Beira is approximately $295/ton. Given that even the largest dealer/distributors in Mozambique only order between 3,000 – 7,000 tons of Urea per year, local companies are generally unable to purchase fertilizers at competitive prices.[9] As a consequence, dealer/distributors have little choice but to purchase fertilizers from South Africa, at prices as high as $415/ton delivered in Maputo.

This analysis took an example where Urea is purchased from South Africa and delivered to Chokwe, 225 km away, via road transport. The initial purchase price of Urea was $0.36/kg (FOB), and the delivered price in Chokwe, excluding margins, (standard margin ranges between 8 – 12.5%) was $0.46/kg. According to interviews, import transaction costs are approximately $0.10/kg or 27% of the initial cost of fertilizer (refer to Table

[9] It is estimated that total demand for fertilizers in Mozambique barely reaches 10,000 tons, while border states in South Africa consume as much as 35,000 tons per year. In this context, further consideration is required to develop a regional fertilizer marketing strategy for Mozambican dealer/distributors to service demand for fertilizers in South African, its bordering states, including Swaziland. This would create adequate volume for local dealer/distributors to purchase fertilizers at a discounted price from suppliers in places like Saudi Arabia for redistribution in Mozambique and to surrounding locations outside the country.

7).[10] What is worth noting is that the cost of transport constitutes nearly 80% of the total cost of accessing fertilizers.

**Table 7: Transport and Associated Cost for Shipping 28 Tons of Fertilizers from South Africa to Chokwe* (Urea & NPK)**

| | | | Mts | $ | % of Total |
|---|---|---|---|---|---|
| 1 | **Cost of Transport** | | | **$ 2,128** | **79.4%** |
| 2 | **Clearing Agent** | | | | |
| | SADC Certificate of origin | | 21,000 | $ 0.91 | 0.0% |
| | Stamp | | 50,000 | $ 2.17 | 0.1% |
| | Local fees | | 270,000 | $ 11.74 | 0.4% |
| | Forms | | 250,000 | $ 10.87 | 0.4% |
| | Service charge | | 2,381,643 | $ 103.55 | 3.9% |
| | Communication fee | | 150,000 | $ 6.52 | 0.2% |
| | **Subtotal** | | **3,122,643** | **$ 135.77** | 5.1% |
| 3 | **VAT (on service charge only)** | | | | |
| | | *17%* | **404,879** | **$ 17.60** | 0.7% |
| 4 | **FRIGO (Matola Cargo Terminal)** | | | | |
| | **Fee*** ** | | 2,502,817 | $ 108.82 | **4.1%** |
| | VAT | | 425,479 | $ 18.50 | 0.7% |
| | **Subtotal** | | **2,928,296** | **$ 127.32** | **4.7%** |
| 5 | **Inspection Handling Charges**** | | **2,487,000** | **$ 108.13** | **4.0%** |
| 6 | **Bank charges******** | | **3,775,668** | **$ 164.16** | **6.1%** |
| **TOTAL CHARGES** | | | | **$ 2,680.98** | **100.0%** |
| **Unit Charge ($/kg)** | | | | **$ 0.10** | |
| **Delivered price of fertilizer** | | | | **$ 0.46** | |
| **% increase** | | | | **27%** | |

**ASSUMPTIONS**

* Chokwe is 225 km from Maputo

** hired labor for uncovering and unloading shipment for customs official to conduct physical verification

*** charge by the number of days a container is parked in the bonded area (average number of days: 5 - 6 days for clearance)

**** 1.5% of the value of the good

| | | |
|---|---|---|
| 1 | Purchase price of Urea - FOB (kg) | $0.36 |
| 2 | Exchange rate (Mts/$) | 23,000 |
| 3 | Total weight of shipment (tons) | 28 |
| | Tons/kg | 1000 |
| | Total weight of shipment (kg) | 28,000 |

Average industry margin for fertilizers 8% - 12.5%

*Source: Global Development Solutions, LLC*

Banking charges and fees paid at the terminal constitute an additional 10% to the cost of accessing fertilizer. Generally, banking charges are calculated at 1.5% of the value of a good, and fees paid at the terminal is a function of the number of days a cargo is parked

[10] It should be noted that once fertilizers arrive in Chokwe, it must then be redistributed to various destinations around the country. Here again, high transport costs make it prohibitive for farmers to access fertilizer. A separate section in the report is devoted to transport costs.

in the bonded area. According to interviews, the average duration is approximately 5 – 6 days.

While the import transaction costs, particularly with respect to transport costs are high, interviews with fertilizer importers suggests that the time lag between issuance of a purchase order and delivery is extremely long, particularly taking into account the cumbersome clearance procedures. It is estimated that between the issuance of a purchase order and delivery, time lapse is between 27 – 36 days (refer to Table 8). As a result of the relatively long time lapse, dealers/distributors are forced to keep stock on hand to accommodate fluctuating market demand. This in turn introduces additional warehousing costs which must then be passed on to farmers.

**Table 8: Import Clearance Activity Sequence: Imports From South Africa to Mozambique**

| | **Activity Sequence** To ⟶ | From | **Documents/Action** | **Time Lapse (Days)** |
|---|---|---|---|---|
| 1 | Importer | Supplier | Issue purchase order | 3 – 5 |
| 2 | Importer | Clearing Agent | Notification of transaction | Immediate |
| 3 | Supplier | Importer | Issue pro forma invoice | Immediate |
| 4 | Supplier | Min. of Agriculture (S. Africa) | Request certificate of origin (C/O) | 7 |
| 5 | Supplier | Importer | Send copy of C/O | Immediate |
| 6 | Importer | Clearing Agent | Send copy of C/O | Immediate |
| 7 | Supplier | Transporter | Issue commercial invoice; bill of entry; and packing list | 8 – 10 |
| 8a | Transporter | Supplier | Pick up order | 2 – 4 |
| 8b | Clearing Agent | Transporter | Begin preparing 'Document Unico' to be issued | Immediate |
| 9 | Transporter | FRIGO | Transport to bonded area | 2 – 3 |
| 10 | Transporter | Importer | Issue 'Confirmation of Freight Dispatch' | Immediate |
| 11 | Customs | Transporter | Authorize 'Guia de Cirulacao Rodoviaria de Mozambique | 2 |
| 12 | Transporter | Clearing Agent | Provide authorized 'Guia' | Immediate |
| 13 | Clearing Agent | Customs | Present 'Guia' and 'Document Unico' (Memorado) | Immediate |
| 14a | Customs | Clearing Agent | Authorize Memorado | Variable |
| 14b | Customs | Clearing Agent | Physical verification | 3 – 4 |
| 15 | Clearing Agent | Transporter | Remove cargo from FRIGO | Immediate |
| 16 | Clearing Agent | MCT | Payment for FRIGO transit cost | 0.5 |
| 17 | Clearing Agent | Transporter | Authorize delivery of cargo | Immediate |
| 18 | Transporter | Importer | Delivery to warehouse | 0.5 |
| **Total Transaction Time** | | | | **27 – 36** |
| *Source: Global Development Solutions, LLC* | | | | |

## 2.0 Agrichemicals: High Cost of Imported Insecticides

As with fertilizers, agrichemicals such as insecticides are imported by a small number of dealer/distributors. While there are a number of insecticides used in the market by cotton farmers, the analysis focused on three different types of insecticides popular among cotton companies and farmers. Taking into consideration that there are only a few companies dealing in agrichemicals, names of the chemicals have been deleted to protect the identity of the dealer/distributor.

This case study focused on the agrichemical sector at two different levels. First, the import transaction costs of three insecticides were analyzed. The second level of analysis focused on the cost of delivering insecticides, and cost per treatment at the farm level to understand the cost implications to cotton farmers.

## 2.1 Cost of Importing Insecticides

The three insecticides selected for this case study were imported from China by a local dealer/distributor. The insecticides are landed in Nacala and distributed inland using local transport services. Similar to fertilizers, the time lapse between the issuance of a purchase order and delivery is long, thus causing dealer/distributors to hold substantial inventory to accommodate demand fluctuations in Mozambique. Specifically, it takes up to 3 months to negotiate and place an order, and another 3 months for delivery.

As Table 9 below indicates, taking into account all of the transaction costs, including freight, duty and service charges, the spread between the FOB and delivered price ranges between 61% - 76%. Excluding the actual cost of purchasing the insecticide, dealer/distributor mark up (25% - 35%), freight (1.7% - 5.5%) and financing charges (2.5%) constitute the highest costs associated with importing insecticides.

***High Margins For Dealers/Distributors:*** According to interviews, industry norms for mark up ranges from 15% - 20%. But during peak seasons, and when there are supply shortages, dealer/distributors enjoy even higher margins, particularly for more expensive insecticides. According to interviews, margins may go as high as 65% - 100% of FOB price.

While the cost of finance is passed on to the dealer/distributor and eventually to the farmer, dealer/distributor must bare the initial financing costs. This is aggravated further when the harvest is poor and ginners are unable to meet payments to dealer/distributors. As evident from the case study presented in this report where yield rates are below 300kg/ha, ginners have difficulty making payments to dealer/distributors.

## 2.2 Cost of Delivering Insecticides to Cotton Farmers

In addition to providing seeds to cotton farmers, concession companies/ginners provide insecticides and the necessary spraying hardware to farmers. An invoice discounting systems is used by cotton companies, where costs associated with provisioning sprays to farmers are deducted from the payment made to farmers for their harvest.

**Table 9: Cost of Importing Insecticides (China – Nacala)**

| | Insecticide A | | Insecticide B | | Insecticide C | |
|---|---|---|---|---|---|---|
| | Cost ($/liter) | % of Total | Cost ($/liter) | % of Total | Cost ($/liter) | % of Total |
| **FOB price** | $ 3.89 | **61.7%** | $ 6.24 | **62.2%** | $ 11.62 | **56.8%** |
| **Freight** | $ 0.35 | **5.5%** | $ 0.35 | **3.5%** | $ 0.35 | 1.7% |
| **Insurance** | $ 0.01 | 0.2% | $ 0.01 | 0.1% | $ 0.01 | 0.0% |
| **Customs fees** | | | | | | |
| Duty | $ 0.11 | 1.7% | $ 0.17 | 1.6% | $ 0.30 | 1.5% |
| Stamp/document fees | $ 0.00 | 0.0% | $ 0.00 | 0.0% | $ 0.00 | 0.0% |
| **Clearing Agent** | | | | | | |
| Fee | $ 0.06 | 1.0% | $ 0.10 | 1.0% | $ 0.18 | 0.9% |
| Document fee | $ 0.01 | 0.2% | $ 0.02 | 0.2% | $ 0.03 | 0.1% |
| VAT (on fee only) | $ 0.01 | 0.2% | $ 0.02 | 0.2% | $ 0.03 | 0.1% |
| **CFM** | $ 0.03 | 0.5% | $ 0.04 | 0.4% | $ 0.08 | 0.4% |
| **THC (paid to shipping agent)** | $ 0.01 | 0.2% | $ 0.02 | 0.2% | $ 0.03 | 0.2% |
| **Other payments** | $ 0.00 | 0.0% | $ 0.00 | 0.0% | $ 0.01 | 0.0% |
| **Forwarding Agent** | | | | | | |
| Commission | $ 0.00 | 0.1% | $ 0.01 | 0.1% | $ 0.01 | 0.1% |
| **Subtotal** | **$ 4.49** | | **$ 6.97** | | **$ 12.65** | |
| **Mark up** | $ 1.57 | **24.9%** | $ 2.72 | **27.1%** | $ 7.21 | **35.2%** |
| **Subtotal** | **$ 6.06** | | **$ 9.69** | | **$ 19.87** | |
| **Transport cost** | | | | | | |
| **Delivery to Montepuez ($/liter)** | **$ 0.09** | 1.4% | **$ 0.09** | 0.9% | **$ 0.09** | 0.4% |
| **Price with Delivery ($/liter)** | **$ 6.15** | | **$ 9.78** | | **$ 19.95** | |
| **Finance Charges** | **$ 0.16** | 2.5% | **$ 0.25** | 2.5% | **$ 0.52** | **2.5%** |
| **Total Delivered Price** | **$ 6.31** | **100%** | **$ 10.03** | **100.0%** | **$ 20.47** | **100.0%** |
| | | | | | | |
| **Inland Transport Costs** | | | | | | |
| Nacala - Montepuez (km) | 425 | | | | | |
| Transport cost (Mts/10 tons/425 km) | 15,000,000 | | | | | |
| Transport cost (Mts/10ton/km) | 35,294 | | | | | |
| Transport cost (Mts/ton/km) | 3,529 | | | | | |
| Weight conversion (liters/ton) | 850 | | | | | |
| Transport cost (Mts/liter/km) | 4.15 | | | | | |
| **Transport cost ($/liter/km)** | **$ 0.000205** | | | | | |
| | | | | | | |
| **Financing charges** | | | | | | |
| Interest rate (%/month) | 0.65% | | | | | |
| Duration of financing (months) | 4 | | | | | |

*Source: Global Development Solutions, LLC*

Because of high costs associated with agrochemicals, farmers tend to spray their crop only two to three times per season rather than the prescribed 5 applications. According to interviews, minimum difference in yield between 3 and 5 applications is as much as 150kg/ha.[11]

[11] Without any fertilizer use, 3 sprays generally yields around 450kg/ha, while 5 applications can bring the yield rate to as much as 600kg/ha.

Interviews conducted for this case study suggests that the average cost per application (excluding the cost of the sprayer and batteries), is approximately 35,103 Mts per hectare ($1.50/application). This is an average cost of three different types of sprays which must be applied during the course of a season (refer to Table 10). A standard 5 application regime would cost approximately 175,715 Mts per hectare ($7.52).

In addition to the insecticide, spraying equipment and batteries to operate the sprayer must also be provisioned. Sprayers range in price from $36 - $40 per unit depending on the quality. Generally, such sprayers are good for one season, and can cover approximately 10 hectares. In addition, one battery per hectare is required to operate a sprayer. Given these costs, the total equipment cost per hectare is estimated to range between $0.66 - $1.23 per hectare. According to this case study, the combined cost of insecticide and hardware per hectare per application ranges between 50,606 Mts – 63,775 Mts ($2.17 - $2.73).

Based on these figure, three applications costs approximately 151,819 Mts/ha ($6.50/ha), while the prescribed 5 application costs approximately 253,032 Mts/ha ($10.84/ha).

Figures in Table 10 above show why farmers are often reluctant to comply with the prescribed five insecticide applications. Reflecting back on the value chain analysis of the two types of cotton companies, cotton farmers working with the private local cotton company estimated the cost of spraying to be approximately 156,593 Mts ($6.71/ha) per hectare based on three applications. This figure is reflective of the cost estimates established in Table 10 above. However, a closer scrutiny of the joint venture concession company revealed that while farmers were following a 3 spray regimen, charges for sprays were nearly double. Specifically, farmers were assessed a fee of 313,800 Mts ($13.44/ha) per hectare.

Although cotton companies have a number of insecticides to choose from, prices between various insecticides do not vary widely, and thus do not justify the wide discrepancy between the estimated cost of delivering sprays to farmers (151,819 Mts/ha) and the cost claimed by the joint venture concession companies (313,800 Mts), and deducted from the cotton farmer's revenue. No reasonable explanation could be found to rationalize this discrepancy, which suggests that further investigation might be required to determine whether some cotton companies are profiting from the transfer of agrochemicals to its farmers.

Taking into account that a network of rural stockists and other support infrastructure for farmers are not available in Mozambique, cotton farmers have no other option but to rely on concession holders to supply them with agricultural inputs. In this context, there is some possibility that the absence of competition in the agrichemical market is contributing to a market distortion that results in dampening the revenue generating potential of cotton farmers.

| Table 10: Cost of Cotton Spraying in Mozambique | | | | | |
|---|---|---|---|---|---|
| **Chemical Costs** | | | | | |
| | **Type of Chemical** | **No. of Treatments** | **Cost/treatment ($/ha)** | **Total Cost ($/ha)** | **Total Cost (Mts/ha)** |
| 1 | Insecticide C | 2 | $ 1.00 | $ 2.00 | 46,680 |
| 2 | Insecticide B | 1 | $ 2.44 | $ 2.44 | 56,950 |
| 3 | Insecticide A | 2 | $ 1.54 | $ 3.08 | 71,887 |
| **TOTAL** | | **5** | | **$ 7.52** | **175,517** |
| **Average Cost/Treatment** | | | | **$ 1.50** | **35,103** |
| **Equipment Cost** | | | | | |
| | | **Low** | **High** | | |
| | Average cost of a sprayer | $ 36.00 | $ 40.00 | | |
| | Coverage per sprayer (ha) | 10 | 16 | | |
| | Battery costs (Mts) | 5,000 | 10,000 | | |
| | Life/battery (treatment/ha) | 1 | 1 | | |
| | Cost of sprayer ($/ha) | $ 2.25 | $ 4.00 | | |
| | **Cost of sprayer ($/treatment)** | **$ 0.45** | **$ 0.80** | | |
| | **Cost of battery (treatment/ha)** | **$ 0.21** | **$ 0.43** | | |
| **Total Cost for Spraying ($/treatment/ha)** | | | | | |
| | | **Low** | **% of Total** | **High** | **% of Total** |
| | Chemicals | $ 1.50 | 69.4% | $ 1.50 | 55.0% |
| | Sprayer | $ 0.45 | 20.8% | $ 0.80 | 29.3% |
| | Battery | $ 0.21 | 9.9% | $ 0.43 | 15.7% |
| | **Total Cost ($)** | **$ 2.17** | 100.0% | **$ 2.73** | 100.0% |
| | **Total Cost (Mts)** | **50,606** | | **63,775** | |
| **Average Yield Rate According to Treatment** | | **Treatment Cost** | | | |
| | **# of Treatments** | **$/ha** | **Mts/ha** | **Yield rate (kg/ha)** | |
| | **3** | **$ 6.50** | 151,819 | 450 | |
| | **5** | **$ 10.84** | 253,032 | 600 | |
| | | | | | |
| ***Exchange rate (Mts/$)*** | | ***23,340*** | | | |
| ***ml/liter*** | | ***1,000*** | | | |
| *Source: Global Development Solutions, LLC* | | | | | |

## IV. Cotton Ginning Sector

Given the relatively low production and yield rates, the ginning sector in Mozambique is characterized by over capacity and poor productivity. The ginning sector has experienced an active turnover of players in the market, as reflected in the number of companies exiting and entering the sector. It is estimated that there are approximately 17 operational ginneries[12] with an installed capacity ranging from 150,000 – 230,000 tons/year. In Nampula alone the installed capacity is estimated to be 85,000 – 130,000 tons/year. Currently, all ginning companies hold closed concessions, while commercial farmers support approximately 8,000 smallholder farmers within concession zones.

With capacity utilization of less than 50%, ginneries continue to face high fixed costs. Two large ginners account for about 60% of all ginning capacity in Mozambique, of which the JFS Group, the largest operator with two joint venture companies, controls over 40% of domestic production.

### 1.0 Poor Ginning Outturn Ratio

The ginning outturn (GOT) ratio (the conversion ratio from raw to lint cotton) in Mozambique is estimated to approximately 34%. This is slightly below average compared to other countries in Africa (refer to Table 11).

**Table 11: Ginning Outturn Ratio For Selected African Countries**

| Country | Ginning Outturn (GOT) Ratio |
|---|---:|
| Kenya | 33% |
| Uganda | 34% |
| **Mozambique** | **34%** |
| Tanzania | 35% |
| Zambia | 38% |
| Zimbabwe | 40% |
| Mali | 42% |

*Source: Global Development Solutions, LLC*

It is estimated that a 6% improvement in GOT ratio would reduce the cost of production by over 20%.

While poor seed quality is a major culprit contributing to the poor GOT ratio, interviews with ginners highlight other critical issues that hinder ginners from achieving greater yield rates.

***Low Moisture Content:*** Given food shortages faced by farmers as a result of the cassava blight, farmers continue to emphasize their own food security before focusing their attention on cash crops like cotton. As a result, cotton farmers tend to plant cotton seeds slightly later in the season, thus resulting in late picking. As a consequence of this cropping pattern, the moisture content of cotton when it is delivered to the ginnery is between 3% - 5%, while in fact the moisture content should actually be between 7% -

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[12] Not all are operating at any meaningful capacity.

9%. With a higher moisture content, there is less fiber damage and more volume to the cotton, which can translate to a GOT ratio of 36.0% - 36.5%.

***Dirty Cotton:*** Due principally to poor post-harvest handling practice, when raw cotton is brought in to the ginnery, additional cleaning is required before the cotton can be properly ginned. This generally contributes to an additional 2% loss.

***Mixed Seed Variety:*** As mentioned in the cotton farming section, farmers plant different varieties of cotton within a given concession. This result in a range of fiber quality and length mixed into a single batch, not only from a single farm, but also from the concession area.

***Mixing of Cotton at Purchase:*** Even though different seed varieties are used by farmers in the same concession, when cotton is purchased and loaded on to a truck, no distinction is made according to variety. In the absence of a quality control mechanism, an enforcement cotton classification scheme, and capacity of extension services to help monitor and enforce quality control practices, ginneries will continue to receive inconsistent fiber length and quality, which inevitably leads to low GOT ratio.

## 2.0 Value Chain Analysis for Cotton Ginning

The two ginneries reviewed for the value chain analysis had a GOT ratio of 34.0% - 34.4%, which is representative of the sector. Based on a delivered price of seed cotton ranging between $0.09 - $0.14 per kg, estimated cost of ginning one kg of lint cotton ranges from $0.15 - $0.26 per kg of lint (refer to Table 12).

**Table 12: Sample Ginning Costs**

| | **Ginning Cost ($/kg of lint)** |
|---|---|
| **Kenya** | $0.15 |
| **Kyrgyzstan** | $0.13 |
| **Mozambique** | $0.15 - $0.26 |

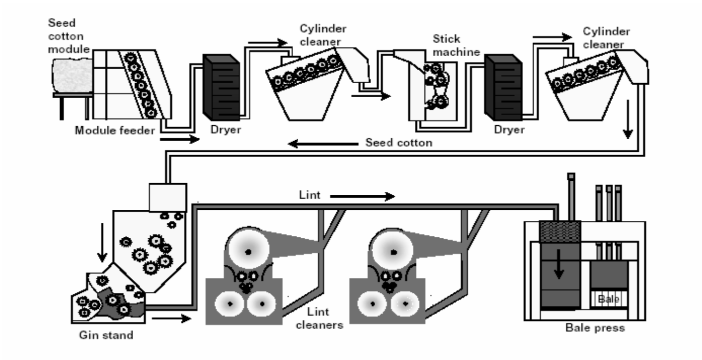
*Source: Global Development Solutions, LLC*

The wide variance in processing cost reflects the poor capacity utilization and poor equipment maintenance. But with the purchase price of seed cotton so low, the delivered price of lint is extremely low. Generally, the delivered cost of lint ranges between $0.89 - $1.32 per kg, and costs associated with the production of lint in Mozambique ranged between $0.54 - $0.58/kg.

Value adding activities in ginning can be divided into six areas (refer to Diagram 6):

- Raw cotton;
- Drying and cleaning;
- Ginning;
- Cleaning and packing;
- Transport; and
- Administration.

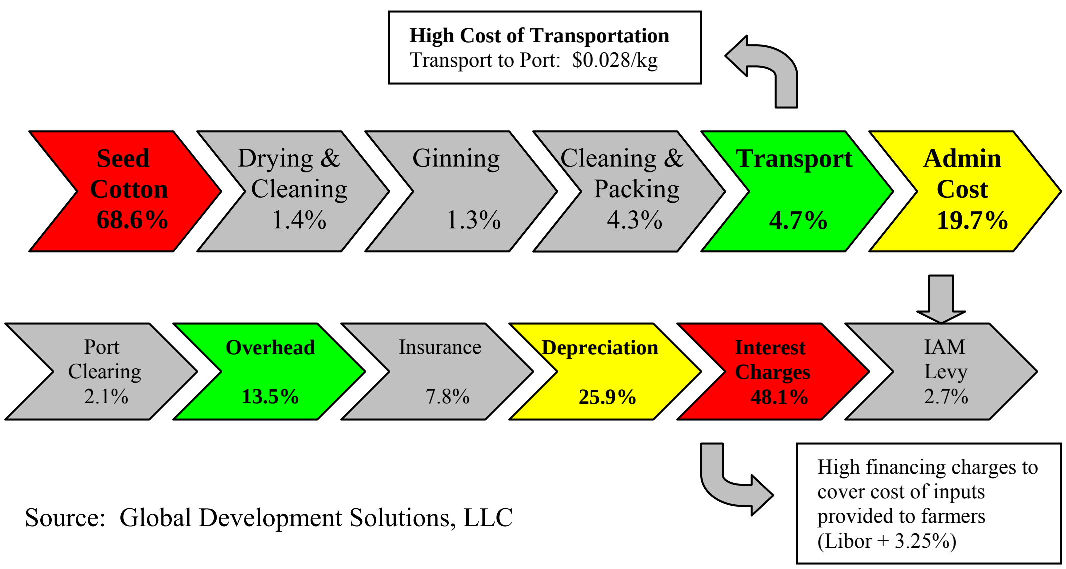
**Diagram 5: Representative cross-section of the typical ginning process**




Source: International Cotton Advisory Committee

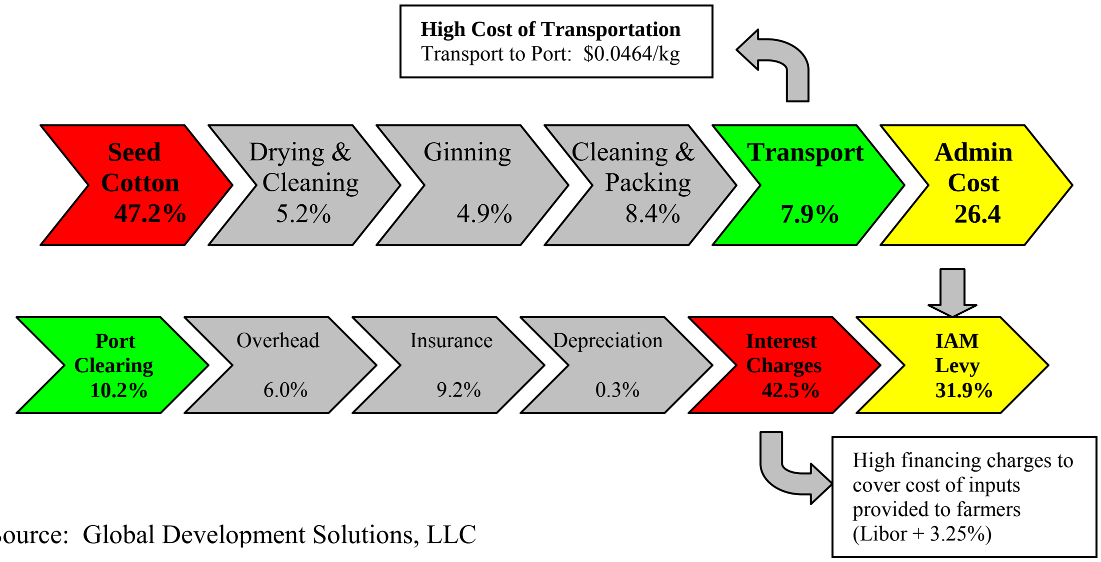
According to the value chain analysis, 47% to 69% of the total value of lint cotton comes from seed cotton, while 20% - 26% of value comes from administrative activities, and 5% - 8% from transport of lint cotton (refer to Diagrams 6 and 7).

**Diagram 6: Cotton Ginning Value Chain for a Joint Venture Company in Mozambique**




Source: Global Development Solutions, LLC

**Diagram 7: Cotton Ginning Value Chain for a Private Company in Mozambique**




Source: Global Development Solutions, LLC

While the percentage distribution of seed cotton and administrative activities are well within the range seen in other ginning operations around the world, the distribution of transport costs is nearly double that of other countries. In this context, cost of transport will be analyzed in a separate section of this report.

***Administrative Costs:*** For both the joint venture and private company, administrative costs were the second highest value adding activity. Close scrutiny of this activity reveals that there are six sub-activities contribution to these costs, namely port clearance, overhead, insurance, depreciation, interest charges and IAM levy.

For a joint venture company, interest charges (48.1%), depreciation (25.9%) and overhead costs (13.5%) were the highest cost components associated with administrative costs. Interest charges are related to the high cost of financing agricultural inputs for smallholder farmers. This cost is generally the same for all ginneries/concession companies.

One notable difference between the two ginning value chains is that there is a clear difference in the distribution of cost as it relates to public sector fee payment. Specifically, 49% of a joint venture company is owned by the government. In this context, both the IAM levy (collected under the MARD), and port clearing charges (collected under the Port Authority and Customs) are substantially lower for a joint venture company (2.7% and 2.1% respectively), when compared to a private company where the distribution of costs for IAM levy and port clearance was 31.9% and 10.2% respectively.

These differences can only be highlighted as an ‘observation’, as further analysis would be required to substantiate whether there is any meaningful correlation between the fact that one ginner is a quasi-governmental organization and pays little public sector fees, while the other is a fully private operation paying high public sector fees.

## 3.0 Other Issues

Interviews with ginners suggest that there are a number of other technical and management issues that require attention to help improve the competitiveness of the ginning sector.

***Poor Quality of Electricity:*** Ginners continue to face fluctuations in their power supply or even complete blackout. As a result, a number of ginners cited that during one season (81 days of ginning), power surges contributed to 35 equipment breakdowns (jams in the gin stand and lint cleaner), which accounted for a total of 4.6 – 4.8 days of work loss per season. As a consequence, some ginners have installed a parallel power supply, principally using diesel generators where the cost of electricity is approximately $0.085/Kwh, as opposed to $0.035/Kwh on the grid. Clearly, the high cost of off-grid electricity sourcing is not sustainable in the medium and long term, but taking into consideration productivity losses resulting from the poor quality of electricity, choices for ginners are currently limited.

***Sampling Requirement:*** According to IAM regulations, ginners are required to take two samples (250 – 350 grams/sample) from each bale: ginners are required to keep one sample for a period of 2 years, while the second sample must be handed over to IAM, which the Institute must retain for the same duration. A number of ginners have voiced their concern regarding this system as IAM does not retain the samples, but in fact sells them off in the market to generate additional revenue. It is estimated that approximately 73.6 tons of samples per annum are being sold in the market by IAM. Ginners cite that while this would not be a problem if IAM cataloged, tested and warehoused the samples for the mandatory 2 years, at which time they sell off the inventory, but currently IAM is not even testing all of the samples it receives, and the data from those that they do sample are not used properly to provide guidance to the sector.

***Dirty Cotton:*** Lack of on-farm support due to the lack of access to transportation for extension works, ginners continue receiving dirty cotton from its farmers, which not only increases the cost of cleaning cotton, but also contributes to a 2% loss rate. The introduction of simple post harvest handling techniques, which could be introduced by IAM, would help reduce ginning costs and loss rates, but the lack of capacity and outreach prevents the introduction of basic on-farm support services.

***Absence of Qualified Ginning Mechanics:*** It is estimated that there are only 5 qualified ginning mechanics in Mozambique. Taking into account that GOT ratio is partly a function of equipment operation and maintenance, ginners see a great need for establishing a nationwide apprentice and mentoring program to education and cultivate a cadre of ginning mechanics to help support the development of the sector.

***Absence of Metrology and Calibration Capacity:*** In addition to the lack of trained ginning mechanics, the absence of metrology and calibration capacity is limiting the operational capacity of existing ginning equipment due principally to the inability to accurately calibrate equipment. Similarly, metrological and calibration services are also required to improve classification standards and to introduce quality control in the sector.

# V. Transportation and Infrastructure Support Services

## 1.0 Shipping Costs and Port Capacity

With a coast line stretching 2,515 km, Mozambique is an economic gateway for Zambia, Zimbabwe, Malawi, and Swaziland. Three principal ports in Maputo, Beira and Nacala service the import/export needs not only for Mozambique, but also for four other countries (refer to Table 12).

**Table 12: Mozambique's Port Capacity**

| | Installed Capacity (tons/year) | LoLo Capacity (Containers/hour) | Berth Length (meters) |
|---|---|---|---|
| Port of Maputo[13]<br>Port of Matola[14] | 12,010,000<br>4,750,000 | 15/hour (2 cranes)<br>Bulk stack: 25 – 30/hour | 3,876<br>865 |
| Port of Beira<br>Additional capacity (general cargo)<br>Additional capacity (fuel) | 7,470,000<br>2,300,000<br>3,000,000 | 10/hour (1 crane) | 645<br>670 |
| Port of Nacala<br>Additional capacity (general cargo)<br>Additional capacity (liquid bulk) | 2,600,000<br>2,000,000<br>Na | 8 – 16/hour/ship<br>(no shore crane) | Na<br>327<br>Na |
| Port of Quelimane/Pemba | 650,000 | | Na |
| Cargo Handling Equipment<br>Electric Crane (34)<br>Empilhadores do cais (15) | | | |
| *Source: Complied by Global Development Solutions, LLC* | | | |

The average cost of sea cargo from Asia to Mozambique is between \$2,550 - \$3,250 per container, and \$2,650 - \$2,950 per 40' container to and from Europe. The principal challenge facing Mozambique is to attract more international shipping lines to its ports. The majority of shipping lines continue to use the Port of Durban (South Africa) as a hub with feeder services to ports in Mozambique. Consequently, the Port of Maputo only receives regular calls from six international shipping lines for break bulk and six for container cargo.

The average customs clearing time in Mozambique is estimated to be between 15 - 18 days.[15] According to Crown Agents average clearance times have since fallen to 4-7 days (land 4 days; sea 5 days; air 6 days), based on the time lag between submitting the Customs declaration and collecting the delivery order, which can be done only after duties have been paid.

[13] Include dedicated terminals for fish, coastal shipping, general cargo, coal, fruits/citrus, sugar, molasses, containers and steel. For exports, the total THC charges are \$195, of which \$100 is paid by the shipper, \$90 by the shipping line and \$5 for ISPS.
[14] Includes dedicated terminals for coal, petrol, cereals and aluminum.
[15] FIAS survey, 2001.

## 2.0 Rail and Road Access

The three principal ports are connected by road and rail. Mozambique has a total of 25,000 km of roads, of which only 4,300 km can be classified as primary roads.[16] In addition, Mozambique and its neighboring economies are supported by a 3,048 km railway infrastructure network, which is divided into four geographic areas (refer to Table 13).

| **Table 13: Principal Railway Corridors Connecting Mozambique With Neighboring Countries** | | | | |
|---|---|---|---|---|
| **Principal Line** | **Principal Link** | **Connecting Country** | **Length (km)** | **Capacity (tons/year)** |
| CFM-South[17] | Maputo-Ressano Garcia | South Africa | 88km | 15 million |
| | Maputo-Goba | Swaziland | 74km | 7.2 million |
| | Maputo-Chicualacuala | Zimbabwe | 520km | 5.7 million |
| CFM-Center | Beira-Machipanda | Zimbabwe | 318km | Na |
| | Sena Line<br>Dondo-Dona Ana<br>Dona Ana-Moatize<br>Dona Ana-Vila Nova<br>Inhamitanga-Marromeu | Malawi, Zimbabwe | <br>298km<br>240km<br>43km<br>88km | Na |
| CFM-North | Nacala-Cuamba-Entre Lagos<br>Cuamba-Lichinga | Malawi | 610km<br>262km | Na |
| CFM-Zambezia | Quelimane-Mocuba | Mozambique | 145km | Na |
| *Source: Compiled by Global Development Solutions, LLC* | | | | |

Although railways serve an important role in linking the east-west corridor, Mozambique Railway's rolling stock has decreased considerably during the last ten years. The number of locomotives has declined by as much as 41%, where the current operational locomotives number less than 50. Similarly, the number of operable wagon has declined by 55% (less than 2,300 wagons are currently in operation).

Having said this, however, railroads continues to be the preferred mode of cargo transport both within Mozambique and into the neighboring countries (refer to Table 14).

| **Table 14: Mode of Transport Utilized in Mozambique** | |
|---|---|
| **Mode of Transport** | **Tons of Cargo** |
| Road | 185,023 |
| Railway | 3,280,335 |
| Ship | 96,467 |
| Air | 3,463 |
| *Source: INE, 2002* | |

## 3.0 Customs Clearance

In the Maputo Corridor the border controls at Ressano Garcia (South Africa) and Namaacha (Swaziland) are weak and lack proper infrastructure including communication facilities. Trucks importing goods to Mozambique are required to go through customs

[16] 50% of the roads are tertiary roads and not suitable for heavy truck traffic.
[17] CFM-South also links to Moamba-Ungubane-Xinavane (93km); Xai-Xai- Chicomo (90km); Inhambane-Inharrime (90km); and Manjacaze-Marão (50km).

clearance through the Matola Cargo Terminal (FRIGO), a privately owned inland clearance terminal on the outskirts of Maputo. There freight forwarders are required to pay a terminal charges, principally to cover storage and parking fees, which are assessed according to CIF value (refer to Table 15).

| **Table 15: Terminal Charges at FRIGO** | |
|---|---|
| Duration at Terminal | Charge (% of CIF value) |
| < 2 days | 0.28% |
| > 2 days | 0.7% |
| Bulk goods | 5% |
| Minimum payment:<br>Packaged goods<br>Bulk | <br>560,000 Mts ($24)<br>590,000 Mts ($26) |
| *Source: Compiled by Global Development Solutions, LLC* | |

Interviews suggest that traders are concerned with the long waiting times (refer to an earlier table outlining the time lapse associated with customs clearance) and the fact that these tariffs are extremely high, especially for valuable goods.

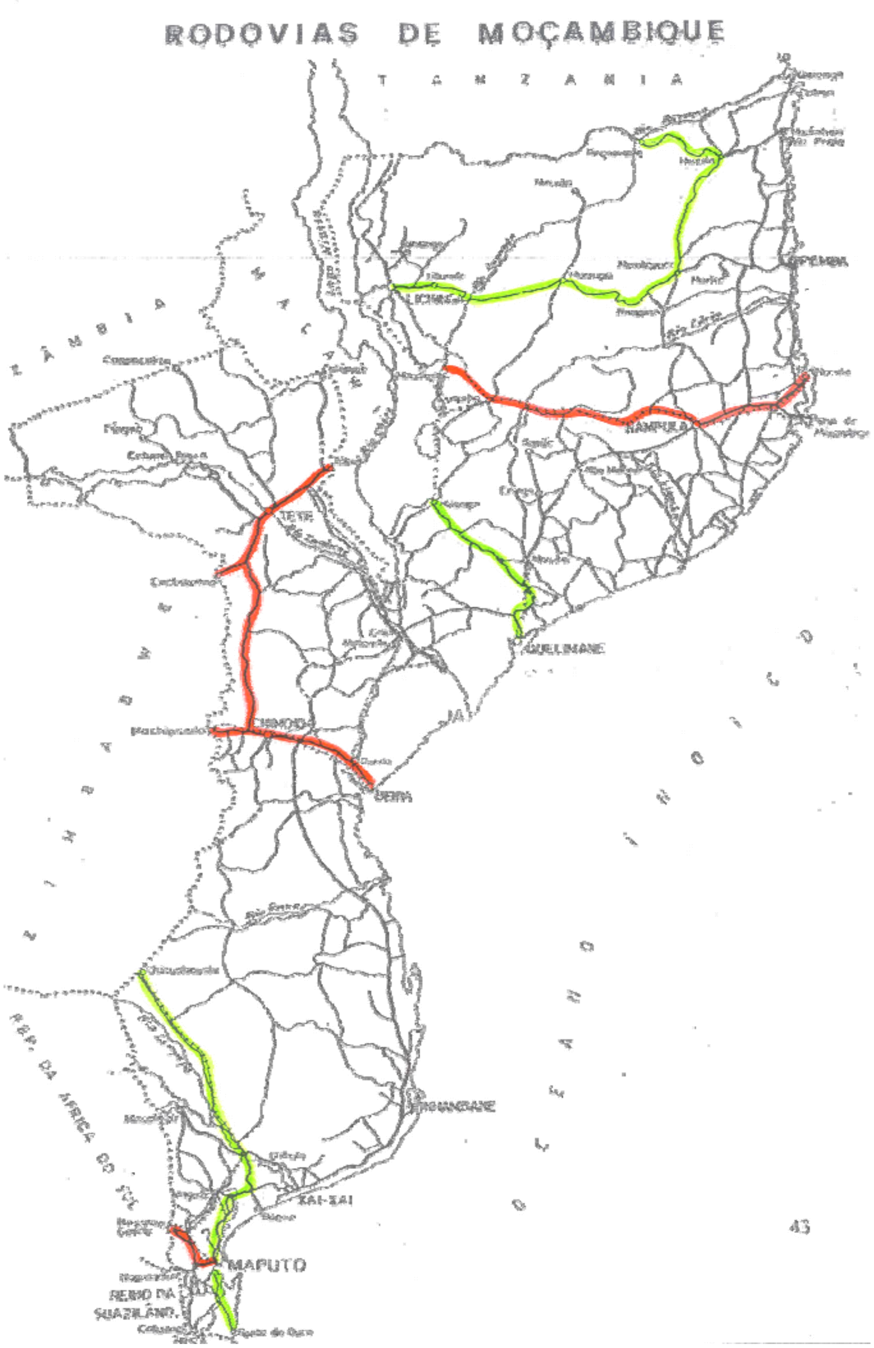
As far as customs clearing agents are concerned, traders feel that there is a lack of competition in Mozambique. The largest agent is ADENA, the state-owned national clearing agent with offices in Maputo, Beira, Nacala and Tete. The clearance process continues to be highly centralized around Maputo. This is further compounded by the fact that thanks to poor communication infrastructure and organization, document transfer from outside Maputo is conducted using a courier service rather than using an internet or web-based clearance system. For example, for a ship calling in Nacala, all necessary documents must first be physically taken to an office in Nampula, where customs official consult with their counterparts in Maputo. Then documents must be couriered from Nampula to Maputo for clearance by the customs office in the capital city, and then sent back to Nampula before cargo can be cleared. This process adds more than one week and $155 ($110 for clearance and $45 for certificate of origin) to a clearing process which should only take one to two days.

Export procedures are relatively uncomplicated (refer to Table 16), but customs clearance continues to be slow. Generally, it is estimated that 3 – 5 days are required for Customs to clear cargo.

| **Table 16: Export Procedure Requirement** | | |
|---|---|---|
| **Procedural Requirement** | **Relevant Organization** | **Costs** |
| Register as exporter | Ministry of Commerce | <$10 |
| Export permit | Customs clearance agent | Variable |
| Certificate of origin | Chamber of Commerce | $15 |
| Phyto-sanitary inspection | Ministry of Agriculture | $55 |
| Customs clearance | Customs | Variable |
| *Source: Global Development Solutions, LLC* | | |

## 4.0 Factors Constraining the Growth of the Private Sector

For historical, political and economic reasons, the east-west corridors linking Mozambique to its neighboring countries are relatively well established. Although the quality of transportation and services can be greatly improved, neighboring countries are able to access its trading partners through the three main ports in Mozambique connected by the corresponding roads and railways. As the map below indicates, the east-west corridors are well established



What is immediately noticeable in this map is the absence of a north-south transport corridor. While there was once a bridge crossing the Zambezi that linked the north-south corridor, civil war left the bridge unusable, thus leaving a small ferry service as the only direct access across this vital link. This is particularly relevant as agricultural production tends to take place in the central and northern regions of the country, while principal investments in industrial activities, processing facilities, the major port, and principal trading activities are all concentrated around Maputo in the south.

In this context, given the state of the existing internal infrastructure, Mozambique's economy is defined according to the three distinct geographic regions: south, central and north, where market integration, particularly with respect to value added production, is virtually unrealizable due principally to the lack of access to a viable north-south transport corridor. This problem is easy to appreciate given the cost of transporting goods through the north-south corridor (refer to Table 17).

| **Table 17: Rail, Road and Ship Transport Cost Comparison** | | | | | |
|---|---|---|---|---|---|
| | **Road (tons)** | | **Rail (tons)** | | **Ship** |
| **Maputo to:** | **22** | **30** | **14** | **22** | |
| Johannesburg | $625 | $950 | $393 | $620 | |
| Harare | $1,008 | $1,344 | $960 | $1,686 | |
| Blantyre | $1,260 | $2,380 | na | na | |
| Lusaka | $1,064 | $2,100 | na | na | |
| Lubumbashi | $2,520 | $2,940 | na | na | |
| Dar es Salam | | | na | na | $845 |
| Dubai | | | | | $2,550 |
| Guangzhou | | | | | $2,550 |
| Tilbury/NWC Ports | | | | | $2,750 |
| Pemba | $7,000 | | na | na | $1,350 |
| Nampula | $5,600 | | na | na | |
| Beira | $1,800 | | na | na | $1,800 |
| Kilema | $3,000 | | na | na | |
| Tete | $3,500 | | na | na | |
| Nacala | | | na | na | $2,500 |
| **Beira to:** | | | | | |
| Harare | $1,200 | | $500 | $1,000 | |
| Blantyre | $1,700 | | na | na | |
| Lusaka | $3,700 | | $1,033 | $2,021 | |
| **Nacala to:** | | | | | |
| Lilongwe | | | $896 | $1,408 | |
| Blantyre | | | $840 | $1,320 | |
| *Source: Compiled by Global Development Solutions, LLC* | | | | | |

For a trader to use road transport to move a product from Pemba to Maputo, a truck would require to use of the east-west corridors to travel through Malawi, Zambia and Zimbabwe to travel south and eventually use the east-west corridor to re-enter Mozambique. As Table 17 indicates, it costs nearly $7,000 to truck a 22 – 24 ton container from Maputo to Pemba, which is nearly 2.5 times the amount it would take to ship the same container from Dubai ($2,550) or Guangzhou, China ($2,550).

Similarly, given the infrequent service routes and poor quality of shipping service, shipping cargo from Nacala to Maputo costs $2,500, which is nearly 3 times the cost of shipping a container from Maputo to Dar-es-Salam, Tanzania ($845), and approximately the same cost as shipping a container from Dubai or Guangzhou to Maputo.

These figures provide a compelling reason why activities involving value added production, particularly related to agriculture, are not taking place, especially in Maputo where investments in industrial activities are concentrated.  In this context, the country faces a dual challenge.  Given the fact that most international shipping lines transship through Durban, the cost of shipping continues to remain high, and the frequency low. This immediately raises the cost of exporting, and thus discounts the competitiveness of products produced in Mozambique.  This in turn discourages investments in productive activities, which leaves many producers, particularly of agricultural products, to export products without much value added.  And in the absence of an economically viable north-south corridor, prospects for developing an economically viable market linkage to integrate agricultural production in north and central Mozambique with value added activities in the south is expected to remain prohibitive.

## VI. Dormant Textile Sector

Historically, Mozambique has had a number of operational textile mills, but since 1993, most mills have closed down with the exception of Riopele, which closed in early 2003. Until 1973, companies were prohibited from spinning cotton as all lint cotton was exported to Portugal. But in 1975, the new government allowed private mills to spin and weave cotton, but production was generally focused on manufacturing military uniforms and blankets using second and third grade cotton. While none of the original mills are currently in operation, a substantial amount of equipment continues to remain idle in Mozambique.

Perhaps the most up-to-date but idle equipment is held by Riopele and Texafrica. In the case of Riopele, given its geographic location (at Marracuene, just outside Maputo) where it is difficult to access cotton from central and northern Mozambique, elected to install equipment to produce synthetic fabric (Kapulana fabric) using imported material, suitable for the production of trousers, uniform, pajamas, shirts, and blouses. The original install weaving capacity was approximately 3.5 million meters/annum, and 2.5 million meters/annum of spinning capacity. However, due to a fire, the company lost the use of some of its capacity, where now, the remaining equipment is capable of producing 3 – 4 million m² per year of woven fabric, 600 tons/year of spun and dyed fabric, and 3 million meters/year of knitted material. An example of the types of equipment available, but idle in Mozambique is presented below (refer to Table 18).

**Table 18: Example of Types of Equipment Currently Idle in Mozambican Factories**

| # of Equipment | Brand Name | Function |
|---|---|---|
| 4 | Trutzshler | Bale breaker |
| 16 | Reiter | Carding machines |
| 15 | Reiter | Spinning machines |
| 2 | Benninger | Warping machines |
| 120 | Sauer Diedrichs | Looms |
| 20 | Staubli | Dobbies |
| 18 | Textima | Circular knitting machines |

*Source: Riopele*

The other large potentially functional mill is Texafrica, a vertically integrated cotton mill with an installed capacity of 12 million linear meters per annum. The mill spun up to 30,000 tons of lint annually using local cotton from concessions which it held, employing 3,000 or more workers.

While none of the mills are currently operating, what is evident in Mozambique is that there is a wide range of operable and repairable equipment sitting idle in the country. With this said, however, operationalizing existing companies will require substantial debt restructuring, technical improvements, and a realignment of the current labor regulations to help reduce the burden of idle labor.

Take Riopele, for example, it continues to negotiate with its shareholders to restructure its ownership and organization, and their financing. In this context, they have made production cost estimates based on a restructured operation. Based on Riopele's estimates, it would cost approximately $2.53/meter to produce synthetic material using current equipment, which includes the cost of raw material (refer to Table 19). Alternatively taking into account that the equipment set up at Riopele is based on the use of synthetic material rather than lint cotton, the estimated cost of production excluding material costs, is estimated to be approximately $1.34/meter woven fabric.

**Table 19: Example of Production Costs Estimates for Woven Material**

| Production Costs | Production Cost Including Material | | Production Cost Excluding Material | |
|---|---|---|---|---|
| | US$ | % of Total | US$ | % of Total |
| Raw material | **4,633,000** | **47.0%** | | |
| Electricity | 500,000 | 5.1% | 500,000 | 9.6% |
| Fuel/lubricants | 250,000 | 2.5% | 250,000 | 4.8% |
| Spare parts | 80,000 | 0.8% | 80,000 | 1.5% |
| Packing material | 55,000 | 0.6% | 55,000 | 1.1% |
| Wages | **1,548,000** | **15.7%** | **1,548,000** | **29.6%** |
| **Administrative costs** | | | | |
| Social charges | 250,000 | 2.5% | 250,000 | 4.8% |
| Overhead charges | 150,000 | 1.5% | 150,000 | 2.9% |
| Fiscal charges/Customs | 279,000 | 2.8% | 279,000 | 5.3% |
| Turnover tax | **857,000** | **8.7%** | **857,000** | **16.4%** |
| Financing charges | - | 0.0% | - | 0.0% |
| CAT | 761,000 | 7.7% | **761,000** | **14.6%** |
| Depreciation | 500,000 | 5.1% | 500,000 | 9.6% |
| **TOTAL** | **9,863,000** | **100.0%** | **5,230,000** | **100.0%** |
| | | | | |
| **Quantity Produced (linear meter)** | **3,900,000** | | | |
| **Revenue ($)** | **$17,134,000** | | | |
| **Production Cost** | | | | |
| $/meter (with material) | $2.53 | | | |
| $/meter (without material) | $1.34 | | | |

*Source: Compiled by Global Development Solutions, LLC based on interviews*

It should be noted that in Kenya, for example, similar fabric production cost (although for cotton), is approximately $2.06/meter. With this said, however, if we consider just the processing cost without material, the cost of production at Riopele would be approximately $1.34/meter. Taking into account that the delivered price of lint is extremely low compared to other countries, there is potential for textile mills in Mozambique to produce competitively priced cotton yarn, which in turn would open up opportunities for Mozambique to revitalize its spinning and weaving operations, and thus position itself to develop a competitive integrated textile and garment industry.

While further investments, technology upgrading, and possibly even relocation of key processing equipment closer to the source of raw material to central and northern Mozambique might be required, the current pricing structure for lint production in Mozambique opens up possible avenues for reintroducing an integrate textile production system in the country.

## VII. The Garment Industry in Mozambique

Given the missing link between ginning and spinning and weaving, the limited garment production currently in operation is CMT (cut, make and trim) where fabric is imported and factories in Mozambique are principally responsible for fabricating garments. While there were seven garment manufacturers operating in Mozambique in 2000, this figure has drop to 2 by 2004.[18]

As a late comer to AGOA, and the limited garment production in Mozambique, the country fills a mere 0.08% of total AGOA apparel exports to the U.S. measured in square meter equivalent (refer to Table 20).

**Table 20: Duty Free Imports of Apparels Under AGOA (January 31, 2004)**

| **Countries** | m² equivalent | **% Share of AGOA Exports** |
|---|---|---|
| Lesotho | 32,483,869 | 35.9% |
| Madagascar | 17,273,746 | 19.1% |
| Swaziland | 16,760,712 | 18.5% |
| Kenya | 15,220,512 | 16.8% |
| Namibia | 3,992,015 | 4.4% |
| Malawi | 2,490,863 | 2.8% |
| Botswana | 1,039,037 | 1.1% |
| Ethiopia | 544,653 | 0.6% |
| Cape Verde | 309,521 | 0.3% |
| Uganda | 305,952 | 0.3% |
| **Mozambique** | **86,714** | **0.1%** |
| Ghana | 68,539 | 0.1% |
| **TOTAL** | **90,576,133** | **100.0%** |

*Source: African Coalition for Trade, Inc.*

It should be noted that only 10.9% of total AGOA quota is currently being fulfilled by AGOA member countries. Similarly, even less under utilized potential is the fulfillment of quota for African fabric, which is currently at 2.7% of the overall AGOA quota allocation. Lesotho, a landlocked country without in-country cotton resources, continues to be the largest exporter of textiles and apparel under AGOA to the United States. While the possible discontinuation of AGOA in 2004 slowed down orders for early 2005, there are signs that demand is again starting to come back.

Given the extreme limitations faced by the Lesotho's garment industry, it has been able to organize and establish a stronghold in the AGOA based market. This poses the question why a country like Mozambique which is able to produce cotton and lint and with a history of textile production, is unable to take advantage of AGOA to generate employment and income not only for selling garments in the U.S. market, but also to become a supplier of yarn and fabric to other African countries, like Lesotho, which must import input materials to continue to enjoy its quota status under AGOA.

[18] The 2 manufacturers in operation today have adequate volume of exports. For example in one factory, the management is planning a production level of 7,400 units/day for 2005.

## 1.0 Value Chain Analysis for Garments in Mozambique

To get a grasp of the barriers that seem to be inhibiting the development and active participation of the garment sector in AGOA and other markets, a value chain analysis for a standard cotton T-shirt, and a high end cotton dress shirt were conducted. Both garment factories export 100% of their production, but are not bound by AGOA. In fact, one of the garment factories exports a majority of its output to South Africa and the UK, and only 5% of it production to the United States.[19]

The first value chain analysis will focus on T-shirt production. There are eight value adding stages in T-shirt production, namely:

- Import transaction cost;
- Layer and cutting;
- Sewing and assembly;
- Finishing;
- Packing and loading;
- In-factory inspection;
- Administration and overhead; and
- Export transaction cost.

## 2.0 Value Chain Analysis for a Standard Cotton T-Shirt

A value chain analysis for two T-shirt production facilities was analyzed. First, is an operator currently producing and exporting T-shirts, and polo shirts to the United States, and the second is from a recently closed facility that produced for the domestic and limited exports to regional markets.

Generally, input material, namely fabrics, is imported from China and India, or alternatively, the parent company outside Mozambique supplies all the inputs as is often the case in CMT operations. The CMT value added for the garment company currently operating in Mozambique is estimated to be $0.69/T-shirt. The three highest value adding activities include, sewing/assembly (30.5%); finishing (22.8%); and administrative overhead (16.0%).

### 2.1 Sewing and Assembly

Sewing and assembly function within the value chain is divided into three value adding activities: labor (88.5%), utilities (4.3%), and depreciation and maintenance (7.2%). A closer scrutiny of labor productivity reveals that due to poor labor skills, labor productivity measure in production of T-shirt per person per day is approximately 10 - 11.2. A similar comparison with Kenya and Lesotho show that labor productivity in Kenya for the production of a similar T-shirt was 20 – 24 T-shirts/person/day. Similarly,

[19] The unique distribution of products outside the AGOA market may have to do with the fact that one of the garment manufacturer specializes in the production of specialized uniform for high end restaurants.

in Lesotho, the labor productivity is approximately 16 T-shirt/person/day (refer to Diagram 8).

In addition to the low labor productivity rate, the garment producer also faces a problem with in-line defect rate, which is approximately 0.4 – 1.7%.  While lower than the defect rates experienced in garment factories in Lesotho (2% – 3%), they are somewhat higher than in Kenya, where the in-line defect rates are generally less than 1%.

Taking into consideration that there is virtually no technical skills training available in the market, and little resources are expended on in-house training activities, labor skills continues to be low.  Labor skills are clearly a problems, but so too is the value added for depreciation and maintenance, which is estimated at 7.2%.  Generally, garment factories add between 17% - 32% value for depreciation and maintenance, which indicates that a factory is investing in regular maintenance of its equipment.  However, in this case, the relatively low value added suggest that the factory may not be keeping up with regular maintenance activities of its equipment, which would lead to equipment breakdown and lost operational time.  This, in part, would help explain the defect rates and low labor productivity rate.

## 2.2 Finishing

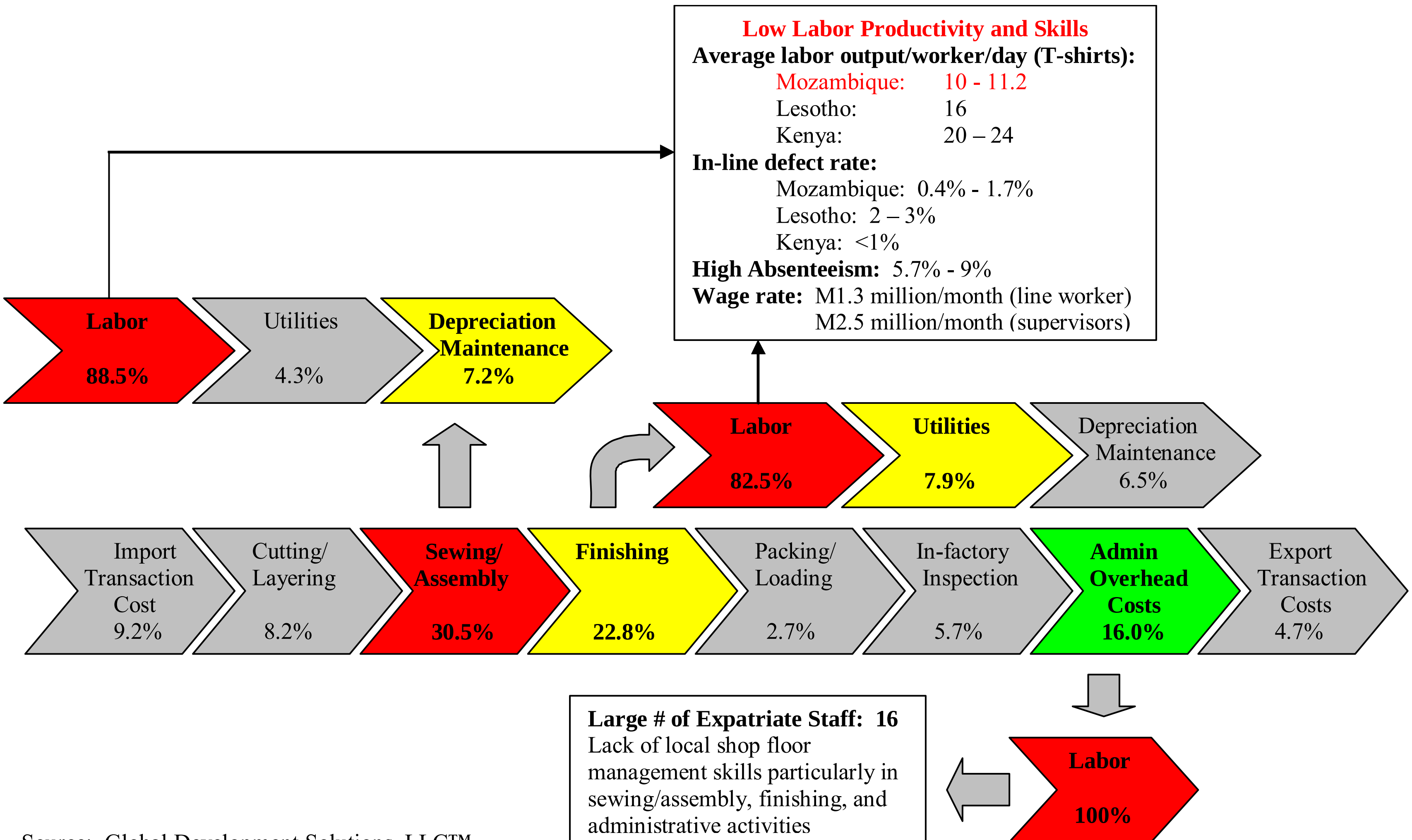
The second highest value added activity is finishing, which constitutes 22.8% of the overall value added.  The distribution of value added activities are somewhat similar to the situation found in sewing and assembly, specifically, high labor input (82.5%), and low depreciation and maintenance (6.5%).  Here again, low labor productivity and limited investment in regular maintenance helps to explain the low labor productivity and high defect rates.

## 2.3 Administrative Overhead Costs

The third area of high value added is administrative overhead costs (16%), of which 100% are accounted for by labor inputs.  A closer scrutiny of this figure reveals that the factory relies on a large number of expatriate staff.  Specifically, the factory uses 16 expatriate staff, of which 12 are line supervisors for sewing/assembly and finishing operation, and front office functions (business managers, accountants, etc).

This figure is reflective of the fact that there are only a few well trained local line supervisors and workers with middle management skills in Mozambique.  Here again, this figure further reinforces the fact that the absence of creditable technical and management training institutions, and thus the lack of well trained workers is contributing to the erosion of the company’s competitive position in the market.

**Diagram 8: Garment (CMT) Value Chain for Mozambique**




Source: Global Development Solutions, LLC™

## 2.4 Other Critical Issues

***Labor Absenteeism:*** In addition to low labor skills and limited equipment maintenance, interviews with a factory manager revealed that labor absenteeism is a major problem contributing to the low labor productivity. Specifically, labor absenteeism, ranged between 5.7% and 9%.[20] This translates to an estimate revenue loss of nearly $450,000 per month.[21] To avoid work slowdown and stoppage, the company has hired an extra 78 workers which they would otherwise not do. Eighteen of these workers are machinists.

In addition, it should be noted that by law, employers are required to provide one month paid vacation for its workers. Generally, workers are given time off between mid-December and mid-January for approximately three weeks. An additional one week of holidays are kept in reserve to be used during the course of the year when the factory faces logistics problems associated with late incoming shipment of input material, late delivery of gas supplies, import/export clearance delays and electricity interruptions.

Labor absenteeism, uncompetitive labor laws, and unreliable logistics support infrastructure compounds the already handicapped operation, eroding away the competitive position of manufacturing operations in Mozambique.

***Poor Physical Infrastructure:*** According to interviews, the time lapse between an order from a buyer and delivery of input material is generally about 17 days. But given unreliable access to shipping services, the factory generally must account for about 30 days time lapse between the receipt of an order and delivery of input material. Specifically, the port used by the company faces a major silting problem due to poor maintenance. As a consequence, shipping companies rate the port as 'insecure', and generally instruct operators to use one of the other major regional ports.

As an example of this problem, due to shipping delays associated with problems at the port, last year the factory operator had to airfreight its delivery order 3 times to the client, which effectively wiped out a significant portion of their profits.[22] In this context, rather than having input material delivered to its nearest port, operators may now be required to have their import-export transactions facilitated through a port 1,200 km away. The additional trucking cost is expected to erode the competitive position of the factory even further. Specifically, for East African garment exporters, sea freight generally accounts for 4.1% - 4.5% of FOB price, while airfreight accounts for 14.4% - 20.3% of FOB price. These figures indicate that problems caused by poor port infrastructure, and as a result having to airfreight shipments erodes the competitive position of a company by as much as 10.3% - 15.8%. For the garment industry access to efficient shipping is particularly important taking into account that shipments from Maputo-Durban-New York, require a minimum of 30 days, while garment manufacturers in East Asia can deliver finished garments to New York in approximately 12 days.

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[20] The current labor law makes it virtually impossible for an employer to fire unproductive workers without a large financial cost burden placed on the company.
[21] This translates to about 14% loss in revenue.
[22] One-day delay in international shipping is estimated to be equivalent to a 0.8% increase in tariff.

## 3.0 Value Chain Analysis for High End Cotton Dress Shirt

The second value chain analysis was conducted for a high end cotton dress shirt. This factory, located in Maputo, is a relatively small operation, but has identified a niche market for its product. Specifically the factory produces dress shirts and trousers used in the hospitality sector in South Africa, the UK and the United States.

The factory imports cotton fabric from China (70%) and India (30%), and is involved in CMT. With respect to lead time for imported cotton, the time lapse between order and delivery of material in Maputo is approximately 30 days, with an additional one week for port and customs clearance. Following port and customs clearance, an additional 3 days is required for the material to be delivered to the warehouse ready for processing.

As indicated by the value chain analysis, the profit margins are favorable, and have proven to be a commercially viable market. The value chain for high end cotton dress shirt is categorized into 6 value added activities, namely:

- Cotton material;
- Cutting and layering;
- Sewing and assembly;
- Finishing;
- Packing and loading; and
- Administrative overhead.

According to the value chain analysis, the CMT cost for high end cotton dress shirt was estimated to be $2.67 per garment, inclusive of the cost of cotton material. The three highest value adding activities including cotton material (46.2%), sewing and assembly (24.7%), and administrative overhead cost (17.8%).

### 3.1 Cotton Material

As mentioned earlier, cotton material and other inputs such as threads, buttons and labels are imported from China and India. While the quality of cotton fabric must be high to meet the requirements of its customers, given the relatively high fiber quality available in Mozambique, the revitalization of the textile sector for the creation of local cotton fabric offer an attractive potential to help reduce the input cost for the factory.[23] Currently, the factory is producing approximately 36,000 shirts and 9,000 trousers per month. The current production level generates a demand for approximately 930,000 m² of fabric.

### 3.2 Sewing and Assembly

The second highest value added activity is sewing and assembly (24.7%), which consists of labor (62.7%), utilities (4.1%), input material (17.7%), and maintenance (15.4%). Refer to Diagram 9.

[23] It is estimated that approximately $1.25 of cotton material is required per shirt.

***Labor:*** As with most garment assembly, labor is a significant feature of sewing and assembly. But as evident from the value chain analysis for T-shirt, absenteeism and idle labor is a critical challenge facing garment factors. In the case of the production of high end cotton shirt, absenteeism was 7% and equally problematic, if not worse, is the fact that due to the prevailing labor law, the factory has to pay for idle labor, which accounts for nearly 15% of the total labor force.

***Input material:*** Generally, input material required for sewing and assembly consists of thread, accessories, and label. Specifically, the highest input is labels, which constitutes 46.9%. As with other input material, thread, accessories and labels are sourced from China and India, and require substantial lead time to access.

***Administrative Overhead Cost:*** As indicated in the value chain analysis, the niche market identified by the garment manufacturer has proven to be a profitable endeavor. With this said, however, given insufficient labor productivity, there is substantial room for expanding margins for the garment manufacturer. As the value chain analysis revealed, reject rates are high. Specifically, defect rate was estimated at approximately 1% of production, while rework rate was 2% - 3%. These figures, which reflect poor labor productivity rates, once again point to the need for investments in labor skills development.

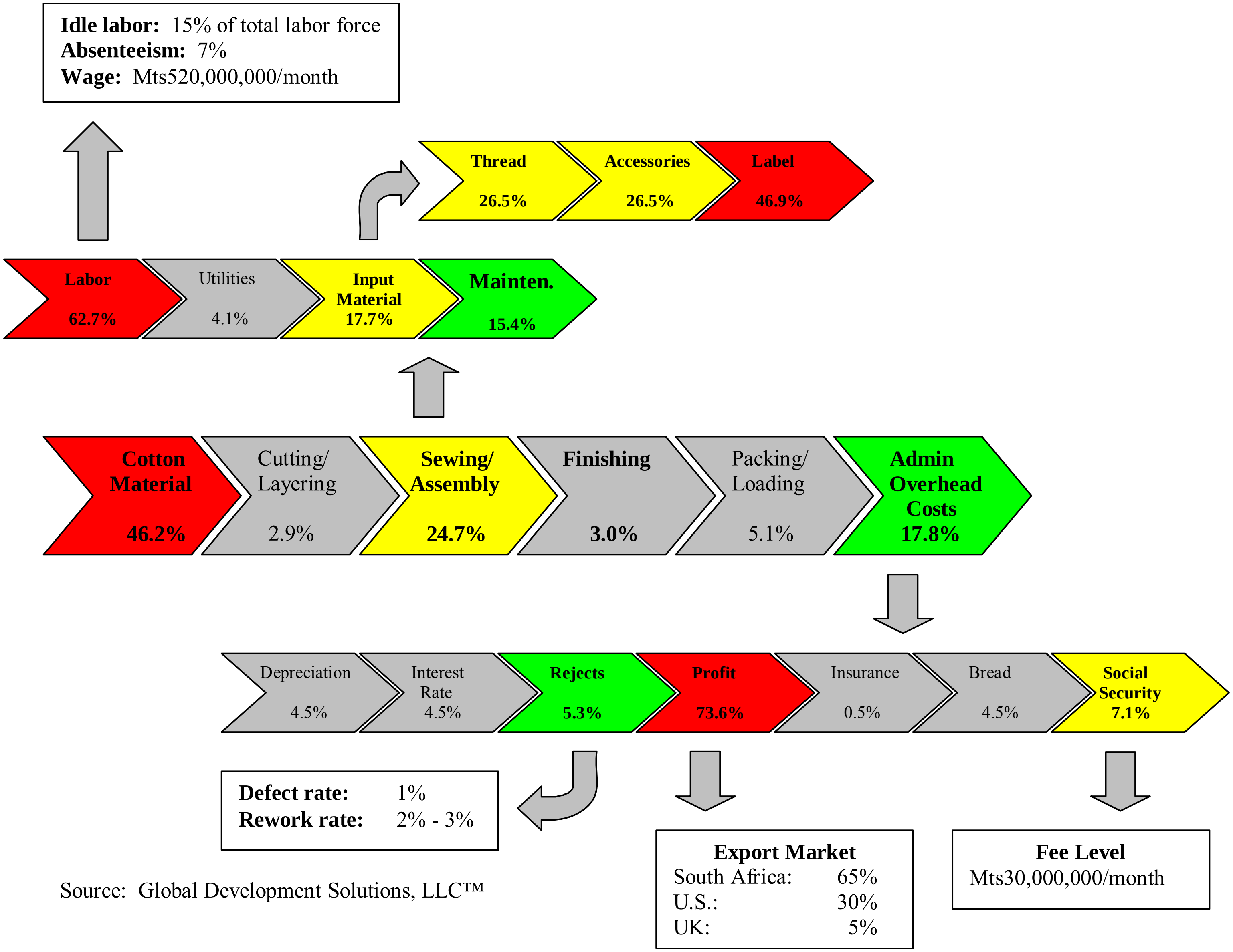
### 3.3 Other Critical Issues

***Slow Order-to-Delivery Sequence Time:*** As indicated in the T-shirt value chain analysis, cost and speed associated with transport is an important variable for the garment industry, particularly if the operation is a CMT, which requires import of input material, which adds time to the order-to-delivery sequence time. In the case of Mozambique, importing input material from China adds an additional 31.3% to the delivery time lapse (refer to Table 21). Taking into account that garment manufacturers that can source material from within the country would have virtually no time lapse to access input material, this would open up a completely different market niche, which allows garment manufacturers to take short turnaround orders that generally tend to offer a premium price for on-time delivery.

What is important to note is that although time required to import input material and export finished goods constitutes over 62.5% of the order-to-delivery sequence time, the actual time it takes to ship material to and from Mozambique is relatively static and can not be changed. Consequently, the focus of attention then must be put on other activities such as CMT and rework time (10.4%), and customs inspections/clearance (7.3%), which are activities requiring the next highest input of time.

As evident from the value chain analysis, the reduction of reject rates, and the elimination of idle workers would have a positive impact on reducing the production flow time lapse. At the same time, garment manufacturers continue to complain that document processing procedures for custom clearance are inconsistent and time consuming. This complaint can clearly be validated by Table 21.

**Diagram 9: High End Cotton Shirt Value Chain for Mozambique**




Source: Global Development Solutions, LLC™

| Table 21: Order-to-Delivery Sequence Map | | | |
|---|---|---|---|
| **Sequence** | **Activity** | **Time lapse (days)** | **% of Total** |
| 1 | Input material shipping: China →Maputo | 30 | 31.3% |
| 2 | Customs clearance | 7 | 7.3% |
| 3 | Loading and delivery to factory | 3 | 3.1% |
| 4 | CMT, and rework[24] | 10 | 10.4% |
| 5 | Packing | 2 – 3 | 2.1% |
| 6 | Document preparation | 3 | 3.1% |
| 7 | Custom inspection/clearance | 7 | 7.3% |
| 8 | Loading | 2 – 3 | 2.1% |
| 9 | Transport to port/airport | 1 | 1.0% |
| 10 | LoLo | 1 | 1.0% |
| 11 | Shipment Maputo → New York | 30 | 31.2% |
| **TOTAL Time lapse** | | **96 – 98** | |
| *Source: Global Development Solutions, LLC* | | | |

***Anti-competitive Labor Regulations[25]:*** According to garment manufacturers, by law, they are required to provide one liter of milk to each employee. While this requirement is reasonable from a social welfare perspective, particularly if it applies to a government run organization or if such costs can be deducted from tax, but such is not the case in Mozambique. According to the plant manager, a liter of milk would cost Mts 30,000 per employee, which is a substantial overhead cost. Instead, the management has come to an agreement with its employees that workers would receive bread and tea (with milk) during a 15 minute break. Under this agreement, the garment manufacturer purchases 400 loaves of bread per day at a cost of nearly Mts19,000,000/month, which account for 4.5% of the operation's overhead cost.

While such employee nutritional support programs are important for worker productivity, provisions should be in place to allow tax deduction for such social welfare functions, which generally are seen as the responsibility of the State. In successful manufacturing operations, this type of nutritional support program is a common benefit for employees.[26] With this said, however, if the principal objective of the Government is to help accelerate the recovery of its industry, enhance competitiveness, and improve job creating opportunities, then considerations need to be made to allow for tax deductions for nutritional support programs.

[24] The time lapse used for this example is for an order size of 5,000 shirts.
[25] Refer Annex 1 for details of labor laws and its impact on competitiveness of companies operating in Mozambique.
[26] Such support programs are generally not obligatory under law as it is in Mozambique, but a conscious choice of an enterprise as a part of a socially responsible governance activity.

# VIII. Mozambique Wood Processing Value Chain Analysis

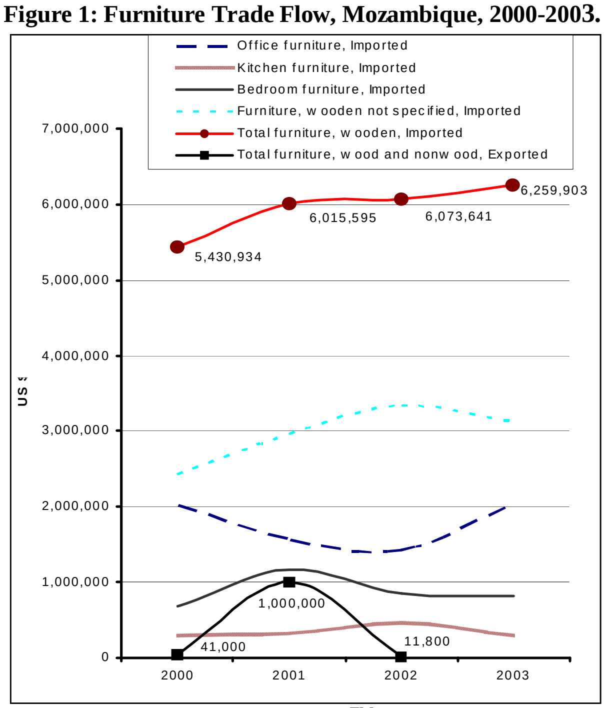
## 1.0 Introduction

Mozambique is rich in indigenous forests and wildlife habitats compared to other countries in the region. The forest resources of Mozambique are estimated at 30 million hectares, of which 20 million are estimated to have potential for commercial forestry. The annual allowable cut is estimated at 500 million $m^3$. Although the forest resources seem to be abundant compared to other countries, the information available on these resources is insufficient. The last national forest inventory count was done in 1994, which makes it difficult to support or discount an often quoted claim that the deforestation rates in Mozambique are alarming. By the same token, it is difficult to support (or for that matter discount) the 'estimated' potential of 20 million hectares of forest for commercial use.

A top priority for the creation of any meaningful strategy for the sector by the stakeholders should be to undertake a comprehensive forest inventory of the country. This will most probably entail a significant allocation of resources, as forest inventory projects are expensive. However, without a full inventory of existing forest resources and timber species that would be clearly mapped into a comprehensive timber map of the country, any policy or industry initiative to improve the competitiveness of the sector would largely be based on guess-work and estimates, and therefore be of very limited value.

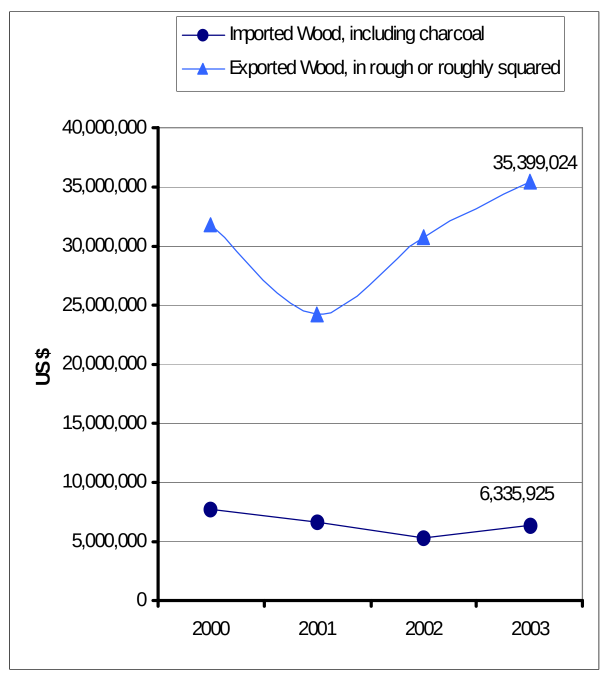
The overall situation of the sector is best illustrated by the trade flow of timber products. Figures 1 and 2 illustrate the fact that Mozambique is a net importer of furniture, by a wide margin, and a net exporter of raw logs by an even wider margin. The implications for the country are many.

**Figure 1: Furniture Trade Flow, Mozambique, 2000-2003.**




*Source: Compiled by GDS, LLC™ from UN Comtrade Statistics.*

**Figure 2: Rough wood trade flow, Mozambique 2000-2003.**




*Source: Compiled by GDS, LLC™ from UN Comtrade Statistics.*

When one aggregates the total volume of raw logs exported from 1995 to 2001, officially reported by the National Forestry Department to be 640,000 $m^3$, to account for the sector's failure to convert those logs into exportable finished wood products, the cost of underperformance could be estimated at US$45 million over the 7 year period (refer to Table 22).[27] First and foremost, the failure to add value has negative implications for employment generation in the country. Although final processing of wood is usually not very labor-intensive, failure to add value along the chain means failure to create jobs in the industry. Secondly, for every cubic meter of timber exported in raw or roughly squared form substantial amounts of money are foregone for failing to process the same cubic meter of timber into finished products such as furniture and/or or other products.

**Table 22: Cost of Underperformance of the Wood Sector in Mozambique, 1995-2001**

| | Total Logs Produced* ($m^3$) | Average Revenues From Logs** (US$) | Potential Revenues, Standard Wood Furniture*** (US$) | Cost of Underperformance, Value Added Revenues Foregone (US$) |
|---|---|---|---|---|
| 1995 | 76,842 | 13,063,140 | 18,442,080 | 5,378,940 |
| 1996 | 85,160 | 14,477,200 | 20,438,400 | 5,961,200 |
| 1997 | 120,557 | 20,494,690 | 28,933,680 | 8,438,990 |
| 1998 | 119,761 | 20,359,370 | 28,742,640 | 8,383,270 |
| 1999 | 61,482 | 10,451,940 | 14,755,680 | 4,303,740 |
| 2000 | 84,750 | 14,407,500 | 20,340,000 | 5,932,500 |
| 2001 | 91,215 | 15,506,550 | 21,891,600 | 6,385,050 |
| **Total** | **639,767** | **108,760,390** | **153,544,080** | **44,783,690** |

*Source: Global Development Solutions, LLC™*
** DNNFB, 2001 &2003*
*** First class average price of $170 for 4 most used species.*
**** At an average recovery rate of 10% from raw log to sawn plank to furniture piece, Standard furniture is to mean furniture from the four most used species in Mozambique, under commercial names of Umbila, Panga Panga, Jambirre and Chanfuta, and as per designs and price ranges already available in the local market.*

This means that roughly US$6.4 million in industry revenues are foregone each year due to its not processing logs into furniture. One has to note that the figure of US$6.4 million per year (or $45 million per seven year period) does not represent the industry *profits* lost due to underperformance in finished wood exports. As in any other industry, for any profits to occur, the industry must match its potential revenues against costs of converting goods and raw materials into finished goods sold.

[27] An important caveat to this figure is that Table 22 is a simplification in that it assumes an average sales price of cubic meter of standard home and bedroom finished tropical wood furniture to be approximately $2,333 – an average of a standard wooden chair sales price of $45 and a standard dining table with four chairs at $500 is divided by the respective cubic meter volume that goes into making these items; it is common knowledge that furniture is not sold in cubic meters but rather on qualities such as product design, presentation, wood species, etc. To put this estimate in context, however, from interviews in the field, a cubic meter of first class raw logs fetches anywhere from $170 to $250, and a cubic meter of parquet is exported at price levels between $350 and $600 per cubic meter, while a cubic meter of dried sawn wood can fetch anywhere from $800 to $1,200.

Judging from the fact that most of the Mozambican official exports are in the form of logs with some sawn wood component and almost no furniture, it is fair to say that the potential annual premium of around $6.4 million is not attractive enough for the industry as a whole to shift production towards more wood processing value addition.[28] The reasons behind this aggregate outcome are many, and it is at this junction that the Integrated Value Chain Analysis[SM] sheds light as to what are the major impediments and bottlenecks constraining the sector toward further value addition.

## 2.0 Forest-to-Mill Value Chain in Mozambique

The wood-processing industry in Mozambique is widely acknowledged to be weak and concentrated on low value addition processes. The industry largely evolves around the very first stages of processing; that of extracting timber from the forest and turning trees into logs/roundwood, after which the further value addition is ad-hoc at best and non-existing at worst.

According to the Forestry Department at the Ministry of Agriculture, by the end of 2004 there were 28 concession holders in Mozambique, and around 133 wood-processing units in the form of sawmills, parquet/flooring units and carpentry units.[29] The overall installed capacity of the industry is estimated at around 121 thousand cubic meters, out of which only around 51% is utilized (refer to Table 23). From the interviews in the field, it is difficult to confirm this figure of capacity utilization, especially since equipment of more than 20 years old was found in a majority of the firms interviewed, and most of the time equipment was in a dysfunctional state, which leaves a significant upward margin of error as to what is the actual *functional* installed capacity that is rather overestimated at present.

**Table 23: Sawmilling Production and Capacity by Province**

| Province | Installed Capacity $m^3$/year | Actual Production $m^3$/year | Util. % |
|---|---|---|---|
| C.Delgado | 7,680 | 7,162 | 93% |
| Gasa | 3,360 | 1,000 | 30% |
| Inhambane | 12,260 | 3,646 | 30% |
| Manica | 29,600 | 12,520 | 42% |
| Maputo | 14,160 | 7,246 | 51% |
| Nampula | 10,625 | 5,826 | 55% |
| Niassa | 4,800 | 2,388 | 50% |
| Sofala | 16,860 | 11,455 | 68% |
| Tete | 5,280 | 1,400 | 27% |
| Zambezia | 16,992 | 9,637 | 57% |
| **Total** | **121,617** | **62,280** | **51%** |

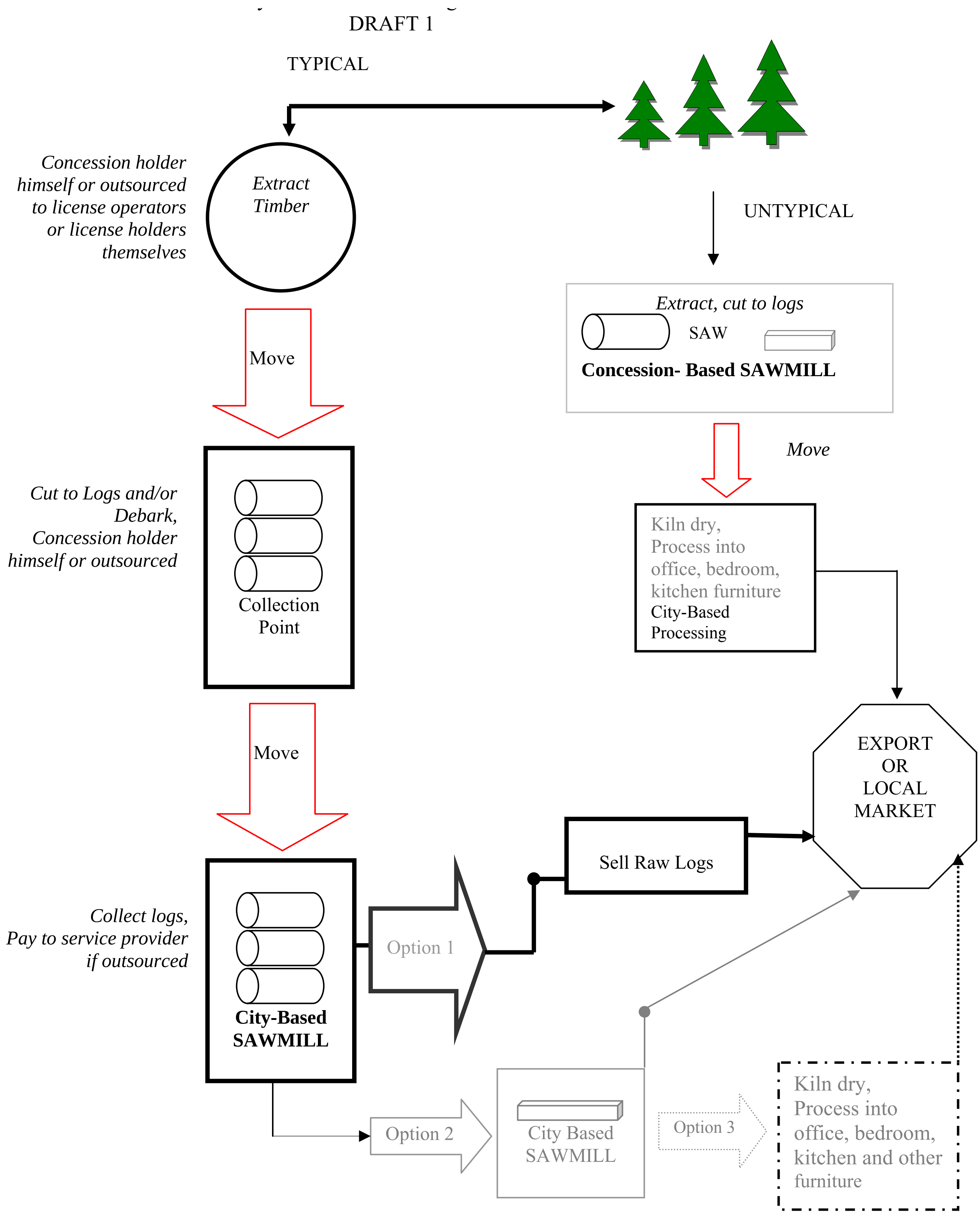
*Source: Eureka, 2001*

As Diagram 10 illustrates, the bulk of value-addition traces the following path: concession holders or simple license holders harvest the timber within their concession/license areas, be it directly or through subcontractors, move the raw timber to the cities where city-based sawmilling facilities are based and where they either process the timber further to sawn wood or simply sell it as logs.

[28] According to DNFFB statistics, on average 74.6% of total wood production between 1990 and 2000 were in the form of logs.
[29] IPEX, 2003

There are also very few concession operators who have sawmilling units based within concession areas, a strategy that seems to be superior to city-based sawmills in that the transportation costs of moving logs multiple times from felling point to the saw mill are greatly reduced by having the sawmilling facilities within a short distance from impact points in the forest. As the value chain analysis below will show, transportation cost-savings from having saw-mills based within concession areas are at around US$20 per cubic meter. However, the upfront costs of establishing sawmills within concession areas are significant, and beyond the reach of the domestic investor in most cases.

**Diagram 10: Wood Processing Value Addition Flow, Mozambique**

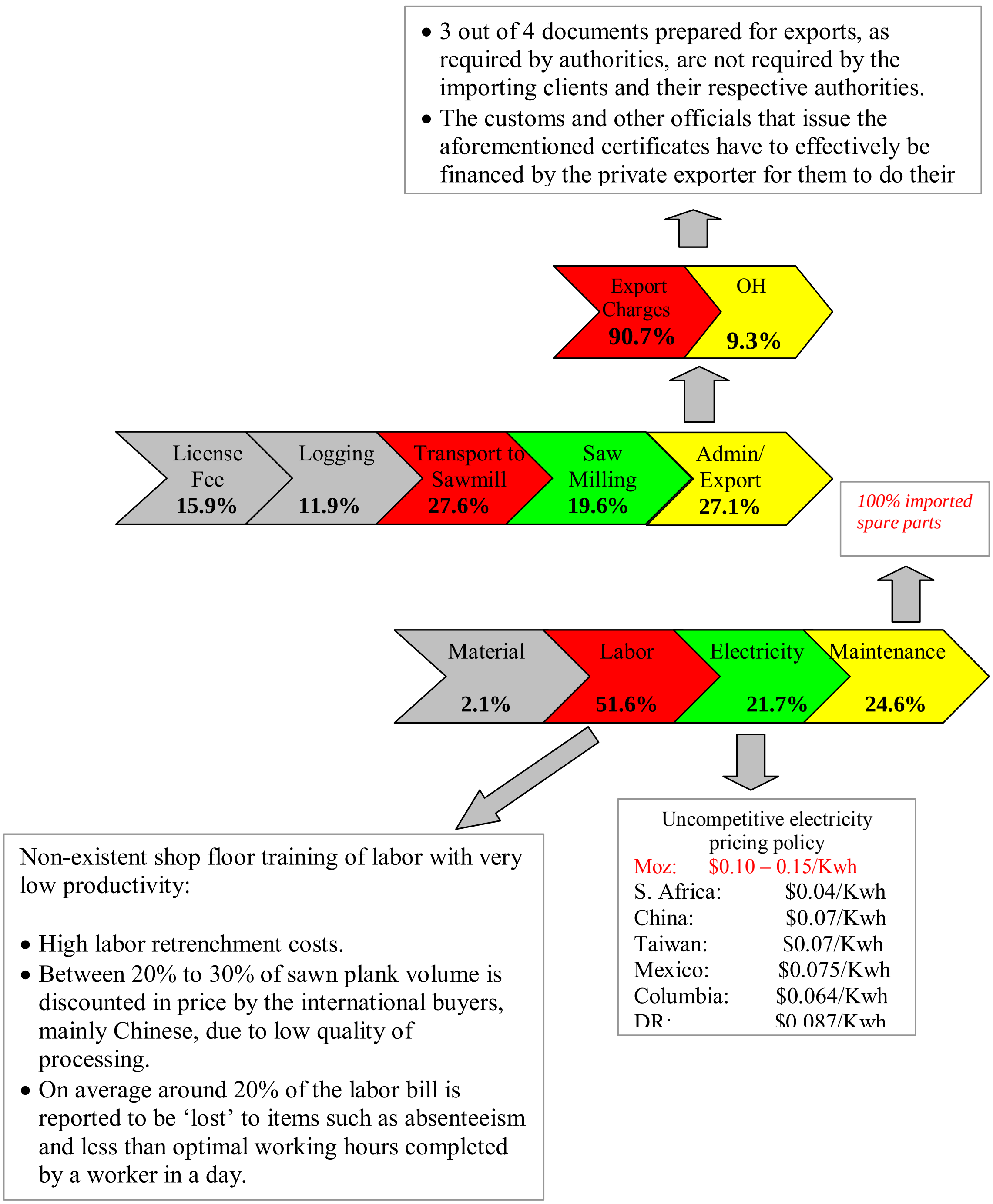



Source: Global Development Solutions, LLC

## 2.1 Transportation Costs

As the value chain analysis shows in Diagram 11, the cost of moving/hauling logs from the impact zone in the forest to the cities is significant. For a typical sawmilling

**Diagram 11: Forest-To- Mill Value Chain, Mozambique.**

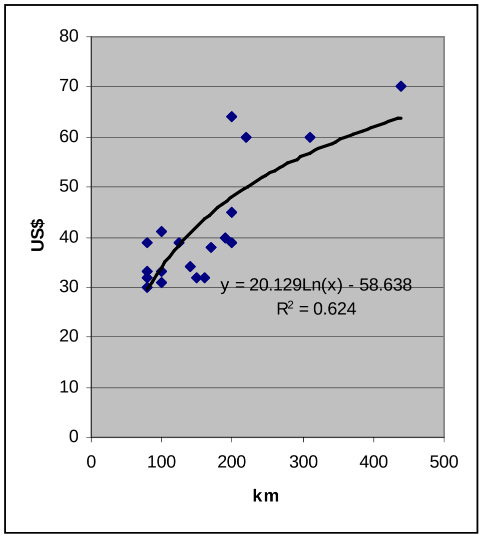



Source: Global Development Solutions, LLC

operation based in a city, the cost of transporting logs from the forest to sawmills constitute the largest share of costs at around 27% of total costs of producing 1m$^3$ of sawn wood.

The cost of transporting logs from the forest to the sawmill depends on the distance of the sawmill from the impact point in the forest as well as distance of the collection point of felled logs from both the impact area in the forest as well as the sawmill.[30] The average distances for this analysis were considered as follows: distance of log collection/bulking point from forest impact area at 45km, and the distance from collection point to the city-based sawmill at an additional 200km.

**Figure 3: Trucking costs per m$^3$ of timber, Mozambique, 2004**




*Source: Global Development Solutions, LLC*

In principle, in the global context, the industry is very dependent on transportation costs. The distance and the cost of moving logs from the felling point to the processing point can make or brake the business, and in fact that stumpage value of a tree (the value of a standing tree in the forest) is normally evaluated against the location/distance of the tree from the selling and/or processing point of the same tree.

In Mozambique, according to interviews, transportation costs (from forest to mill) vary anywhere from between US$30 to US$70 per cubic meter. Obviously, the costs per cubic meter depend on distances over which logs have to be transported. Based on the figures from the interviews in the field, our regression analysis in Figure 3 shows that at distances from 80 up to 200 kilometers, the variation in transport costs is large.[31] One of the reasons is in the fact that the short haul roads from collection points up to the points where asphalt roads can be reached are in some cases very poor and in some other cases less so. As Table 24 below shows, less than 20% of classified roads in Mozambique are paved roads.

In cases where basic access to and from collection points is not available, companies must build their own basic road sections to make transportation possible, which increases their costs.

[30] This cost also depends on the technology used to move the logs.
[31] With confidence interval $R^2 = 0.624$, these results need substantially more data points in order to draw confident conclusions.

**Table 24: Type of surface for classified roads in Mozambique (in km)**

| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|---|---|
| Total | 29190 | 28463 | 29951 | 31955 | 28463 | 28463 | 28463 |
| Classified roads | 26194 | 25467 | 26955 | 28959 | 28463 | 28463 | 28463 |
| Paved | 5338 | 5285 | 5536 | 5266 | 5269 | 5269 | 5269 |
| Gravel | 6935 | 8154 | 7751 | 6879 | 7561 | 7561 | 7561 |
| Dirt | 13876 | 12672 | 13407 | 16814 | 15633 | 15633 | 15633 |
| Other | 45 | 644 | 261 | 0 | 0 | 0 | 0 |

*Source: Mozambique-Trade and Transport Facilitation Audit/WB.*

In most cases, the infrastructure deteriorates rather rapidly as most sections are poorly maintained. In one case, very representative of the industry, a concession holder with sawmilling operation based in Pemba, 310 kilometers away from his impact area, had outsourced transportation of logs due to his truck's accident in one of the dirt road sections on the way to his sawmill. In-house costs for transporting logs was US$50/$m^3$, while with outsourcing the company must pay US$60/$m^3$ . As a result, the company had to cut levels of sourcing raw logs by 70%, and of the logs sourced, 100% of them were sold as roughly cut logs as opposed to sawn planks. This in order to speed up the cash inflows needed for repairing the truck – raw logs are sold in Pemba, mostly to Chinese buyers or people trading on their behalf, very quickly, within 24-48 hours of landing in port/city, while selling sawn planks takes more time both for processing as well as marketing.

Interviews reveal that this company's case is the rule rather than an exception. The transportation costs, as given in the interviews, rise significantly in the event of machinery/truck failures and incidents caused by poor infrastructure. In such cases, most of the companies lack the capital to repair their trucks and therefore choose to outsource transportation to transporting companies.[32] The road deterioration and lack of maintenance is therefore a critical distortion that is affecting the industry.

As the variations in regression analysis illustrate, within short distances (in the context of Mozambique, a short distance for moving logs is generally anywhere between 80 to 180 kilometers) cost per cubic meter can vary from a low of US$30 to a highs of more than US$60. One of the explanations for this variation is the difference in access to quality roads. The length of stretches of poor and inaccessible (and more equipment-debilitating) roads largely determines the cost of moving timber from forest to mills. There are some measures that could be taken in Mozambique to decrease the transportation costs and therefore improve the competitiveness of the industry in the

[32] It is not very uncommon that mechanics from South Africa or Zimbabwe have to be brought in to repair major machinery failures, which can cost a company an average of $2,000 to have the mechanic flown into the country, lodge, and pay the necessary service fees. In this scenario, most of the small scale companies that don't deal in big volumes prefer not to repair their trucks but instead outsource transportation until sufficient capital is accumulated to maintain their own fleet.

upstream side of the business. First and foremost, the majority of sawmilling facilities are based in the cities, at long distances (further than 350 kilometers) from impact points in the woods, something which increases the transportation costs of timber inputs. The reason behind this is rather simple: for every cubic meter of sawn wood to come out as output in the production process one needs to put roughly three cubic meters of logs as inputs in the very beginning of the process. Recovery rates of 30-33% from log to sawn plank are generally achievable in Mozambique, although in terms of exports the yardstick of quality is higher and full separation of wood is required, as a result of which recovery rates fall to levels of 20-22%.

In other words, for sawing purposes, around 70% of all log volume input is not used in the end of the process of sawmilling. It is, therefore, very economical to have sawmilling facilities nearest to the impact zone so as to minimize the distance over which log inputs are transported, especially since two thirds of the volume of the inputs ends up wood residues outside of sawn planks.

For the concession holders, the best way to do this is to place the sawmilling facilities within the concession area. Transportation cost savings of concession-based sawmills as compared to city-based sawmills are around 28%, i.e. for every $100 that a city based sawmill (or its suppliers) spend on transporting logs from forest to city, a concession based sawmill spends $72 for transporting the same amount of logs to its sawmilling facilities.[33] With all its cost-saving advantages, placing sawmilling facilities in the concession areas, usually 200-300 km away from urban infrastructure, is very demanding in terms of finances.

**Table 25: Sample infrastructure gap in remote forest concession areas, Mozambique.**

| Distance from Concession | To Nearest Infrastructure Point |
|---|---|
| Water source | 18km |
| Clinic | 40km |
| Electricity | 240km |
| Fuel Station | 240km |
| Shop | 240km |
| Telephone | 240km |
| Bank | 240km |

*Source: Interviews, Global Development Solutions, LLC.*

Table 25 illustrates sample distances of major infrastructure service outlets from one particular concession. With all its benefits of lower log transportation costs, having a sawmilling facility within a remote concession area entails investments such as installing power generation facilities and equipment, opening of wells, as well spending more for bringing auxiliary materials from urban areas to the remote concession area.

Whether the industry players find it attractive enough to establish new facilities or move their existing city-based sawmilling facilities within concession areas depends very much on the scale of their operations. Small sawmills may very well find the cost of relocation too deep for their pockets and therefore not attractive enough to lock-in cost savings from lower log transportation costs. However, for the ones large enough and willing to consider such a move, a system of incentives could be put into place to

[33] Interviews, Global Development Solutions, LLC.

facilitate such a movement. One of the best tools available to the government is the license fee system. A concession-based sawmill could be given a discounted price of licensee fee (over and beyond the existing discounts) to compensate it for the concession holder's additional investment in creating a viable operational infrastructure where there is none. The benefit for the government is not only in the fact that sawmills away from its cities put less pressure on the city's infrastructure, but also in terms of employment creation by concession-based sawmills in remote areas of the country.

## 2.2. Sawmilling Costs

The value chain analysis shows that the average sawmilling cost in Mozambique constitutes approximately 19.6% of total production cost of sawn wood at approximately US$46/$m^3$ . Labor constitutes almost two thirds of value added, while the remaining value added consists of machinery operation and depreciation. This mix of capital and labor is not necessarily good or bad in the case of Mozambique. There are differences between the level of technology and labor content in sawmilling industries worldwide, yet there are very few variations in terms of average sawmilling costs across the world.

The global average sawmilling cost is US$49/$m^3$ and Mozambique is within $3 of this average. When viewed this way, it appears as if the conversion cost of logs into sawn planks is competitive in Mozambique. However, when the cost structure of sawmilling is looked at more closely, there are some disturbing aspects that warrant attention. Due to the lack of technical training and lack of investment in skills development, there is an absence of local sawmill mechanics or milling engineers staff in-house, and the foreign skilled labor that is brought in as a result adds to the overhead costs significantly. The lack of readily available local experts in sawmilling is symptomatic of the underdevelopment of the industry, and it is almost certain that this labor market failure serves as a major disincentive to invest in further value-addition processes that require availability of a much more sophisticated knowledge base, such as design centers and clusters for the furniture industry as well as technological know-how for the pulp and paper industry.

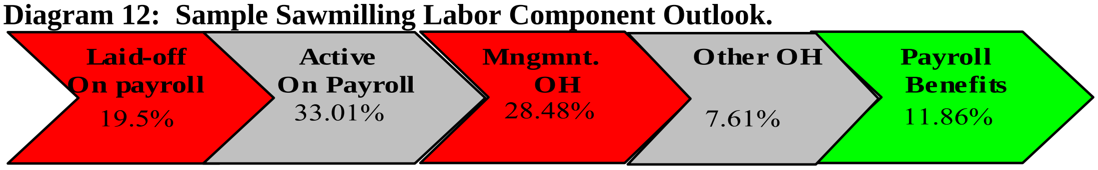
To date, there are no wood processing technical schools in Mozambique that could fill this gap. Any strategic development of the wood processing industry hinges upon the creation of training institutions on the part of the government and supported by industry and in close cooperation with industry for purposes of placement and curriculum development, and as such is indispensable.

A good example of the poor labor productivity is that while most sawmills report recovery rates from log to sawn plank at 30%, the actual recovery rates for export logs are much lower, at around 20%. Most of the sawn wood exporters acknowledge that the total sawn plank volumes sold are discounted by foreign buyers by at least 20% on average. The main reason is said to be in the fact that the deviations in the plank sawing process are higher than internationally acceptable margins. These deviations stem from poor setup of machinery as well as poor sawing practices.

Some of these losses are most probably also related to poor marketing skills of Mozambican producers, as even in the most advanced timber industries the complexity of timber-related trading and contracting is widely acknowledged.[34]

Another feature of the labor structure is the high cost or labor retrenchment which compromises the flexibility of the firms to reorganize. Diagram 12 below illustrates the average labor cost structure of two sawmills in the northern part of the country . It can be seen that management overhead and salary expenses for the laid-off workforce is around 20%, which is effectively the amount that is taken away from the potential profits of the operators. Prevailing labor laws, in these particular cases, are anti-competitive as illustrated in Diagram 12, where operators are required to pay laid-off worker, which for a medium-sized operator employing around 25 people translates to around US$10,000 operating profit lost.

**Diagram 12: Sample Sawmilling Labor Component Outlook.**




*Source: Global Development Solutions, LLC*

The high management overhead is dominated by the fact that qualified managers are not readily available through the local labor force, and therefore managerial salaries are at a very high premium. Another feature of the labor cost structure is the high cost of labor severance. As per the time of the interviews, the severance payment schedule to the employees was as per Table 26.

**Table 26: Sample Severance Schedule to Sawmill Employees**

| Average number of laid-off workers | Average Years of Experience with the employer | Multiple of monthly salaries to be paid to each |
|---|---|---|
| 8 | 0.5 | 3 |
| 2 | 6 | 9 |
| 3 | 8 | 12 |

*Source: Global Development Solutions, LLC*

While a more detailed and representative analysis would be needed, in general it seems very difficult to justify the levels severance pay guaranteed under the Labor Law of 1998 to the *less experienced* employees. For example, anyone who has rendered services to the same employer for 6 months and is subsequently fired is entitled to receive 3 months pay, while at the same time anyone who has worked 8 years, or 16 times longer, for the same employee would be entitled to 12 months compensation. With the sampling caveats mentioned, this structure needs immediate rework since the severance compensation is skewed to benefit the wrong end of the labor force (Refer to Annex 1 for a comparative matrix on severance pay).

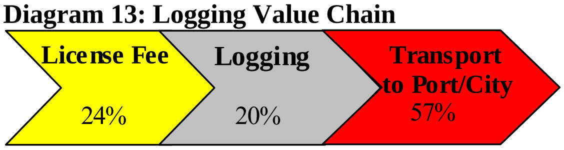
[34] *www.wood-markets.com*

In most general terms, the private sector goes to great lengths to maintain its experienced labor force due to the very fact that employees' tacit knowledge and on-the job experience gained cannot be easily replaced by the marketplace. The stipulations of the labor policy, insofar as long-term employees are concerned, don't necessarily guide the employer for hiring and firing these types of employees. The labor policy stipulations that guide hiring decisions of employers are for the new entrants in the labor force, and it seems a further in-depth consideration is needed at redesigning the severance guarantees at the lower end of the experience bracket.

In specific terms, as per the sawmills interviewed, the labor severance cost the companies almost 20% of total labor bill on average, yet the majority of the workforce laid off served barely 6 months for a large number of companies.[35] As such, the severance payoff schedule clearly serves as a major disincentive to hiring new workers.

In a rather counterintuitive way, the rigidity of the labor code and the lack of skilled labor is one of the most crucial factors that determine the apparent preference of the wood sector in Mozambique towards logging business over wood processing and value addition. Diagram 13 illustrates a consolidated Value Chain for logging costs in Mozambique. The average cost of a cubic meter of debarked timber of the four most used species, FOB major port in Mozambique, is at around $102. The average net margins over and above these costs can be between 45 and 50 percent. While margins from sawn wood sales can sometimes exceed these levels, logging margins are far more rewarding in that there is very little risk involved. Transportation is almost always outsourced and there is very little if any permanent entrenched labor involved. All the labor is contracted on per volume basis, and therefore the payment scheme is based on direct productivity of felled timber. This way, the loggers' costs, as opposed to the sawmillers' costs, are straightforward and its competitiveness doesn't hinge upon on any eventual labor policy distortion. Loggers' risk of failure is basically associated with one single risk factor: cost/risk of transportation of logs from impact point to selling point.

**Diagram 13: Logging Value Chain**




*Source: Global Development Solutions, LLC*

In aggregate terms, therefore, investment in additional machinery that requires training and hiring of permanent workers is a nuisance that is rather avoided by the majority of the players. By and large, the entire country has an estimated 133 wood processing facilities, of which not more than 10 companies can be ranked as established wood processing operations with staff of more than 50 employees and in the scale and scope of multiple products and revenues above $250,000.[36]

[35] In the case illustrated, the 8 out of 23 workers had experience of less than 6 months.
[36] Interviews in the field and from various other (survey-based) sources on the sector.

### 2.3. Administrative/Export Charges

Table 27 below represents the fee structure for exporting sawn wood and/or parquet via a 20 feet container from Beira. The margin of variance between reported figures that relate to fees from all the Beira-based exporters interviewed is less than 10%. As can be seen from the schedule, there are a couple of major distortions that increase the cost of exporting.

First and foremost, considering the fact that a 20 foot container can hold 18m$^3$ of sawn or parquet wood, the cost of export fees and charges per cubic meter is $68.

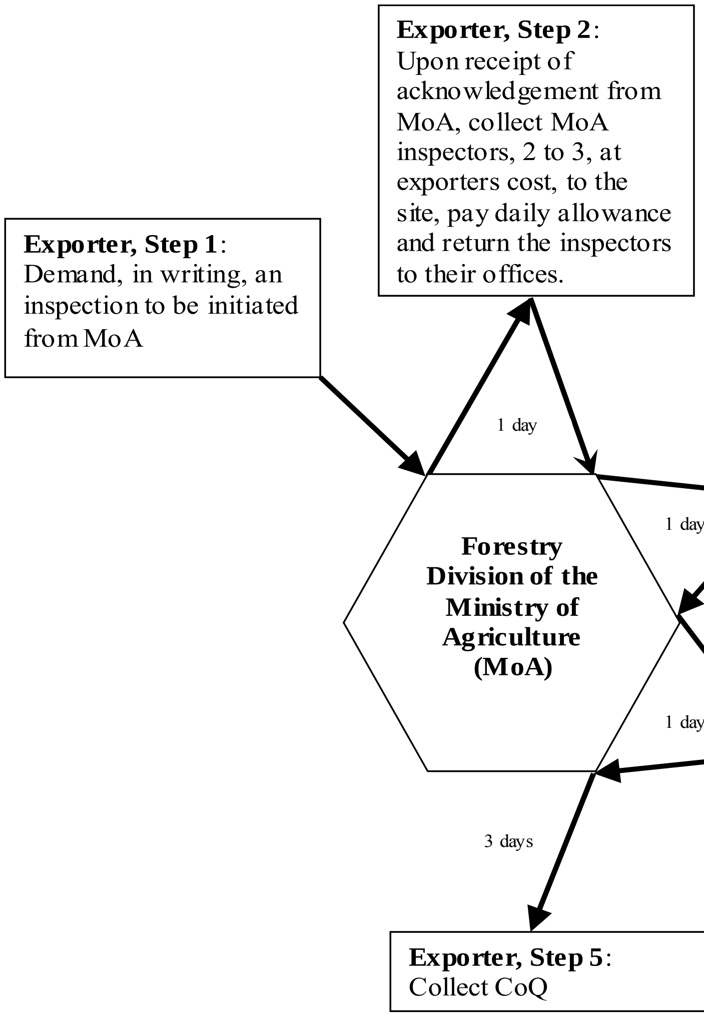
**Table 27: Fee Schedule, 20 feet container, FOB Beira.**

| | Mts. | USD | Days to complete procedure | Required by importing partner/authority |
|---|---|---|---|---|
| Certificate of quality and conservation | 1,462,500 | 73 | 5 to 7 days | No |
| Certificate of Origin | 750,000 | 16 | | No |
| Phytosanitary certificate | 1,050,000 | 53 | | Yes |
| Fumigation certificate | 1,250,000 | 63 | 2-3 days | No |
| Container loading fee | 800,000 | 40 | | -------------- |
| Container offloading fee | 4,300,000 | 215 | | |
| Insurance to shipping yard | 515,000 | 26 | | |
| Container transport | 4,000,000 | 200 | | |
| Freight Forwarding | 3,500,000 | 175 | | |
| Bill of Lading | 2,817,500 | 141 | | |
| Customs fee | 3,879,000 | 194 | | |
| **Total** | **24,324,000** | **1,194** | **7-10** | |

*Source: Global development Solutions, LLC™*

Secondly, it takes around 5-7 days to obtain certificates for which there is no apparent requirement on the part of the importer or its authorities. While some of these documents may serve a purpose domestically, more often than not their more apparent purpose, as reported by exporting companies, is rent-seeking on behalf of customs officials.

**Diagram 14: Process Flow for the Issuance of Certificate of Quality and Conservation From The Ministry of Agriculture, Mozambique.**




*Source: Global Development Solutions, LLC*

Tracing just one of these documents, the Certificate of Quality (CoQ), illustrates how cumbersome the entire process of obtaining these documents is; most of which are not even required by the importing partners. The process of obtaining the CoQ starts with the official request from the exporter made to the Agriculture Department/Forestry Division in any of the provincial headquarters and ends up, 5 to 7 days later, with the collection of the certificate, as illustrated in Diagram 14.

As the process map shows, there appears to be a fundamental misconception on the part of the government agencies as to what their role is in supporting private sector exports. Instead of the private sector firms being at the center of attention and support on the part of government institutions, it looks like the situation is reverse. Exporters have to go at great lengths to accommodate the government officials. For a processor not based in a major city, costs associated with obtaining certificates increase significantly. Table 28 below illustrates the same fee schedule as the one illustrated above adjusted for additional costs associated with obtaining the export documentation for a wood processor based 200 kilometers from the nearest administrative center of Pemba.

**Table 28: Fee Schedule, 20 feet container, for an Operator based 200km from Pemba.**

| | Mts. | USD | Days to complete procedure | Additional Costs |
|---|---|---|---|---|
| Certificate of quality and conservation | 1,462,500 | 73 | 5 to 7 days | Driving back and forth to Pemba, at least 3 times, at least 5 full managerial days spent for documentation: |
| Certificate of Origin | 750,000 | 16 | | |
| Phytosanitary certificate | 1,250,000 | 53 | | |
| Fumigation certificate | 1,250,000 | 63 | 2-3 days | |
| Container loading fee | 800,000 | 40 | | |
| Container offloading fee | 4,300,000 | 215 | | |
| Insurance to shipping yard | 515,000 | 26 | | |
| Container transport | 4,000,000 | 200 | | |
| Freight Forwarding | 3,500,000 | 175 | | |
| Bill of Lading | 2,817,500 | 141 | | |
| Customs fee | 3,879,000 | 194 | | |
| **Total fees**** | **24,324,000** | **1,194** | **7-10** | |

| | US$ | Note |
|---|---|---|
| Fuel | 110 | Not possible to process documentation from sawmill base |
| Management time | 250 | Almost impossible to finish paper work through subordinate |
| Productivity losses* | 100 | Absenteeism, process fallout, etc… |
| Sub Total | 560 | |
| Share on top of total fees | 46.9% | |
| Adjusted Total | 1,754 | |

*Source: Global development Solutions, LLC™*

* It is worth noting that the manager of this facility estimates productivity losses when he is away from his production site at minimum US$100 dollars per day due to the fallout that occurs in production and other processes when he is away from his facilities. Also, the major share of absenteeism is reported to take place while the "boss" is away for paperwork.

** The actual total differs slightly from the Beira-based companies, but not significantly so as to change the overall picture.

In this context, it is anticipated that streamlining the documentation and approval process can offer substantial efficiency gains for the private sector. Similarly, the streamlining process would create an opportunity for the Government to introduce capacity building activities to computerize the documentation process

## 3.0 Policy alternatives for increased wood processing in Mozambique

At the outset it is important to note the discrepancies that appear between the national and international data reported on the value of timber exports. Table 29 shows the reported exports from Mozambique for the period 2000 to 2003. The variance between the official statistics and importers' statistics in 2002 is more than US$13 million, a gap of 76%. For year 2000, the gap is bigger than the year's entire officially reported exports. This suggests that there could be significant levels of illegal exports from the country.

**Table 29: Wood Export Values, Mozambique, 2000-2003 (US$ '000)**

| | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|
| Export Value, As per National Statistics* | 14,600 | 12,332 | 17,412 | n.a |
| Export Value, As per Importers' Statistics** | 31,761 | 24,317 | 30,765 | 35,399 |
| Variance | 17,161 | 11,985 | 13,353 | -- |

* Bank of Mozambique, as quoted by various sources.
** Mirror data from UN COMTRADE statistics, 10 major importers. All data refer to wood, raw or roughly cut, and less than 5% of the reported data have some secondary processed wood.

This has significant implications for Mozambique. First, since the bulk of the country's exports are logs, this gap in export figures reveals that the failure of the private sector to process logs into exportable wooden products is more significant than it appears from the official incoming foreign revenues from exports. As a result, any policy deliberation, such as to ban or restrict exports of logs, has to very carefully weigh the costs and benefits of such a policy, especially since it appears that the current export levels are not in the official range of US$14-17 million, but rather at US$31-35 million, and disturbances in the market by intervening with policy instruments may be bigger than what the official statistics would suggest.

Secondly, the robustness of log exports suggests that the policy solution set towards increased wood processing is not only in improving the efficiencies, know-how and business environment for the estimated 130 primary processing companies, but perhaps more so in finding ways to encourage the estimated 230 logging operators to take the path of further processing. After all, if anyone is reaping benefits and earning revenues from the US$30 million yearly wood exports, it is the log exporters.

Diagram 15 below illustrates the market and policy support structure currently in existence in Mozambique. From the diagram, it can be seen that the market and institutional existence in place is not very conducive to increased wood processing.

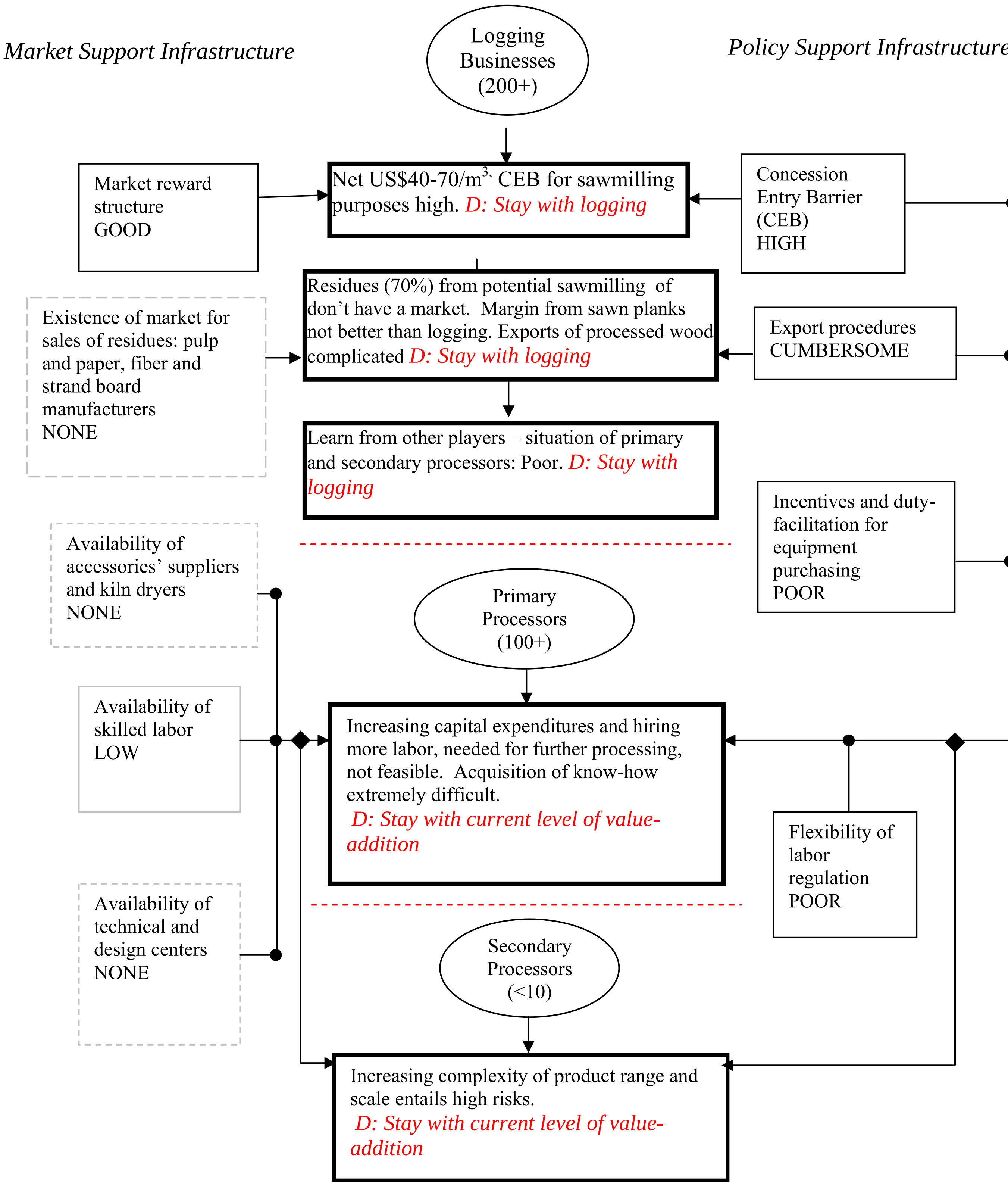
One of the most salient features of the current market is the fact that the market reward structure for selling logs is almost as good if not better than for selling further processed wood. Average net benefits from selling a cubic meter of raw of roughly cut wood for export is estimated between US$40-60. The margin for selling a sawn plank for exports is roughly the same, depending on the species, but the complexity of having to hire workers and purchasing machinery as well as establishing operations is such that it makes the entire endeavor very risky. The same holds for secondary processing establishments.

For example, a processor in Pemba has reported losses of at least US$100,000 over three years for its operations due to a combination of late duty-drawback repayments, lower than expected export volumes due to port bottlenecks (1 container per month as opposed to 5 containers per month as initially planned), as well as export documentation hassles.

In many countries, the policy impetus towards addressing poor levels of wood processing has been towards the very top of the structure – namely, tackling the market reward structure for raw log sales by imposing bans on log exports. Countries like Malaysia, Indonesia and Brazil have all pursued this avenue in the hope than export bans of raw logs will force the industry to further process logs into value-added products. One generally acknowledged result from such bans has been to encourage illegal logging and exports.[37] Another feature of such log bans has been that they succeed in promoting further processing only insofar as a common alignment strategy and support infrastructure is put in place to direct the logs banned for export toward some sort of processing. In the case of Indonesia, for example, the plywood industry was heavily subsidized and supported as carrier of further processing.[38]

[37] See ITTO, Wood World, International Tropical Timber Council for more details.
[38] See Robert Go, "High Rates of Deforestation in Indonesia", *The Straight Times,* September 10, 2003; see also www.american.edu for case studies on export bans in Malaysia, Indonesia, etc.

**Diagram 15: Market and Policy Support Infrastructure, Wood Processing Industry, Mozambique**




D= Most likely decision

Source: Global Development Solutions, LLC

In Mozambique, any deliberation on banning log exports has to take into account the fact that there exists no market on institutional framework in the country today to support wood processing value addition. The country has no cluster or support industry in any part of the value chain: no accessories manufacturers, no pulp and paper producers, only one kiln-drying facility, no design or engineering capabilities or learning centers for the industry. Before any ban is imposed, if at all, ways to address current institutional and market gaps need to be addressed. If logs are banned from exports, and at the same time they cannot be turned into processed wood, than any tightening of log exports would clearly result in net losses of foreign currency earnings and jobs.

Imposition of a ban is going to depress the log prices locally in the immediate aftermath of a ban. This may be a temporary relief for processors in terms of lowering raw material costs due to oversupply of logs banned for exports. In the medium-to-long term, however, it is very difficult to see how an industry of wood processing swill emerge out of the institutional and knowledge-gap vacuum that exists in the country.

Positive incentives for the stakeholders would be a more rational policy avenue. Simplifying and increasing the efficiency of duty drawbacks for purchases of machinery, spare parts, and accessories is one of the tools available to the government to positively impact investments for further value addition. Another positive incentive would be to reduce the barriers to concession licenses. A strategic policy choice toward managing and directing forest exploitation in Mozambique has been the concession allocation. However, gaining legal access to a concession is cumbersome and time consuming. While proper surveying and environmental impact assessment is a must, given the lack of information on forest resources, Ministry of Agriculture (MoA) has limited capacity to benchmark survey data to assess the validity of a concession.

Interviews with MoA suggest that much of the decision-making lay at the hands of the governor of the area being considered for a concession, which raises a number of issues with respect to transparency, rent seeking, and a much broader challenge of maintaining data integrity on forest resources in Mozambique. Taking into consideration that a computer-based tracking and management system for the concession approval process is not yet in place, forest resource management continues to be a challenge for the Government.

With this said, however, it was not evident that there are clearly written guidelines for potential concessionaires to follow for government approvals. In this context, a concession approval map was developed by the project team to highlight the approval sequence, time required for approval, and formal costs associated with a concession approval (refer to Table 30).

**Table 30: Forestry Concession Approval Process (50 year concession) in Mozambique[39]**

| | Activity | Focal Point | Time Lapse (days) | Cost |
|---|---|---|---|---|
| 1 | Preliminary request for concession | Provincial office, MoA | 2 – 3 | None |
| 2 | Species survey | Concessionaire | 7 – 14 | Variable, cost incurred by concessionaire |
| 3 | Local consultation: Advertise proposed concession in local newspaper | Concessionaire | 30 | Mts300,000,000 |
| 4 | Project proposal preparation | Governor of the province | 14 – 21 | Variable, incurred by concessionaire |
| 5 | Submit proposal to governor | Governor of the province | 7 | None |
| 6a | Projects <20,000 ha: application for concession review by Governor | Governor approval | 7 | None |
| 6b | Projects 20,000 – 100,000 ha: application of concession review by governor, followed by submission to Minister of Agriculture, and Gazette | Governor for review<br>MoA: Minister for tentative approval | 7 | None |
| 7 | Management plan for the concession** | Concessionaire | 180* | $10,000 - $25,000 |
| 9 | Analysis of management plan | MoA: Maputo (review committee)*** | 14 | |
| 10 | Ministerial approval | MoA: Signature by Minister | < 7 | None |
| 11 | Preparation of contract at provincial level | Provincial government | < 7 | None |
| 12 | Contract signing | Signature by governor | 7 – 14 | None |
| **TOTAL LAPSE TIME** | | | **109 – 297 days** | |
| *Source: Global Development Solutions, LLC ™* | | | | |

* concessionaire can begin the management plan at anytime
** 76 companies authorized by the Ministry of Industry and Commerce to prepare the management plan
*** six member committee representing interests in commerce, social, economic, ecology, law and forestry

[39] Review of concession takes place every 5 years. Currently there are 28 concessions in operation where 15 out of 116 different species are harvested.

In 2001, MoA&F had on record 24 concession contracts, and by 2004, 28 concessions were registered. While it has taken 10 years to complete the forestry law for the 10 provinces, the government is taking some initiative to develop a dialogue with the private sector to help manage its forest resources. Specifically, the Forest and Wildlife Forum which meets 2 – 3 times annually, currently serves as a platform for dialogue between the Government and concession holders to discussion key issues related to the country's forest resources. While this type of a Forum is an excellent vehicle to collect data on forestry resources, the lack of consistent data collection, and the absence of a uniform format for data collection at the concession level, compounded by the lack of trust between the private and public sector, discounts the opportunity for the MoA&F to develop information infrastructure to help manage forest resources.

According to the MoA & F, it is estimated that the country is home to 116 species of wood, of which 15 species are aggressively logged by concession holders. With this said, however, given the high cost of accessing timber resources and associated transport cost, only 20% - 30% of the capacity available through the concessions are said to be utilized.

An inherent problem faced by the Ministry of Agriculture and for concessionaires is the lack of information available on the forestry sector and its capacity to carry over its mandated duties and responsibilities. According to Forestry and Wildlife Regulation of 1998, Article 101, defines the repopulation surcharge as "…over and above the license tax for forestry and wildlife exploitation a[t] percentage of 15% of the value which constitutes a surcharge destined for the repopulation of forestry and wildlife." The Forestry Department and the private sector acknowledge that there is no replanting done by the government even though the surcharge is there. This sends a mixed signal to the private as to the commitment of the government towards the well-being of the forest population, concession management and the future of the sector. The concession holders themselves, with one single exception, do not engage in any management or replanting either. The combined result is that a behavior of short-termism prevails across all stakeholders. The Government has a key responsibility in reversing this trend by establishing and committing itself to a long-term vision for the industry and establishing support mechanism for the industry.

# IX. Mozambique Tropical Fruit Value Chain Analysis

## 1.0 Introduction

Mozambique's horticulture sector is said to have big potential due to land availability and good climatic conditions in the country. Beira corridor as well as Manica Province are considered to have the biggest potential, with over 500,000 hectares of land estimated to be suitable for commercial horticulture production. The objective of this section of the report is to focus attention on the potential of mango and banana commercial farming, products which are expected to serve as a proxy in the effort to highlight the major aspects of the horticulture sector in Mozambique.[40]

Due to the political and economic instability in neighboring Zimbabwe, many farmers have moved to Mozambique to establish their farming operations in a variety horticultural crops. Mangoes and bananas have received their share of attention from South African and local investors as well, and are considered to have good potential for generating export income. Notwithstanding the potential, the current economic activity in mango and banana farming and exports is very limited. On the global demand side, part of the limited exports of horticultural produce from Mozambique can be attributed to the increased demand side requirements on the part of international buyers, which can be characterized as follows:

- High demand for consistency of delivery and volume;
- Demanding uniformity standards in terms of marketability at retailing stage – such as fruit size, weight, shape, and packaging requirements.
- Increased enforcement of environmental regulations, particularly those related to MRLs;[41] and
- High competition from big market players.

All these demand side trends are, by and large, not in the control of producers in any part of the world and are therefore issues that producers have to follow in order to be competitive. The Integrated Value Chain Analysis will highlight the supply side issues that Mozambican mango and banana producers and all other stakeholders face.

[40] Due to the extremely limited number of commercial mango and banana plantations in the country, the sample size of companies interviewed is very limited and therefore drawing any conclusions from this section needs to account for the limited sample size.
[41] Minimum residue level.

## 2.0 Farm-to-Market Value Chain for Commercial Mango and Banana Farming

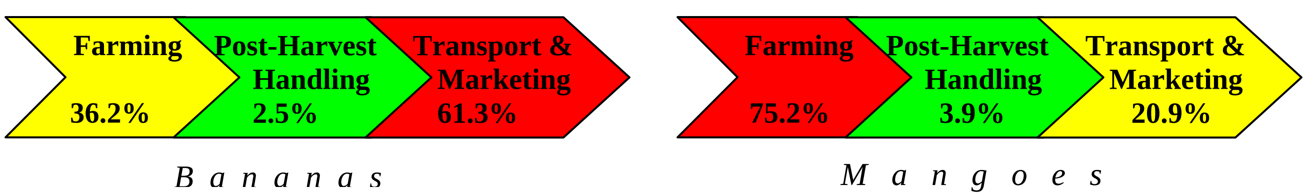
Estimates as to how many commercial farms are involved in mango and/or banana production in Mozambique vary depending on the source, especially since there appear to be many start-up and test-trial projects that skew the picture as to the exact number of players in the market at any given time. In general, though, not more than a handful of players were known to be involved in some form of mango and/or banana commercial production and exports at the time of this analysis. It is unclear what percentage of the population of small- and medium-farmers are involved in mango or banana production as accurate statistics in this area is not readily available.

A medium scale commercial farmer of mango and banana was selected each for the value chain analysis. For this example, mangoes are grown with drip irrigation lines and land size for both banana and mango farms is between 40 and 50 hectares. (Estimated installation cost of drip irrigation is at $2,500 per hectare). Neither grower has any processing and packing facility, nor do they have refrigerated trucks, and they transport and market their produce in bulk through outsourced transportation and marketing agent.

The value chain analysis (VCA) is divided into three separate value chains, namely farming, post-harvest handling, and transport & marketing. Based on interviews, as per the most common varieties grown in Mozambique – namely, Florida type mango cultivars (mostly Kent, Tommy Atkins, and Keitt), and Cavendish banana variety, the farm-to-market cost per hectare was estimated to be US$2,732 for mangoes and US$3,852 for bananas.

As Diagram 16 below shows, there is a stark difference in the outlook between the farm-

**Diagram 16: Farm-to-Market Value Chain for Bananas and Mangoes**




*Source: Global Development Solutions, LLC™*

to-market value chains for mangoes and bananas. For mangoes, farming constitutes the bulk of the value added (75.2%), while for bananas the bulk of value-added activities (61.3%) involve downstream activities related to transport and marketing to the final buyer. The reason behind this difference is in the fact that the mangoes' farm-to-market value chain refers to mangoes sold in bulk for wholesale end-customers that use mangoes as inputs for their final product, namely for making fruit salads. As a result, mangoes have very little post-harvest handling and marketing costs since the value chain ends with bulk sales of unpackaged fruit.

By contrast, the banana' value chain deals with sales to retail end customers who will sell bananas as a final product, with significant costs associated with marketing and intermediation fees.[42] Also, post-harvest handling costs such as ripening (in this case outsourced crops) as well as packaging and other handling costs such as sorting are present in the banana value chain, which brings the total post-harvest costs up to 22% of the total value added, while this value-adding activity does not exist in the 'sold-as-bulk type of transactions for mangoes.

## 2.1 Value Chain Analysis for Banana Farming

The value chain for banana farming can be divided into 8 activities, namely:

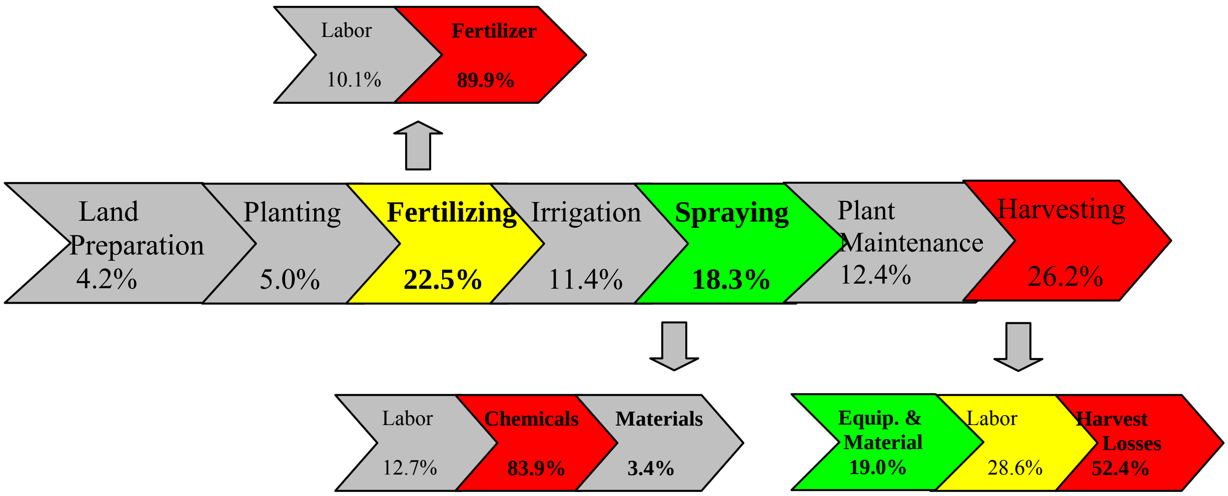
- Land preparation;
- Planting;
- Fertilizing;
- Irrigation;
- Spraying;
- Plant Maintenance; and
- Harvesting.

According to the VCA, the three highest value-adding activities are harvesting (26.2%), followed by fertilizing (22.5%), and spraying (18.3%). Somewhat similar to the cotton VCA, sprays and fertilizers are a major cost component in the farming sector (Diagram 17). The VCA yields a farm-gate production cost of bananas at Mts 2,600/kg, excluding ripening and other marketing costs, at average yields of 40,000kg/ha.

***High Degree of Losses During Harvesting:*** A closer scrutiny of the harvesting phase of the value chain revealed that harvest losses constitute more than 52% of the total cost of harvesting. According to interviews, the quantity of bananas that are lost and cannot be sold, but are either given away for free or sold at symbolic prices, is around 15% of total production volume. The main reason for the high lost rate is that all harvesting and moving of bananas is done by hand. A typical modern practice of banana harvesting involves use of large overhead cable systems that run throughout plantation areas whereby harvesting workers place protective materials such as foam cushions around the fruit to stop it from being damaged (bruising and other damages). The fruit is then pushed along the cable toward the packing plants whereby it is treated for fungicides and herbicides at post harvest stages.

[42] The transportation and marketing costs are estimates based on the producer's anticipated cost of exporting to South Africa, for which all costs for moving and marketing bananas were analyzed beforehand. In other words, there is no packaging or marketing costs associated with the farm at the time of interview, but instead all the costs of packaging and marketing are estimated from the cost structure of existing purchasing consolidators in South Africa. For mangoes, since the end buyer is a fruit salad producer, there is very little if any packaging and other marketing costs – the fruit is further processed (cut into a salad) which in its own has packaging and marketing costs, but which cost do not relate to mango producer's competitiveness and cost structure.

**Diagram 17: Farming Value Chain for Bananas**




*Source: Global Development Solutions, LLC™*

The Mozambican farmer has no cable system in place and neither does it have packing house facilities. As a result the damages to the fruit during harvest as well as by the end of the harvesting to collection point of bananas are significant, at around 15%, which is why harvesting is the most costly item in the banana value chain. Improvements in this part of the value chain are, therefore, going to have major impact in the cost structure of the Mozambican banana farmer. Establishment of cable systems is indispensable for the harvest losses to be diminished.

***High Cost of Agricultural Inputs:*** The high cost of agricultural inputs, specifically, sprays and fertilizers, is a critical constraint to competitiveness. Agrochemicals constitute over 83% of the spraying costs, and similarly, fertilizer inputs constitute over 89% of the fertilizing costs. Even though the proximity to South Africa where the nearest agrochemicals' manufacturing takes place should be of advantage to

**Table 31: Agrochemicals Share in Total Farming Operational Costs.**

| **Operational Cost Items** | **$/ha** | **Share of Total** |
|---|---|---|
| Irrigation, energy, and maintenance | 167 | 5 % |
| Props and other materials | 400 | 12% |
| Labor | 1,033 | 32% |
| **Agrochemicals & Agrochemicals Transportation (fertilizer, nematode control, herbicides, pesticides, etc.)*** | **1,583** | **51%** |
| TOTAL** | 3,183 | 100% |

*Source: Global Development Solutions, LLC™*
** Does not include the depreciable portion of establishment costs, which would increase the total production costs and hence decrease the percentage share of agrochemicals to 40.8%., as per VCA.*
*** Does not include the pre-planting applications at establishment.*

Mozambican producers, agrochemicals are still costly to the Mozambican farmer. In fact, as suggested in a sample of farming operational cost structure presented in Table 31, it can be seen that agrochemicals and their transportation constitute half of all operational costs, excluding depreciation costs that come from establishment of operations.

As was shown in the cotton VCA (refer to cotton value chain analysis section "Fertilizers: High Transport Costs and Its Impact on Accessibility"), in order to mitigate the excessive costs of accessing and transporting agrochemicals for Mozambican farmers, consideration needs to be given to a regional marketing and sourcing strategy that would lock-in the benefits of volume purchases and thus potentially decrease the cost of agrochemicals for Mozambican farmers.

## 2.2 Post-Harvest Handling

The post-harvest value chain can be divided into 5 categories:

- Sorting/Cleaning
- Grading;
- Inspection;
- Packing; and
- Transport to consolidation point, (CP)

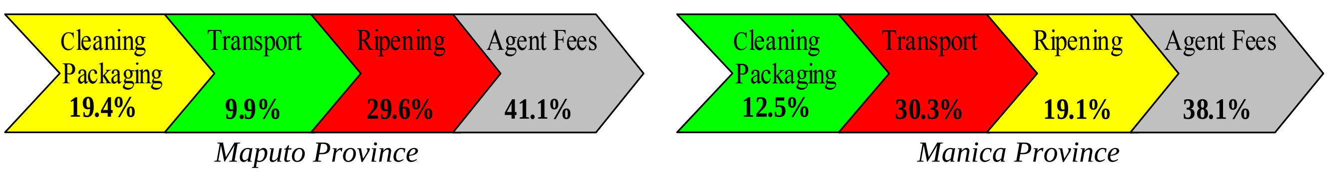
Very few, if any, banana growers have on-site post harvest processing facilities. This is reflected in the VCA, with extremely low post-harvest handling costs of 2.5% of total value added. All of the post-harvest handling done in banana farms is basically bulking the produce in bags and/or buckets after harvest, and moving it forward to the consolidation point. Prior to moving the produce to the consolidation point, there is some basic manual sorting and grading. Thus, the bulk of post-harvest handling is passed on to the marketing agents/buyers of bulk bananas. This, of course, comes at a price. Namely, the price that the commercial farmer gets for his produce sold in bulk is less than what a farmer receives if bananas are sorted, graded, cleaned inspected, and finally exported as packaged. The retail price in Maputo markets for example, is approximately US$0.50/kg, while the farmer sells the produce at farm gate, in bulk, between US$0.15-0.17.

## 2.3 Transport and Marketing

Most of the cost associated with commercialized banana farming is not borne by the local farmer in the post-harvesting stage. These costs are passed on to the transport and marketing value addition stage. This is why, as farm-to-market VCA above shows, transportation and marketing is 61.3% of the entire value chain, or US$0.17/kg.[43]

A closer look at the VCA, Diagram 18 below, reveals that agent fees constitute the largest cost driver at 41.6%, followed by ripening (29.6%) and packaging (19.4%). Transport is the lowest cost driver since the VCA depicts results from plantations located in the south of the country near the border with South Africa.

**Diagram 18: Transportation and Marketing Value Chain for Bananas, Maputo and Manica.**




*Source: Global Development Solutions, LLC*

### *High Transportation Costs from the Central Provinces*

For plantations in Manica and Beira, transport becomes very much the main cost driver at 30.3% of total marketing and transportation costs. Looking at the overall integrated farm-to-market value chain, the VCA indicates that transportation costs constitute almost

[43] This cost refers to plantations in Maputo targeting sales for Johannesburg, South Africa, while for farmers in Manica the marketing and transportation costs increase by 65% to US$0.28/kg.

20% of the total farm-to-market value chain, and as for almost every other commercial activity in Mozambique, a key competitiveness driver for exports.

Table 32 below traces the transportation and marketing costs faced by a typical Manica banana plantation, without any packing, storage, labeling, or other commercialization facility. The end retail market is Johannesburg. As the table shows, plantations in Manica are effectively priced out of the market at the time of the export feasibility analysis.[44]

The main reason is that even without marketing costs such as ripening and export packaging, transportation costs are too high a burden for exporting bananas from central provinces to the South African market.[45]

Mozambican banana producers, of course, have other market opportunities outside of South Africa, and it is conceivable that bulking vessel space to join the ongoing export flows from neighboring countries' through the Mozambican ports may decrease the transportation costs to other export markets. A precondition to any possibility to access foreign markets, however, is for commercial plantations to create in-house packaging, marketing and other support facilities and capabilities for their produce.

***Lack of pack house and cleaning facilities***

In all parts of the country, the lack of packing, storing, and ripening facilities is a major competitiveness drag for banana growers. The lack of these facilities results in producers' not being able to sell ripe, clean, and packaged bananas for which they would get most value out of their investment. As the VCA shows, the end result for the producers is that what has to be the post-harvest handling stage for them, where they can control the quality and marketability of their produce by cleaning, sorting, packing, etc, effectively becomes a transportation and marketing stage of value addition. As the VCA shows, implications for the banana growers are tremendous: around 61.3% of farm-to-market value is out of their hands, and as result, other players in the market reap the most benefits from cleaning, packing, ripening, branding, and in the end selling the bananas.[46]

For example, it costs a banana producer around Mts 1,500 to pay for ripening 1 kilogram of bananas. This not only is more than half of farmer's production cost for 1 kilogram of bananas (Mts. 2,600/kg), but it also means loss of control over the products' ripening quality.

[44] Analysis presented to GDS as per market situation and exchange rates as of January 2004.
[45] The starting farm-gate price, which includes overheads and profits, has to decrease to reach levels that would make the end-price competitive.
[46] The cost of agent fees and market commissions can almost never be in the control of the producer and therefore is intrinsically built in as a cost in the entire supply chain from producer to retail vendor. In the case of Mozambican exports to South Africa, the VCA shows that this cost is approximately 40%, which is at par with international wholesale/retail multipliers for bananas.

**Table 32: Cost of Exporting Bananas from Manica to South Africa (duties included: January 2004).**

| | | | |
|---|---|---|---|
| Farm-Gate Price (USD/MT)* | 166.32 | 37.7% | |
| Cost of Commercialization 1 | 0.00 | 0.0% | Ripening |
| Cost of Commercialization 2 | 0.00 | 0.0% | Export Packaging |
| Delivery of Empty Container to CP | 11.50 | 2.6% | From Container Depo to C.P |
| Price EXW Chimoi CP | 178.17 | | EXW |
| Full container to point of exit, Beira | 22.85 | 5.2% | Transport Chimoi-Beira |
| Terminal Handling Charges | 3.25 | 0.7% | Sea Port Charges |
| Cargo Handling | 9.00 | 2.0% | Clearing Agents, Handlers, etc. |
| Container Movement Tax | 2.50 | 0.6% | Mozambique Customs Charge |
| Movement Guide | 0.20 | 0.0% | Mozambique Customs Charge |
| Customs Service Tax @3% of Invoice | 6.67 | 1.5% | Mozambique Customs Charge |
| Price FOB/FCA Maputo | 222.64 | | At Exit Port |
| Seafreight to Durban | 21.25 | 4.8% | |
| Price CIF/CIP Durban | 243.89 | | Unloaded on the quay |
| Clearing Formalities | 18.50 | 4.2% | South African Port Charges |
| Customs Duties in South Africa | 0.00 | 0.0% | SADC=0 |
| Carriage to Johannesburg | 23.75 | 5.4% | Railage Costs |
| Price DDP Johannseburg | 286.14 | | Average, SA Wholesaler |
| S.A Market Commission (12.5%) | 40.83 | 9.2% | |
| SA Price to Retailer | 326.97 | | |
| SA Retailer Margin @ 35% | 114.44 | 25.9% | |
| Delivered Retail Price in SA | 441.41 | | |
| | | | |
| Comparative Retail Price in SA | 421.60 | | |

*Source: Interviews, Global Development Solutions.*
*CP=Consolidation Point; MT=Metric Ton; DDP=Delivered, Duty Paid; EXW=Ex Works*
** Farm-gate price includes the OH and margin of the farmer, as per exchange rates in Jan 2004.*

The same goes for packaging. The lack of packaging facilities effectively means giving away that stage of value addition to the in-bulk buyer who packages the bananas and yields a premium on the wholesale or retail markets. It is therefore of utmost importance for all stakeholders to support start-up investments in facilities where the growers can store, clean, and pack their produce. These facilities can be costly to build for each grower individually.[47] In this context, creating shared, fee-based facilities for the use of multiple growers can be one way to move forward.

[47] One producer was willing to invest in its own facility, but was turned down by three different banks as being "too risky" of an operation to lend to.

## 3.0 Value Chain Analysis for Commercial Mango Farming

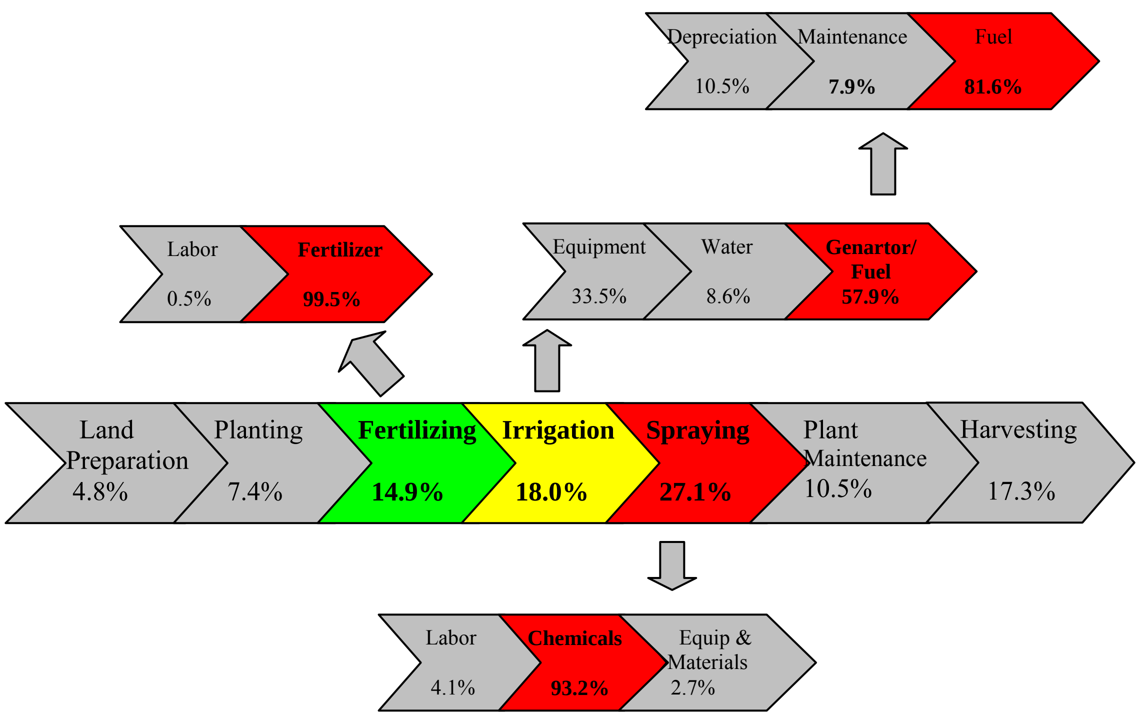
The VCA shows that the farm-to-market cost for mango is US$ 2,732 per hectare. Farming constitutes 75.2% of the value chain, followed by transport & marketing (20.9%) and post-harvest handling (3.9%).[48]

***Farm-to-market value chain for mangoes***


*Source: Global Development Solutions, LLC.*

A closer look at the farming cost structure reveals that spraying constitutes the major part of value added (27.1%) followed by irrigation (18.0%) and fertilizing (14.9%) (Diagram 19).

**Diagram 19: Farming Value Chain for Mangoes**




*Source: Global Development Solutions, LLC™*

### *High Cost of Agricultural Inputs*

[48] The VCA for mango in this analysis is for mango sold in South Africa to a fruit-salad processor, all sold in bulk in buckets. As a result, while the banana value chain includes the cost of bananas sold as full fruit, cleaned, packaged and ripened for end consumer in retail markets, the mango value chain does not have these costs in the VCA structure.

Somewhat similar to the banana (and cotton) VCAs, sprays and fertilizers are a major cost components in the mango farming sector as well, and therefore, generally speaking, a comprehensive strategy is needed at the national level to address the issues of access as well as cost of agricultural inputs for the entire farming sector.

More specifically, as Table 33 shows, the share of agrochemicals' cost on total mango growing costs in Mozambique, at expected full maturity, is the largest when compared to competitive mango growing countries like India and Pakistan.

**Table 33: Mango Yields and Costs, International Outlook***

| Country | Yield (Kg/ha) | Farm gate production cost (US$/kg) | Share of agrochemicals in total production costs | Variety |
|---|---|---|---|---|
| Philippines | 6,800 | 0.22 | 34% | Carabao |
| India | 9,200 | 0.14 | 34% | Dasheri, Langra, Neelam, Chausa |
| Pakistan | 7,300 | 0.17 | 28% | Chausa, Langra, Sindhery |
| Puerto Rico | 17,000 | -- | -- | Florida types (Kent, T.Atkins, Keitt, etc) |
| Mexico | 9,200 | -- | -- | Florida types (Kent, T.Atkins, Keitt, etc) |
| Mozambique** | 10,000 | 0.21 | 42% | Florida types (Kent, T.Atkins, Keitt, etc) |
| World Average | 7,650 | -- | -- | |

*Source: Global Development Solutions, LLC™*
** Figures relate to commercial, intensively managed orchards, with trees at full maturity.*
*** Based on the reported 'expected return' at full tree maturity, with the current level of agrochemical usage.*

### *Average Variety Performance*

The yield of Florida type mango in Mozambique is currently at around 5,100 kg/ha. This was the estimated yield for year 2005 as per 4th year of tree maturity. The optimal target from the 7th year maturity onwards, as estimated during the interviews, was estimated at 10,000 kg/ha. At these estimated yields, the total cost of producing 1 kg of mango becomes US$0.21. At the current as well as expected yield levels, Mozambican producers would still lag behind Florida-type mango producers. There are many factors that could account for this yield gap. The gap could be caused by environmental factors (location and PH levels) as well as specie attributes such as' year effects' whereby the tree has its peak and off-peak yields of fruit.

What could also influence yields are management factors. The management requirements of mango orchards demand not only that farmers are knowledgeable and experienced, but also that a well-informed extension service network exists that works closely with researchers. This network and management base is completely missing in

Mozambique, and it is of utmost importance that access to extension and research capabilities from the neighboring countries, and most notably South Africa, is made possible. In the long term, creation of such capabilities in the country is indispensable for a meaningful development of the sector.

The lack of management skills and extension services is a significant barrier for those willing to invest in mango commercial farming. The situation is best described by a farmer who when asked as to why is he not investing in mango commercial farming, responded by saying "we don't know what variety grows best, and even of we knew what variety grows best, we don't know how much it would fetch in the international market or would it sell there at all. It is going to be a waste of time and money."[49]

Much has been spoken about the capability of the Mozambican growers to supply mangoes during a counter-season, when most of world supplies are low, and sales prices increase – during October, November, and December.

While this may be the case for the market in South Africa, it is very uncertain as to what is the use of this countercyclical capability for any potential access to markets in Asia and Middle East.[50] Judging from interviews conducted by GDS in South Asia, and with suppliers to the Middle East, the varieties that are consumed in these markets are Indian yellow varieties that are not grown in Mozambique. Test-trialing the growth of these varieties for Mozambican conditions would be a precondition for contemplating any market strategy eastwards.

Also, while farm-gate price is always important, what is even more crucial is to reach the final market at a competitive price. A case in point is that, for example, while Indian farm-gate cost is on average lower than the Pakistani farm-gate cost, the Pakistani mangoes are more competitive in the Middle Eastern markets when their harvesting cycle is in full, mainly due to cheaper and more efficient transshipping from Karachi port. The Indian mangoes regain strength in this market only when the Pakistani harvest volumes decidedly diminish starting in March.[51]

### *High Irrigation Costs*

As per the value chain, irrigation costs constitute the largest value added component next to agrochemicals, with 27.1%. Almost 60% of irrigation costs go for installing, running and maintaining the generator that provides electricity to pump the water through the plumbs of the drip irrigation pumps . The farm does not have access to the electricity grid. The nearest access point to the electricity grid is around 80 kilometers. The grower would very much prefer to use grid electricity, but the estimated cost of electrification, at US$ 8,000-12,000/km, is to high to invest in. As a result, the farmer has to resort to own

[49] Interviews, Global Development Solutions.
[50] USA and European markets, while the most sizable and lucrative, are widely accepted to be beyond the reach of tropical fruits from Mozambique because of either long distance or high sanitary entry requirement,
[51] Interviews, Global Development Solutions, LLC

generation. The largest share of irrigation costs is the diesel fuel that powers the generator, at around $8,500 per year.

In order to decrease the irrigation costs, and as a remedy for failing to provide infrastructure to the farmer, the government is strongly encouraged to establish a system of incentives such as removal of VAT from the fuel purchased by the exporter. The same goes for the cost/incentives of importing the generator and the duties on equipment for exporting farmers, duties which are currently borne by the farmers operating budget, and which decrease his competitiveness.

### 3.1 Post-Harvest Handling

The VCA shows that post-harvest handling constitutes around 4% of farm-to-market value added. This shows that there is very little post-harvest handling after the mangoes are harvested. Since mangoes in this particular case are shipped in bulk, and product appearance matters very little to the buyer (producer of fruit salads), there are very few post-harvest handling processes carried out.

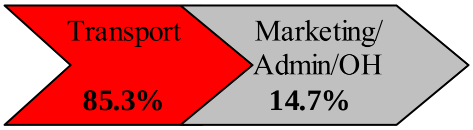
What is very ominous for the competitiveness of mango exports is that the post-harvesting stage of the farm-to-market value added will inevitably increase in the event of exports to markets for fresh, whole-fruit mango consumption, namely, for fresh fruit exports, expenditures on the processes of sorting, grading, packaging, cleaning, heat treatment, chilling, will all have to be completed. It does not particularly matter whether the farmer himself or the buying consolidator/exporter will undertake these processes, as the bottom line is that the post-harvesting costs will be added to the farm-gate price. As Table 33 above shows, with the expected yields and current farming costs, Mozambican mangoes are already in a very tight competitiveness position at the farm gate cost level. As a result, robust financial and technical assistance is needed to help the growers at this stage of value addition so that they don't lose further ground in terms of price-competitiveness.

### 3.2 Transportation, and Marketing

In fact, without assistance on packing, grading, and other modern post-harvest facilities, it is very difficult to see how the mangoes from Mozambique can be competitive internationally in the short-to-medium term with a farm-gate price of approximately US$ 0.21/kg.[52] One of the most pertinent reasons to that effect is that during the same (short-to-medium term) period, it is very improbable that the systemic drag caused by the poor transportation network can be removed. As Diagram 20 illustrates, transportation constitutes the bulk of the cost of transportation and marketing value-added. This large share of transportation value-added (85.3%) would not necessarily be a competitive disadvantage, but its absolute size in monetary terms is very costly in terms of competitiveness. According to field interviews, the cost of moving mangoes in chilled trucks from central Manica to the South African border in the south is approximately US$ 0.12/kg.

[52] At anticipated yields of 10,000kg/ha.

**Diagram 20: Transportation & Marketing Value Chain**




*Source: Global Development Solutions, LLC*

The current transportation structure in Mozambique makes it very difficult for Mozambican Florida-type mangoes be competitive in international markets. That is why maximum efforts in the short-to-medium term need to be focused towards the farming at post-harvest stages of value addition. In the long-term, however, it is of strategic importance for the competitiveness of the sector that transportation costs in Mozambique be brought down in line with international levels.

## Annex 1: Commentary on Selected Provisions Under the Labor Law Hindering Competitiveness in Mozambique

**Table 35: Selected Provisions under the Labor Law and Other Regulations Hindering the Competitiveness of Companies Operating in Mozambique**

| Issue Area | Citation | Activities | Critical Issues |
|---|---|---|---|
| **Vacation and leave time** | Article 39<br><br>Article 42 (para 1)<br>Article 43<br><br><br><br><br><br><br><br><br><br>Article 45 (para 1) | <12 mths worked = 21 days paid leave<br>>12 mths worked = 30 days paid leave<br>Additional days if vacation and leave fall on a public holiday<br>Justifiable Absence:<br>Marriage = 6 days<br>Family death = 6 days<br>In-law death = 3 days<br>Relative death = 2 days<br>Union or political activities = unlimited<br>Sick leave/accident = unlimited<br>Hospitalization of a family minor = unlimited<br>Convalescence from abortion = unlimited<br>Other justifiable absence | Employer can not legally replace the worker until whether justifiable evidence is present that clearly indicates that a worker is no longer able to return to work.<br>Based on these generous leave provisions, a male worker actually works 77.1% of the time and a female worker 64.8% of the time for which they are fully remunerated. |
| **Dismissal procedure** | Article 70 &<br>Article 23<br><br>Article 68 (para 4) | Prepare a disciplinary notice within 60 days of an event<br>Worker has 10 days to respond<br>An additional 30 days to begin disciplinary procedures<br>Employer must communicate 90 days in advance to the worker, union and Min. of Labor regarding termination of a contract | Employee is fully paid during this entire period<br>Long time lapse between the event and possible dismissal |
| **Severance pay** | Article 68 (para 6)<br>Article 68 (para 7) | >3 yrs worked = 3 mths/every 2 additional yrs<br>If dismissal can not be justified, severance pay can be doubled | Substantial cost and liability to employers<br>Preference by employers to hire older unskilled worker at low wages rather than to replace them with younger skilled but higher paid worker. This hiring patter contributes to the continued low labor productivity |
| **Labor inspection** | Decree No. 25/99 | Allow inspectors to impose fines between 10 – 80 time minimum salary | Opens up opportunities for bribes, particularly as inspectors as a group are entitled to keep a significant portion of fines imposed.<br>The judicial system lacks appeal and recourse for employers. If the Ministry does not respond within 30 days of an appeal, the appeal is automatically rejected |
| **Social security** | Article 182 – 206<br>Law No. 5/89<br>Decree No. 46/89<br>MD No. 45/90 | A total of 7% contribution: 4% from employer; and 3% from the worker | Workers tend not to be paid social security, even if they have been contributing |
| **HIV/AIDS** | Law No. 5/2002, Article 10<br>Article 11<br><br>Article 9<br><br>Article 12 & 13<br><br>Article 13 (para 2) | Employers must bear the entire cost of treating an employee, even if an employee is unable to work<br>Employee with AIDS who is absent from work is covered under 'justifiable absence' and entitled to full pay<br>Employer can not replace a worker with AIDS, and must offer less strenuous job<br>If a worker is dismissed from work and found to be unjustifiable, an employee is entitled to double damages and reinstatement<br>Applicant not given employment due to HIV/AIDS is entitled to 6 months salary equal to the wage rate published for the application<br>In addition, the potential employer is fined between $1,625 – $5,000 | Cost of treatment is more than double the monthly minimum wage paid to a worker<br>Unfairly punishes and places financial burden on an employer for a larger public issue |

| | | | |
|---|---|---|---|
| | | per applicant | |
| **Dispute resolution** | Article 116 – 123<br>Law No. 18/92<br>Law No. 11/99 | No labor court exists in Mozambique. Labor disputes are adjudicated by either the court of general jurisdiction or the labor section of those courts | Bottleneck of labor litigation, and courts provide not practical recourse to an punitive plaintiff |
| *Source: Compiled by Global Development Solutions, LLC* | | | |

**Table 36: Comparative Labor Regulations and Worker Benefits**

| | Mozambique | South Africa | Lesotho | Namibia | Botswana |
|---|---|---|---|---|---|
| **Average working hour/week** | 48 | 45 | 45 | 45 | 48 |
| **Overtime pay** | <20 hrs = 1.5x<br>>20 hrs = 2.0x<br>Max = 2 hrs/day | Standard = 1.5x<br>Sunday = 2.0x<br>Max = 10 hrs/wk | Standard = 1.25x<br>Holidays = 2.0x<br>Max = 11 hrs/wk | Standard = 1.5x<br>Sunday = 2.0x<br>Max = 10 hrs/wk | Standard = 1.5x<br>Sunday = 2.0x<br>Max = 14 hrs/wk |
| **Vacation** | Yr 1 = 21 days<br>> Yr 2 = 30 days, not including public holidays & sick leave | Yr 1 = 21 days<br>> Yr 2 = 1 day/17 days worked | 1 day/one-month worked | 24 days | Yr 1 = 15 days<br>>Yr 2 = 1.25 days/one-month worked |
| **Sick leave** | No limit<br>Medical certificate provided after 30 days | <6 months worked = 1 day/26 days worked<br>Every 3 years = # of days worked in 6 weeks<br>Medical certificate provided | <6 months worked = zero<br>>6 months worked = 12 days<br>>12 months worked = 12 days full pay, 24 days half pay | >3 years worked = 30 – 36 days | 14 days full pay<br>Medical certificate provided |
| **Maternity leave** | Pre-birth = 20 days<br>Post-birth = 40 days<br>Full pay | Max = 4 months unpaid | Pre-birth = 6 wks<br>Post-birth = 6 wks<br>Unpaid leave | Pre-birth = 4 wks<br>Post-birth = 4 wks<br>Unpaid leave | Pre-birth = 6 wks<br>Post-birth = 6 wks<br>25% of wage |
| **Probation period** | Fixed term contract (FTC) = 30 days<br>>6 mths in FTC = 15 days<br>Open contract = 90 days | Discretionary | <4 mths worked = 1 wk notice | <4 wks worked = 1 day notice<br>>12 months worked = 1 wk notice | >12 mths worked = 1 wk notice |
| **Dismissal notice** | 1 mth worked = 3 mths | <6 mths worked = 1 wk<br>>6 mths worked = 2 wks<br>>12 mths worked = 4 wks | <6 mths worked = 1 wk<br>>6 mths worked = 2 wks<br>>12 mths worked = 1 mth | <4 wks worked = 1 day<br><12 mths worked = 1 wk<br>>12 mths worked = 4 wks | <5 yrs worked = variable<br>5-10 yrs worked = 4 wks |
| **Severance pay** | 3-6 mths worked = 45 days<br>6 mths – 3 yrs worked = 3 mths<br>>3 yrs worked = 3 mths for every 2 yrs worked | 1 yr worked = 1 wk | 1 yr worked = 1 wk | 1 yr worked = 1 wk | >5 yrs worked begin accrual |

*Source: Complied by Global Development Solutions, LLC, based on data from Consultoria e Investimentos, LDA.*