



## **Agro-Logistics for Nutmeg & Cocoa Exports from Grenada**

### **A Logistics Chain Approach**

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## **Currency Equivalent**

(1\$EC = 0.37US\$)

## **Acronyms**

GCA	Grenada Cocoa Association
GCNA	Grenada Cooperative Nutmeg Association
LCA	Logistics Chain Analysis

## Table of Contents

Executive Summary .....	1
Introduction.....	4
Overview of Nutmeg and Cocoa Exports from Grenada .....	4
Overview of Logistics for Grenada.....	7
Supply Chain Mapping .....	11
Logistics Costs by Segment .....	14
Overview.....	16
Domestic Transport Services (Cocoa & Nutmeg) .....	16
Handling Practices & Container Stuffing at the Port .....	18
Conclusions.....	23
Suggestions for Further Work.....	23
Bibliography .....	25
Annex I. Production & Export Tables: Nutmeg & Cocoa .....	26
Annex II. Cost & Time to Export: Grenada in Comparison .....	28
Annex III. Comparable Cost Structures for 20’ Containers to Netherlands .....	30

## List of Figures

Figure 1. Cocoa and Nutmeg Exports by Destination.....	5
Figure 2. Nutmeg and Cocoa Exports from Grenada (EC\$).....	6
Figure 3. Logistics Indicators for 3 Caribbean Islands .....	7
Figure 4. Costs to Export a Container (US\$).....	8
Figure 5. Mapping the Nutmeg Export Supply Chain .....	11
Figure 6. Mapping the Cocoa Supply Chain.....	13
Figure 7. Logistics Costs by Type, Nutmeg & Cocoa .....	15
Figure 8. Cocoa Prices per pound .....	17
Figure 9. Cocoa Logistics Cost Structure .....	21
Figure 10. Nutmeg Logistics Cost Structure.....	22



## Executive Summary

**The success of agricultural exports lies in the ability of an industry to deliver on-time and meet the quality standards of the buyer.** These factors depend not just on farmers but on a range of stakeholders, including processors and exporters, truckers, shipping companies, port authorities, laboratories and government regulations for food safety standards and quality. Coordination in transitions and clear responsibilities are also critical. A Logistics Chain Analysis (LCA) explores these relationships and transitions by taking a comprehensive snapshot of product movement from the farm gate to the port of destination, identifying challenges along the whole supply chain and taking into account the role of each stakeholder.

**This study presents the findings from LCAs for two of Grenada's most important agricultural exports: cocoa and nutmeg.** After two hurricanes in 2004 & 2005 decimated production of both crops, the island has been working to enhance their recovery through increased innovation and value-added, while addressing present challenges in market structure and competitiveness. Though production has partially recovered since 2005, there is still a long way to go. In 2011, annual production volumes for nutmeg were less than 15% of 2004 production levels, having dropped from 12.8 million pounds to less than 2 million over the period. Cocoa production has rebounded to reach 2003 levels, but only half of the 6,000 farmers have continued production. Other challenges include a median farmer age of over 60, little or no competition among exporters or shippers, as well as limited marketing and expansion into higher value-added exports. At present, nutmeg and cocoa exportation account for 35% and 18% of agricultural exports respectively, and a total of 20.5% of total export earnings<sup>1</sup>.

**Infrastructure and logistics on the island are characterized by limitations of connectivity, geography and scale, leading to high logistics costs.** The quality of roads is good, but ground transport services are limited and high cost, reaching an estimated \$0.76 per ton/km<sup>2</sup> due to both the mountainous terrain and limitations of scale. Port infrastructure and equipment is quite limited and terminal handling fees, reported to be \$710 per exported container<sup>3</sup>, are high for manufactured products (agricultural exports are exempt). Few shippers visit the island regularly, limiting competition and keeping freight rates high; maritime transport from St. George's port to Miami was quoted at \$3,100 – above average for the region.

**Unlike costs, time to export is average or below average in regional comparison.** Grenada's Automated System for Customs Data (ASYCUDA) keeps document processing and cargo clearance times low, while also contributing to lower overall wait times for export containers at the port. The recently updated system allows exporters to process multiple transactions (documentation processing, inspection, release approval, payment of taxes, duties and other fees), thereby reducing procedural steps in the processing and clearance of goods (IFC, 2011). Also, shippers report that normal conditions at the port include on-schedule docking and loading times of less than 6 hours, despite limited equipment availability.

**The logistics chains for both products presently function well, with relatively low costs and speedy exportation.** Logistics costs for both cocoa and nutmeg exports from Grenada are less

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<sup>1</sup> Public figures from the Ministry of Agriculture.

<sup>2</sup> Based on transport services prices for cocoa movements from the warehouse to the port.

<sup>3</sup> Doing Business, 2013.

than 10% of the F.O.B. value of goods at \$0.23 and \$0.58 respectively, excluding insurance<sup>4</sup>. The higher logistics costs for nutmeg highlight key differences between the U.S. and European markets. The nutmeg chain covers the U.S. market, for which the cost of marine freight per kg is almost double (about \$400 more per shipment). Additional food safety testing for aflatoxins is also required for the U.S. and adds almost \$500 to the cost of each shipment. While these costs are fairly reasonable for these high-value dry goods, exporting to the U.S. could be cost prohibitive for lower value perishable products, such as tropical fruits.

**For the cocoa chain, restructuring the first segments of product movement and processing would leave more space for an increased producer price and reduce transport costs for the exporter.** The Grenada Cocoa Association (GCA) handles two primary transport segments along the chain: from one of 8 buying stations to the central warehouse; and from the warehouse to the port. In addition to these transport costs, the GCA also covers costs for packaging and port loading – in total, 47% of all logistics costs associated with this supply chain. An extra step in the supply chain - in which private agents operate buying stations, ferment and dry cocoa beans - is the principal factor. Private agents receive an extra \$0.16 per pound over the producer price for wet beans for delivering dry beans to the central warehouse, as compared to only \$0.04 per pound extra for producers who ferment and dry their own beans. If producers were organized to operate the buying stations, or given a greater financial incentive to dry their own beans, the GCA could cut its transport costs by 37%. This alteration to the market structure would need to be piloted in order to ensure that diverse drying facilities and methods posed no risk to the high quality of Grenadian cocoa.

**Present product handling facilities and practices, including open-air storage and container stuffing at the port, increase the risk of product contamination and may present difficulties for future expansion into new export markets.** For up to 30 days for cocoa beans and 15 weeks for nutmeg, packed jute bags are stored in open-air storage facilities, which experience frequent changes in humidity levels, increasing bean “breathing” and the potential excretion of essential oils from nutmeg – natural processes which both effect product quality. Shipments of nutmeg and cocoa are presently transported on flat-bed trucks to the port, where they are then loaded into containers by employees of the port authority for a per bag charge of \$1.52<sup>5</sup>.

**A strategic plan to increase agricultural exports must involve coordinated public and private investments in the infrastructure, equipment and services necessary for exporters to load and unload products at their own warehouses.** A good start would include investments in the following areas: (1) improvements to existing storage facilities, including temperature and humidity control technology for warehouses; and (2) equipment for the easy movement of containers both within and beyond the port, as well as improvements to the technical skill level of port workers. The capacity of the Grenada Bureau of Standards to perform microbiological and chemical testing should be expanded as needed to match the individual tests required for new exports, by new markets.

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<sup>4</sup> Typically set at 0.7 to 1% of overall cargo value, cargo insurance accounts for a disproportionate amount of overall logistics costs for high value goods, and so were omitted from total logistics cost calculations.

<sup>5</sup> According to the estimated cost structures in this report, port loading of cocoa for the GCA, at an estimated \$0.03/kg, appears to be more expensive than for nutmeg. This is because the GCA could estimate a per bag cost for fumigation and craft paper. The GCNA was unable to estimate the corresponding costs for nutmeg because it continues to draw from a large quantity if both imported in 2011, and does not have the purchase records.

**Further diagnostic work will be needed to identify the proper technical projects and investments, assess their potential costs and impacts for nutmeg and cocoa exports, as well as for agricultural exports in general.** First, further diagnostic work should be done to explore structural issues that affect the cocoa and nutmeg industries, including institutional management and competition. Findings from this analysis revealed that traditional market structures may be negatively affecting the adoption of cost-effective or time-saving improvements. Second, logistics analysis should be performed for perishable products; particularly soursop and fish, in order to take into account the country's cold chain, as well as food safety systems. Third, cost-benefit analyses may be conducted in order to compare the potential benefits and likely costs of specific infrastructure investments.



## **Introduction**

This study of the logistics chain for cocoa and nutmeg exports from Grenada is designed to build a link between the study and improvement of agriculture and that of logistics for agricultural exports, and complements the Grenada Small Farmer Vulnerability Reduction project. The overall objective of this analysis is to understand product movement for two of Grenada's primary agricultural exports and identify opportunities to enhance competitiveness for these and other products by improving logistics. Logistics refers to the infrastructure, machinery, related services and information systems that allow products to move from the original point of production to the final point of consumption.

### *The Methodology*

Logistics Chain Analysis (LCA) is a survey-based tool used to pinpoint transports and logistics bottlenecks that constrain or prevent the movement of a particular product. The analysis identifies where logistics inefficiencies, from the farm gate to the port of exit, increase logistics expenses, travel times and uncertainty. LCAs quantify and monetize the effects of bottlenecks for individual producers, showing policy-makers opportunities to improve logistics performance and increase export competitiveness. The methodology used here is based on that developed in Fries & Fernandez (2012)<sup>6</sup>.

Results from SCAs bridge a gap between policy and practice for agriculture and logistics and can inform overall export competitiveness and trade facilitation strategies and/or sector strategies for agricultural products of key interest. On the public side, the results of this study are of interest to the Ministries of Agriculture, Forestry and Fisheries, Communication, Works and ICT, and Economic, Planning, Trade and Coop., Customs Officials, Port and Air Authorities. On the private side, the results are of interest to Nutmeg and Cocoa Producers, the Grenada Nutmeg and Cocoa Associations, and shipping service providers.

## **Overview of Nutmeg and Cocoa Exports from Grenada**

Grenada enjoys high regional and international demand for its exceptional quality nutmeg and cocoa. Nutmeg and cocoa are both traditional exports, accounting for a combined 20.5% of total export values. According to published figures and interviews with exporters, there are approximately 3,000 active nutmeg and cocoa farmers on the island of Grenada, with average farm sizes of 5 and 2 acres, respectively. The current cash advance price to farmers for green nutmegs is \$EC5.00 per pound and \$EC1.50 per pound for green cocoa.

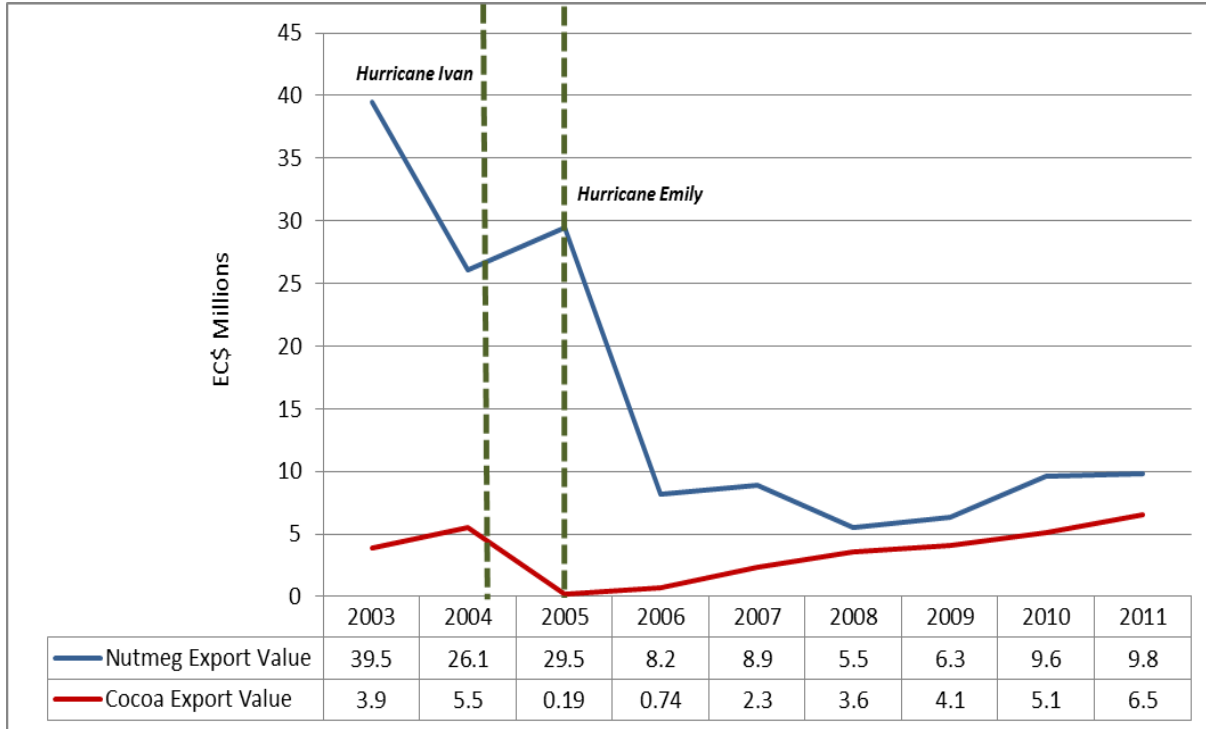
The market structure for both nutmeg and cocoa is unique in that there is only one principal exporter for each product, which is a public rather than a private actor, and there are limited buying agents. The Grenada Cooperative Nutmeg Association (GCNA) is the principal player in the Nutmeg Sector of Grenada. This body was formed in 1947 and is governed by the Nutmeg Industry Act, which gives it the mandate to be the sole marketing agent for Grenada's nutmegs. The farmer-owned and run GCNA both manufactures and exports nutmeg. GCNA's revenue comes from its traditional sale of raw nutmegs to international customers. On the domestic

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<sup>6</sup> The name of the analysis has been changed from Supply Chain Analysis to Logistics Chain Analysis.



Figure 2. Nutmeg and Cocoa Exports from Grenada (EC\$)



Source: 2010-2011 Annual Agriculture Review, Grenada W.I.

In 2003, Grenada produced approximately 12.9 million pounds of green nutmeg and 1.5 million pounds of Cocoa. Fast forward through the two devastating hurricanes and several bouts of “Nutmeg Wilt Disease” to 2011, where Cocoa production remains steady at around 1.5 million pounds, and Nutmeg production numbers have drastically fallen to 1.8 million pounds. This severe reduction in production resulted in a loss of market share and a loss of position at the top of the world market. This loss has been acutely felt in the rural areas which once flourished with over 8,000 nutmeg farmers in 2003, (2010-2011 Grenada Annual Agriculture Review) to about 2,900 currently active nutmeg farmers (GCNA, 2013).

Despite the overall decline in production and export value of these two products over the last decade, nutmeg and cocoa sectors have seen a positive increase in these values in recent years, and cultivation continues to play a pivotal role as a source of income, employment and revenue for Grenada. Strategic initiatives captured in the Grenada Nutmeg Sector Development Strategy and technical assistance activities for farmers implemented through several Government-IFI interventions (i.e. the Ministry of Agriculture’s Farm Labour Support and Propagation Expansion Programmes; the World Bank’s Grenada Small Farmer Vulnerability Reduction project; and the African/Caribbean and Pacific/EU Private Sector Development project) have provided Grenada critical support in addressing the challenges facing these two important agriculture products.

## Overview of Logistics for Grenada

Low connectivity characterizes logistics in the Caribbean, and Grenada is no exception. The 2013 Doing Business Indicators show that costs to export and import containers from Grenada & St. Lucia, two smaller islands with public ports, are almost double those of Trinidad & Tobago, a key transshipment hub. On indicators such as ‘required documents’ and ‘time to trade’, Grenada has performed well (see Figure 3).

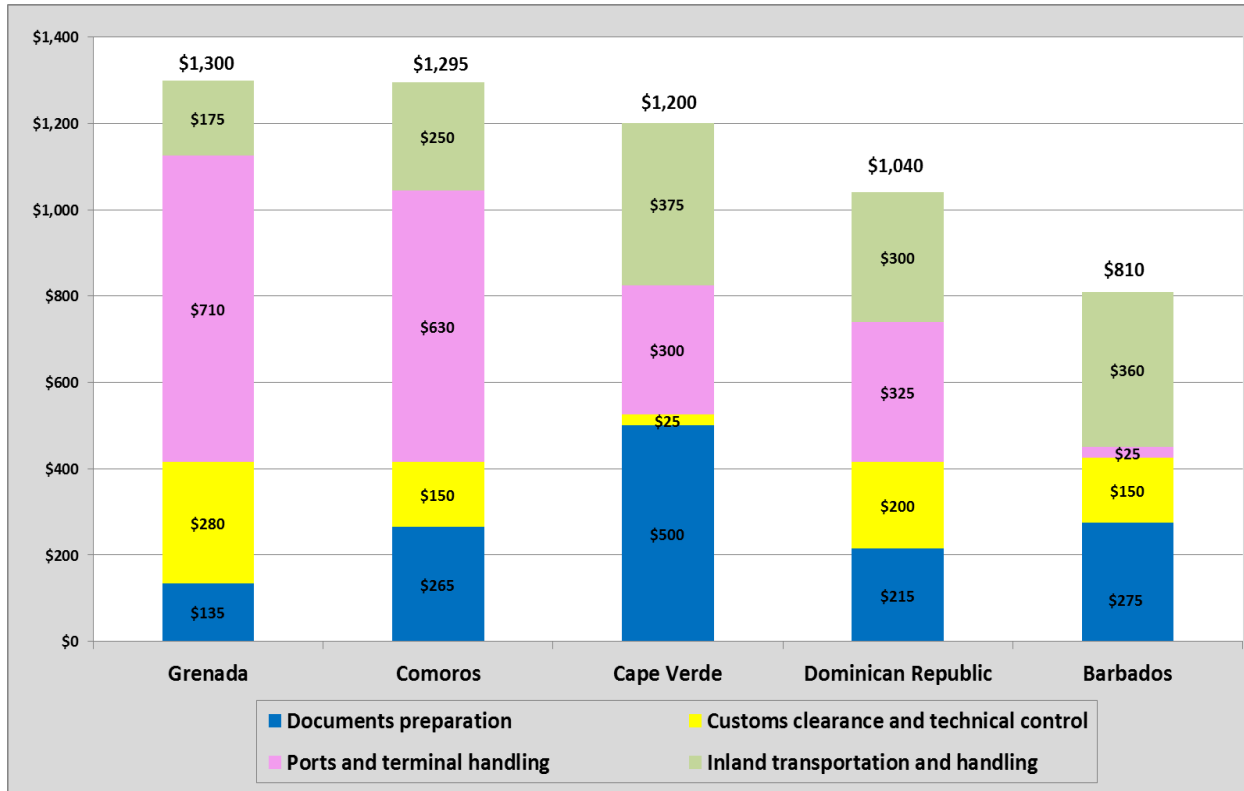
Figure 3. Logistics Indicators for 3 Caribbean Islands

Trade Indicators	Grenada	Trinidad and Tobago	St. Lucia
Trading across borders (rank)	71	75	109
Documents to export	5	5	5
Time to export (days)	9	11	14
Cost to export (US\$ per container)	1,300	843	1,375
Documents to import	7	10	9
Time to import (days)	9	14	17
Cost to import (US\$ per container)	2,235	1,260	2,675

*Source: Doing Business (2013)*

In comparison with other small islands around the globe, such as Comoros and Cape Verde, Grenada has high total costs to export; that can be attributed primarily to customs clearance and port terminal handling fees (see Figure 3). Terminal handling charges and other port fees for Grenada are the highest in the Caribbean at an estimated \$710 per container (Doing Business, 2013).

Figure 4. Costs to Export a Container (US\$)



Source: *Doing Business (2013)*

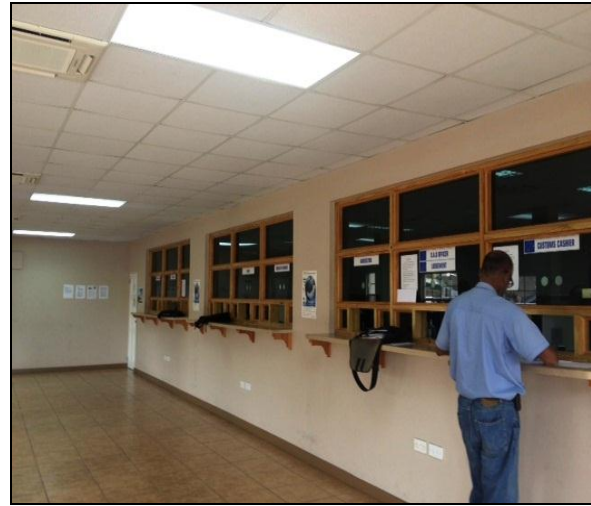
### Customs and Document Processing

From 2006 to 2013, Grenada was able to reduce the time it takes to export a container, from the capital city to the primary port, from 19 to 9 days (*Doing Business: 2006 & 2013*). Critical reforms implemented by the Grenada Customs and Excise Division in recent years allowed for improved efficiency and streamline document processing for both imports and exports. Since early 2012, clients have been able to submit their manifests electronically and follow the customs procedures online through the Automated System for Customs Data (ASYCUDA) System, which can be done both remotely and at the port.

In order to enhance trade facilitation, Grenada Customs has implemented a One Stop Service (OSS) for clearance of cargo at the Port of St. Georges (see Box 1 & 2). This single service facility, located on the premises of the Grenada Port Authority, has two ASYCUDA computer stations and service windows for all relevant government agencies, which allows exporters to process multiple transactions (documentation processing, inspection, release approval, payment of taxes, duties and other fees), thereby reducing procedural steps in the processing and clearance of goods (IFC, 2011). In the case of agriculture products such as nutmeg and cocoa, brokers and exporters can submit their single-administrative document (SAD) entry electronically and subsequently go down to the OSS facility at the port to provide a hard copy together with supporting documentation (invoice, certificate of origin, EUR 1 form – if exporting to Europe), when cargo is ready for shipment.



**Box 1.** Customs brokers handling documentation for exports enter shipping information at the customs office within St. George’s Port. Information entered here is sent automatically to the customs office at the port, where it is immediately printed and stamped upon approval.



**Box 2.** The One Stop Service (OSS) facility at the port. However, the office is not exactly a “single window”, as customs brokers/exporters must still visit each window to process different types of documentation.

### *Ports & Maritime Shipping*

Without the ability to command large volumes of cargo traffic, the smaller islands of the West Indies tend to offer limited port infrastructure that corresponds to present cargo volume demand. St. George, Grenada is one of three Caribbean maritime ports<sup>8</sup> that lacks both gantry and mobile cranes and can only receive geared ships. The absence of cranes is related to longer overall vessel call times as well as higher marine transport costs, as vessels must come equipped with their own container cranes (Sanchez & Wilmsmeier, 2009). In addition to equipment limitation, shipping companies reported that poorly trained port personnel and some cases of overstaffing for an individual movement were factors that contributed to longer vessel call times.

Maritime freight rates stay high as one or two shipping companies may enjoy little or no competition along a particular route. According to 2003 figures (latest available), for cargo traveling to and from Grenada, maritime freight and insurance accounted for 20% of product value on average – the highest in the region and well above the regional average of less than 15% (Sanchez & Wilmsmeier, 2009). Both the GCNA and GCA use one shipping company to export to the United States and Canada, and one for European markets (see Boxes 3 & 4). These two shipping companies stop at the Port of Grenada once a week (for about 6 hours) to unload and collect cargo; it takes approximately 5-7 days for cargo to arrive in the United States and 2 weeks for Europe.

<sup>8</sup> Georgetown, Guyana & Roseau, Dominica are the other two.



**Box 3.** Marine shipment of cocoa and nutmeg to Europe is handled primarily by CMA CGM. The SCA for nutmeg follows a 20 ft. container as shown here.

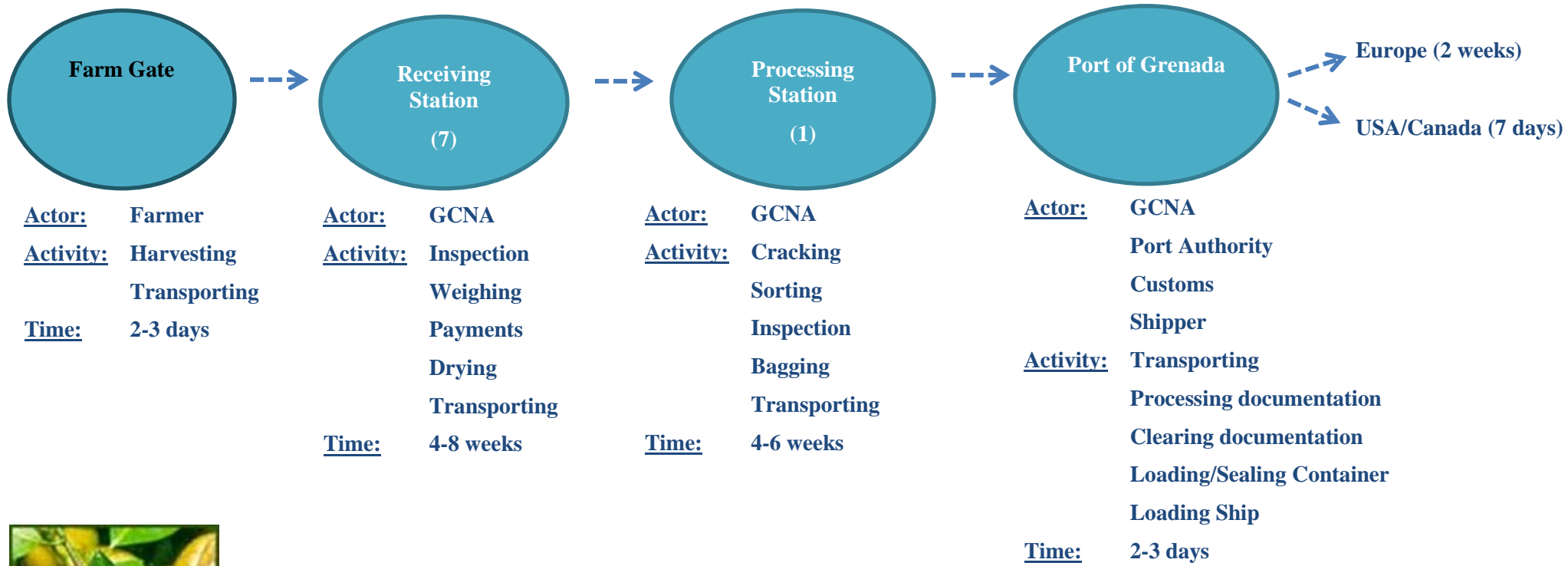


**Box 4.** Tropical Shipping handles all shipments of cocoa and nutmeg to destinations in the U.S. and Canada. This photo shows a typical container vessel equipped with two container cranes for loading & unloading.



# Supply Chain Mapping

Figure 5. Mapping the Nutmeg Export Supply Chain





Nutmeg is a year-round crop (the “nutmeg year” is July 1 – June 30) with peak harvesting periods from June to September. When ripe, nutmegs split open and fall from the tree to the ground (or more recently into nets for easy and efficient collection). Mature trees can yield up to 50 pounds per harvest. Once nutmegs are collected, they are washed, de-maced<sup>9</sup> and placed in plastic bags or buckets and taken (by hired or owned trucks) to be sold at the GCNA receiving station. Larger farmers with more production hire harvesters and vehicles to collect the nutmeg and transport it to the receiving station. Smaller farmers collect nutmeg pods themselves and carry up to 60 pounds at a time to a main road, where they take a collective bus to the receiving station for a cost of \$1.84 round trip. Nutmegs must be taken to the receiving station no more than two days after collection, when they are still heavy and green in order for farmers to sell at the maximum weight. Depending on the distance from the receiving station and the quantities of nutmegs involved, deliveries may be made once or twice weekly. While it appears that logistics costs for small nutmeg farmers are lower overall than for large farmers who must hire workers and transport, small nutmeg farmers bear a hidden “time burden” logistics cost which is 13% of the producer price<sup>10</sup>.



**Box 5.** A 62.5 kg jute bag used for both nutmeg and cocoa exportation.

Once at the receiving station, nutmegs are manually inspected (to weed out broken, discolored or rotten seeds), weighed and recorded in the farmer and station notebooks. Subsequently, nutmegs are dried on drying beds for a period of 4-8 weeks (depending on the season) and are stirred manually twice a day. Thereafter, the nutmegs are transported by truck to a processing station for cracking, sorting and bagging. After additional careful quality control (a sample of seeds is inspected for moisture, degree of oiliness and intensity of the aromatic smell), nutmegs are packed into jute bags, which each hold 62.5 kilos. These bags are transported to the port (it takes approximately 1 hour) by GCNA trucks for loading into 20 or 40-foot containers. Twenty-foot containers have a capacity for 200-240 bags, while 40 foot containers can fit up to 400 bags.

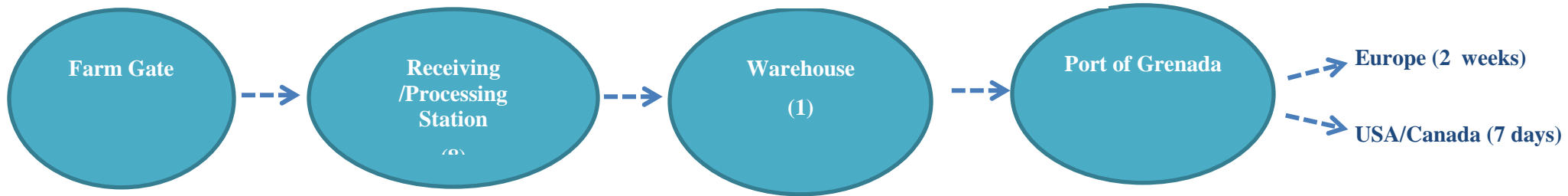
At the end of the year's operation the nutmeg farmer is paid a bonus (or surplus) representing the difference between the advance rate and the net realized prices of nutmeg and mace obtained in the year's trading by GCNA.

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<sup>9</sup> Mace is a spice made from the waxy red covering that surrounds the nutmeg seed. Apart from its culinary uses, mace is used in both the pharmaceutical and cosmetics industries. During harvesting, this covering is removed manually from the nutmeg seed and dried naturally under the sun until it becomes brittle. The mace is then sold at the receiving station for grading and packaging. Twenty pounds of nutmeg yields approximately 1 pound of mace. (Grenada Nutmeg Sector Development Strategy 2010-2015 and interview with GCNA).

<sup>10</sup> This cost was calculated using a minimum wage of EC\$5.00 per hour for agricultural workers (<http://www.minimum-wage.org/international/en/Grenada>) for a 3 hour roundtrip (by bus) transport of 30 pounds of green nutmeg from farm gate to receiving station. Although mace is typically also transported with nutmeg, cost calculations have been done only for nutmeg.

Figure 6. Mapping the Cocoa Supply Chain



**Actor:** Farmer  
**Activity:** Harvesting  
 Transporting  
**Time:** 2 weeks

**Actor:** GCA/Agent  
**Activity:** Payments  
 Fermenting  
 Drying  
 Inspection  
 Transporting  
**Time:** 4-6 weeks

**Actor:** GCA  
**Activity:** Sorting  
 Bagging  
 Holding  
 Transporting  
**Time:** 2-4 weeks

**Actor:** GCA  
 Port Authority  
 Customs  
 Shipper  
**Activity:** Transporting  
 Processing documentation  
 Clearing documentation  
 Loading/Sealing Container  
 Loading Ship  
**Time:** 2-3 days



Cocoa growing season is year-round, although the peak production period is from September to May. Cocoa pods, each yielding between 20 and 50 beans per pod, are harvested when red and yellow in color. Cocoa farmers fill plastic bags or tubs, each holding between 40 to 70



**Box 7.** Drying platforms for cocoa beans at the GCA's Carlton St. Andrew's receiving station.

pounds of beans, with their cocoa pods and transport them to one of the GCA's receiving/processing stations. Once at the

receiving/processing station, cocoa beans are poured into "sweat boxes" (untreated wood boxes), and insulated with banana leaves,

where they undergo a fermentation process for a period of 7 days.

The layer of pulp that naturally surrounds the beans heats up and ferments them, producing the chocolate flavor. The beans are turned manually 3 times during this 7 day period. Once fermentation is complete, the beans are put into bags and transferred to drying

patios for approximately 7-9 days. When the beans are dry, they are carefully inspected (for moisture levels and aromatic smell), packed in jute bags (typical weight is 137.5 pounds per bag) and trucked to the GCA's central storage warehouse, located about 12 miles from the port.

Both products arrive at the port and are loaded by port workers directly into containers for maritime shipment. Containers are fumigated and bags are packed between layers of craft paper to absorb humidity and minimize potential damage from condensation and mold.

There are only two maritime shipping companies that transport these goods: one that handles shipments to the United States and another that handles shipments to Europe, entering through one of three Dutch ports: Rotterdam, Antwerp or Amsterdam. The duration of travel for shipments to the United States is between 5 and 7 days, passing through the port of Martinique before arriving at the port of Miami, with a total service cost estimated at around \$3,100 for a 40' container. Due to the established routes and greater overall cargo volumes, maritime transport service to Europe is less expensive at around \$2,800 per container and take about 2 weeks.

## Logistics Costs by Segment

As is common for well-established supply chains of traditional exports, overall logistics costs (excluding cargo insurance), at \$0.23 per kg for cocoa and \$0.59 per kg for nutmeg, are reasonable relative to comparable supply chains and represent less than 10% of product value for both products. Existing constraints in the logistics chain often have not been addressed because they require actions or investments that are beyond the control or capacity of stakeholders. Still, should Grenada wish to expand exportation of these two products, or diversify agricultural exportation further into perishable fruits, such as soursop, existing challenges in these supply chains indicate key issues that must be addressed to build competitiveness in the future.



**Box 6.** Cocoa beans fermenting in a sweat box at the GCA's Carlton St. Andrew's receiving/processing station.

Figure 7. Logistics Costs by Type, Nutmeg & Cocoa

Logistics Costs per kg by Type				
	Nutmeg		Cocoa	
Ground Transport	\$	0.29	\$	0.05
Maritime Transport	\$	0.21	\$	0.11
Aflatoxin Testing	\$	0.03		
Packaging & Handling	\$	0.06	\$	0.06
Insurance	\$	0.18	\$	0.03
Total (w/o insurance)	\$	0.59	\$	0.23
Total	\$	0.66	\$	0.25
F.O.B. Price	\$	17.97	\$	3.24
Logistics as a % of Final Price		3%		7%

Reasonable overall logistics cost values obscure important peculiarities of these two supply chains. Domestic ground transport<sup>11</sup> is relatively expensive considering the distances traveled, as are loading and packaging costs and maritime freight rates to Miami. In the aggregate, these high cost components are offset by low terminal handling charges at St. George's Port, as well as the absence of sophisticated testing prior to arrival in Europe. While Grenada's terminal handling charges are some of the highest in the Caribbean for manufactured imports and exports (Doing Business, 2013), special exemptions for agricultural exports, designed to promote both of these key industries, keep these fees uniquely low or nonexistent.

As for quality and food safety testing, even without sophisticated laboratory infrastructure and services, European buyers report confidence in the consistent quality of Grenada's nutmeg & cocoa based on years of successful trade relationships, as well as the fulfillment of additional testing requirements for European standards at the port of destination<sup>12</sup>. For nutmeg exports to the United States, aflatoxin testing is required; samples are sent to Long Island, NY for an additional cost of \$496 per shipment.

Constraints to innovation in these supply chains are more likely related to the overall industry environment than poor connectivity. Both industries are characterized by an aging farmer population and long-standing, exclusive control of exportation by associations closely linked to the public sector. These characteristics shape the organization of the supply chain, limiting competition and the drive for innovation that typically serve as the impetus for improvements to logistics efficiency.

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<sup>11</sup> Domestic ground transport costs for nutmeg include the cost of round-trip bus fare (\$5EC) to the receiving station as well as a time burden calculated for small nutmeg producers holding between .5 to 2 acres of land. The time burden was estimated by multiplying total transit time by the Grenadian minimum wage of \$5EC per hour. These cost estimates, when shown as a proportion of the price of nutmeg, seem misleadingly high. Necessarily omitted from these calculations are the earnings from high-value mace, which is transported simultaneously with the nutmeg, meaning higher earnings per trip, making the bus fare and transit time more 'worthwhile'.

<sup>12</sup> This is not the case for exports to the U.S., which require aflatoxin testing for nutmeg prior to exportation. The GCNA sends samples to a lab in Long Island for an additional cost of near \$500 per lot or US\$0.03/kg. Though high, this cost is not significant as a proportion of the value of a shipment.



## Overview

For cocoa exports, this LCA covers the exportation of 25 tons of cocoa beans from Grenada to the Netherlands for further distribution within Europe. Cocoa beans are transported within a 40 ft. container in 400 jute bags weighing 62.5 kg each. For nutmeg, the SCA covers a shipment to Miami of 15 tons in a 20 ft. container, in 240 jute bags also each weighing 62.5 kg each<sup>13</sup>.

Grenada has taken very positive steps to enhance their trade environment through the electronic ASYCUDA system. There is room for further improvement in key areas of agro-logistics that may be necessary to keep costs reasonable and maintain product quality should export volumes grow. Key challenges should also be addressed in order to enable the growth and development of less traditional agricultural export markets, such as soursop or other tropical fruits.

Based on this analysis, aspects of the logistics chain that could be improved include:

- Domestic transport (Cocoa & Nutmeg)
- Handling practices (Cocoa & Nutmeg)
  - Open-air Storage Facilities
  - Container Stuffing at the Port
  - Temperature & Humidity Control in Shipping
- Laboratory testing for product quality (Cocoa & other products)

### *Domestic Transport Services (Cocoa & Nutmeg)*

#### *High Transport Costs for the GCA*

High costs for ground transport are predominantly a concern for the GCA, which handles two primary transport segments along the chain: from 1 of 8 buying stations to the central warehouse; and from the warehouse to the port. In addition to these transport costs, the GCA also covers costs for packaging and port loading – in total, 47% of all logistics costs associated with this supply chain.

Ground transport services are indeed expensive in Grenada. The price per ton/km on the transport segment from the primary cocoa warehouse to St. George's Port is \$0.76, as compared to \$0.11 in the United States and Canada<sup>14</sup>. The market for transport services is competitive, with several private individual owners of flat-bed trucks engaged in constant price negotiations with exporters. Elevated costs can be attributed primarily to the high cost of diesel fuel (\$5.79 per gallon in early June 2013), as well as truck bed cleaning required prior to transport service, which, though not an explicit component of the service charge, is built into the price negotiated by transporters. Additional factors include geographical features that keep average speeds down and time spent for loading and unloading, which is a more significant component of overall transport service fees considering the short distances.

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<sup>13</sup> Europe is the primary destination for both nutmeg and cocoa exports. However, the U.S. was chosen as the final destination for the nutmeg logistics chain in order to show how maritime shipment costs are higher though the distance to Miami is shorter. Also, quoted maritime freight rates for a 20' container to the Netherlands, at \$2899, were higher than those for a 40' (average of \$2,794). Also, the aflatoxin testing required by the U.S. market (but not for Europe) is an example of the increased stringency to which exporters will need to adapt in coming years, in order to stay competitive. Cost structures for both products for a 20' container to Europe are included in Annex III.

<sup>14</sup> Calculations based on land supply chain data from the World Bank's Logistics Performance Index for 2012.

Though a concern for the GCA, domestic transport costs are presently not a significant cost for cocoa farmers. From the farm gate to the buying station, cocoa farmers pay only about \$19 to transport 400 kg an estimated distance of no more than a mile – equal to about 4% of the producer price received for wet cocoa beans. Since harvest schedules and therefore transport volumes are more predictable for cocoa than for nutmeg, farmers can plan ahead and rent services to transport up to 410 kilos per truck. Product loss, rather than being associated with transport, is associated with poor harvest practices.

**Recommendation**

For the cocoa chain, the GCA could minimize its transport costs by increasing the incentives for farmers to dry their own beans and bring them directly to the GCA’s central warehouse, cutting one transport segment from the exporter’s overall logistics costs and reducing their ground transport expenses by 37%. However, diversity in drying practices and performance could lead to inconsistency in the high quality of the Grenadian cocoa, a hallmark of the product. A pilot program, involving technical assistance to farmers on proper drying practices, would be a helpful way to discern whether this alteration of the traditional chain structure could lower logistics costs without sacrificing quality.

At the present time, private agents operating in the buying stations purchase, ferment and dry the cocoa, sometimes using the GCA’s own drying facilities at the central warehouse. These agents receive a price of \$1.54 per pound, which is \$0.16 greater than the equivalence price for dry cocoa. By contrast, farmers that deliver dry beans to GCA receive a price that is only \$0.04 greater than the equivalence price per pound – a quarter of the increase that private agents receive (see Figure 8). The GCA could reduce or eliminate the gap between the producer and agent prices for dry beans, offer farmers a stronger price incentive to deliver dry beans, and save on transport when individual farmers bring dry beans directly to the central warehouse.

Figure 8. Cocoa Prices per pound

EC	US	Cocoa Beans, prices per pound (June 2013)
\$1.50	\$0.55	Producer Price, wet cocoa beans
\$3.75	\$1.38	Equivalence price for dry (cocoa loses 60% of weight in drying)
\$3.85	\$1.42	Producer Price for dry cocoa
\$4.18	\$1.54	Agent Price for dry cocoa
\$2.84	\$1.05	Estimated current world market price
\$4.00	\$1.47	F.O.B. Price per lb for GRENADA cocoa (price premium included)
<i>Source: GCA &amp; Grenada Trade Portal</i>		

An increased financial incentive for farmers to dry their own beans would increase rural incomes through a higher producer price, as well as increase opportunities for private industry newcomers, including much-needed younger stakeholders, to start new markets for a wider range of higher value-added products, including chocolate bars, oils and health and beauty products.

Potential risks include the failure of elderly farmers to adapt and make the necessary on-farm investments and improvements needed in order to take advantage of an increased price incentive. In interviews, farmers appeared resistant to new buyers, fearing instability and the risks of change. The GCA would lose its traditional control over the supply chain; fermenting and drying infrastructure at the central warehouse may then be underutilized.

With this proposed restructuring of the chain, there is also a risk that cocoa farmers would face higher transport costs, due to lower volumes and potentially less negotiating power with

transporters. Still, the GCA could help farmers to coordinate these services and help to keep prices low. Also, even if transport costs for the first two segments along the chain were to double, they would still account for only 5% of the present producer price for dry beans.

### *Handling Practices & Container Stuffing at the Port*

Handling practices in storage, loading and shipping along both the nutmeg and cocoa supply chains presently leave these products exposed to risk of contamination from the introduction of filth and mold growth, resulting in the development of aflatoxins. Present handling, storage, loading and transport methods may be adequate for present volumes and market demands, but inadequate to meet the demands of more stringent requirements from new buyers and in future markets.

#### *Storage Facilities*

For both nutmeg and cocoa chains, aging processing and storage facilities increase operating costs and the future likelihood of damage during shipment. During Grenada's rainy season, the weather fluctuates often with short bursts of rain which keep GCA's workers watching the weather, ready to cover beans in the solar drying patios and protect them from exposure to moisture. The open-air storage facility, where beans may be stored for up to 30 days, experiences frequent changes in humidity levels that may endanger the quality of beans upon arrival in Europe. Facilities are also open-air for nutmeg, which may be stored for up to 15 weeks prior to loading and shipment.

The GCA does presently perform the required quality testing on the beans, both prior to purchase (for dried beans) and prior to shipment, while also sending samples to buyers for future shipments. Still, if export quantities are to expand and the GCA would like to reach new markets, more stringent regulation of moisture levels, as well as updates to these facilities will be required to maintain the country's reputation for cocoa excellence.

#### *Container Stuffing at the Port*

Shipments of nutmeg and cocoa are presently transported on flat-bed trucks to the port, where they are then loaded into containers by employees of the port authority for a per bag charge of \$1.52. Port loading, at an estimated \$0.03/kg, is more expensive for the GCA, which must cover expenses for fumigation and craft paper. Though the GCNA pays for the same chemicals and paper, the scale of their market allows them to import purchases in bulk; the last shipment of both products was received in 2011.

Stuffing at the port also introduces greater risk of product contamination in several ways. First, as the product travels to the port outside the container, it may be exposed to excessive heat or rain. Even when covered by a water-proof tarp, jute bags may still take on extra moisture during this transport segment, and during loading. Second, if port workers are not properly dressed to handle goods, they may introduce filth into the shipment from their clothes or shoes. Third, while both exporters can measure humidity levels of the cargo prior at the warehouse, they cannot control temperature and humidity levels present in the container during loading, or while the container waits for loading onto the vessel. Though port loading is coordinated with vessel schedules, containers may wait up to 2 days on the dock for loading; if container loading is coordinated with weekend arrivals and departures, additional fees are incurred for worker overtime.

Though not ideal, container loading at the port continues in part due to custom, but also due to the market for domestic ground transport: roads are good, but geography makes transporting large cargo difficult; warehouses aren't properly equipped to store and handle containers; most transporters have flatbed, rather than container trucks, and therefore, container transport rates may be higher.

Shippers have suggested that containers be stored at exporters' warehouses for loading there, but this does not appear to be a practical or cost-efficient solution for either the GCNA or the GCA. If the GCNA loaded containers at their warehouse, they would no longer be able to use their own trucks to move shipments to the port. Instead, the exporter would need to hire additional domestic transport services capable of carrying a container, which could be more expensive than the container stuffing fees at the port. Though the GCA does not own its own trucks, the difference in price to hire a container truck, as opposed to a flatbed truck, may also be equal or greater than the cost of stuffing fees. Also, the movement and handling of containers at the warehouse may require the additional purchase of expensive equipment (e.g., cranes or container handling units) for both exporters.

### *Shipping conditions*

For both nutmeg and cocoa, shippers must abide by temperature and humidity parameters in order to mitigate mold buildup or moisture damage. Though the shipper is technically responsible for shipping conditions, the exporters may provide oversight of the loading process to ensure optimum condition and minimize losses.

The quality and quantity of cocoa beans shipments may be compromised due to either sweat damage or vapor damage. Sweat damage typically results when the moisture content of the beans is near or above 8%, and the beans release water during shipment; condensation forms on the top of the container and drips onto improperly covered bags, which can then develop patches of white mold. Vapor damage tends to have a more general effect on the shipment and results from excessive relative humidity within the hold or container. Extreme temperature changes, particularly in shipments from the tropics to Europe, also create conditions for water release and condensation build up. Extended periods in temperatures exceeding 20<sup>0</sup>C also create conditions for moisture release and self-fermentation of the high-fat cocoa beans. For this reason, it is recommended that containers shipping cocoa beans have a moisture content of below 6% at the moment of loading.

Though nutmeg is less sensitive than cocoa, care should be taken to stow cargo away from direct exposure to the tropical sun, which can heat up the cargo and cause the nutmegs to release essential oils.

### *Recommendations*

At the present time, poor handling practices may be adding logistics costs for the exporter, but do not appear to lead to substantial product loss. European buyers report few recent incidents of product loss related to contamination. For cocoa, even a reduced-quality product can be sold to one of a range of buyers; if not, cargo insurance covers some types of losses related to contamination during shipping. In the future however, weaknesses in handling and shipping practices may complicate the expansion of both industries as new buyers without a tradition of trade may be less accommodating, and new markets may have more product quality and safety requirements. With little competition in the shipping market – a condition unlikely to change - exporters must rely completely on the quality of service offered, and have little or no bargaining power to insist on the adoption of new methods to protect cargo during shipment.



In the short term, exporters should continue coordination of container loading with shipping times, with additional care taken to measure the temperature and humidity of containers in the moment of loading.

In order for Grenada to become a competitive exporter of agricultural products, investments will need to be made in the following areas: (1) improvements to existing storage facilities, including temperature and humidity control technology for warehouses; and (2) equipment for the easy movement of containers both within and beyond the port, as well as improvements to the technical skill level of port workers.

As part of a strategic plan to increase agricultural exports, the practice of loading containers at the port must be phased-out through investments in the infrastructure, equipment and services necessary for exporters to load and unload products at their own warehouses. Warehouse and distribution centers for perishable products like tropical fruits should be located strategically close to the port, with accompanying consideration of the required equipment and transport services (i.e. trucks and container handling units).

Figure 9. Cocoa Logistics Cost Structure

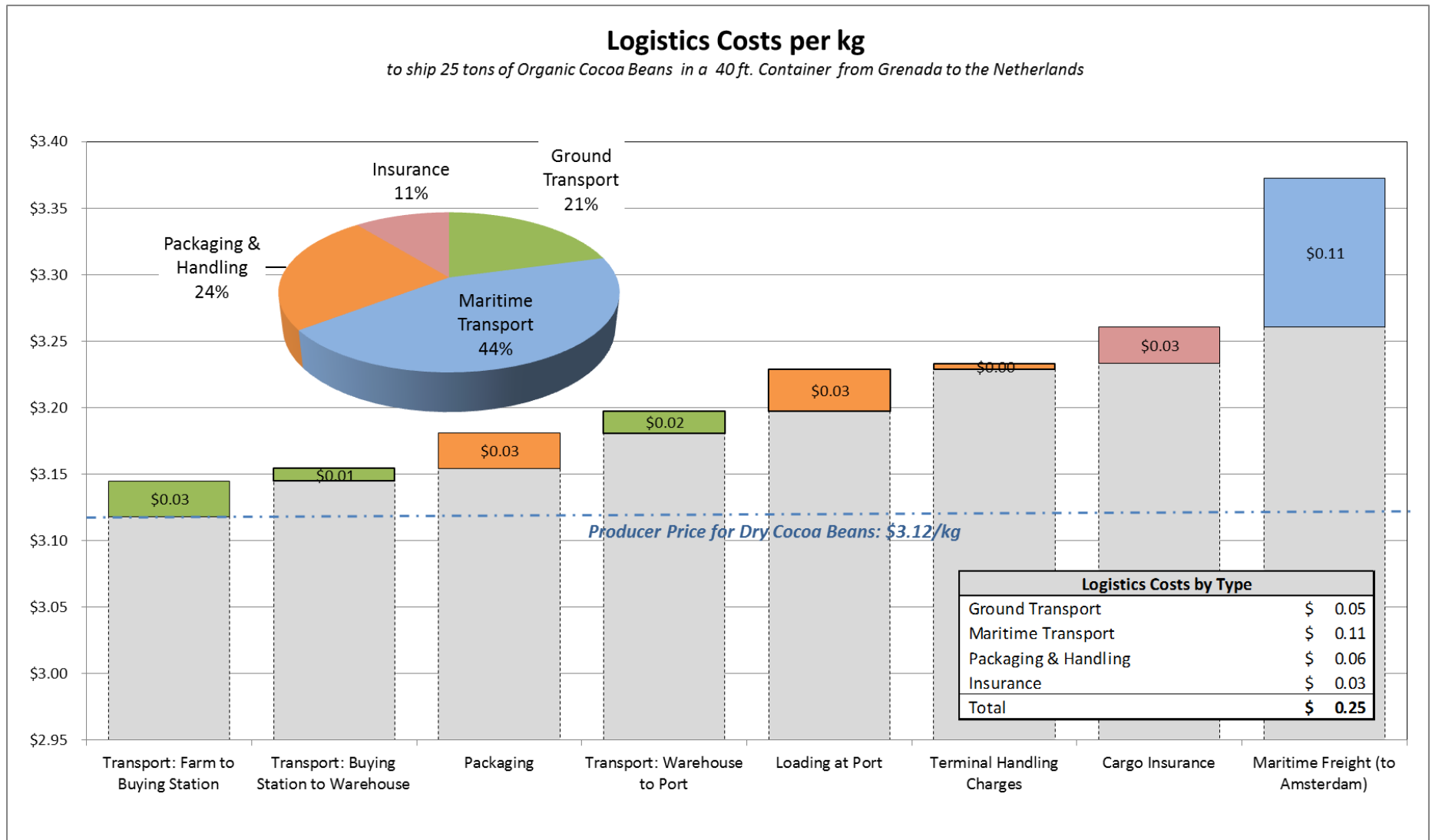
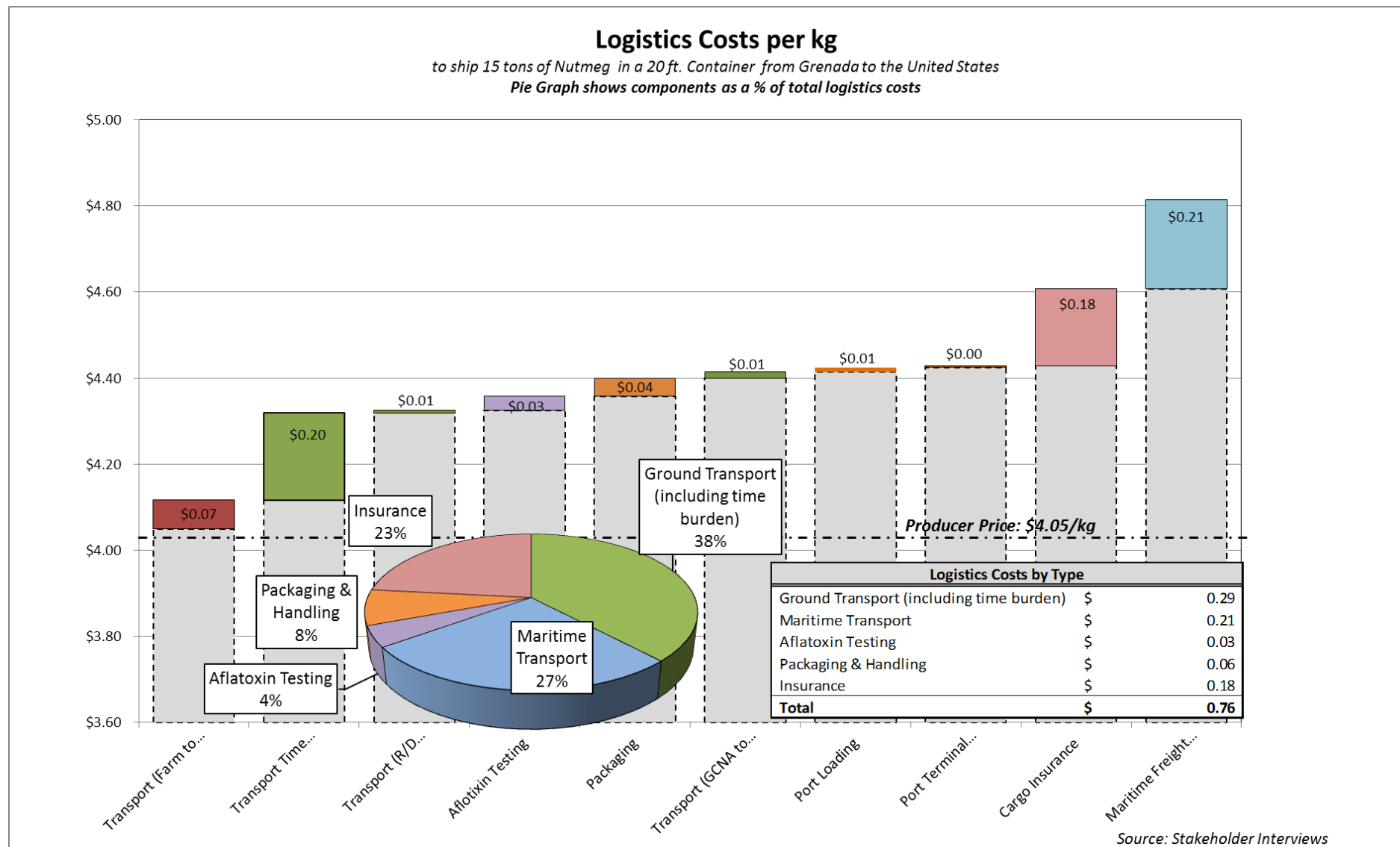


Figure 10. Nutmeg Logistics Cost Structure



## Conclusions

Principal findings for the logistics chains for nutmeg and cocoa exports from Grenada include the following:

Achievements:

- Logistics costs for both cocoa and nutmeg exports from Grenada are reasonable (less than 10% of the F.O.B. value of goods) at \$0.23 and \$0.59 respectively, excluding insurance.
- Special exemptions for agricultural products keep export terminal handling charges low.
- Grenada's trade environment has been enhanced through the implementation of the electronic ASYCUDA system.

Challenges:

- Industry structures with only one exporter and one principal buyer limit the scope for improvement and innovation.
- Relative to overall logistics costs, ground transport and container stuffing costs are high.
- Small nutmeg farmers perform arduous manual labor (time burden) instead of facing high logistics costs to transport their products to market.
- Open-air storage and container stuffing at the port increases the risk of humidity and mold damage.
- Shipment cost per distance traveled is much higher for products sent to Miami than those sent to the Netherlands. For Miami, the cost per km is \$1.25 versus \$0.38 per km for shipments to the Netherlands.
- Coordination among the various authorities at the Port's One Stop Service facility needs improvement and the ASYCUDA system can be further enhanced to streamline payments.
- Although stakeholders do communicate regularly, there is no formal channel of communication arranged to voice grievances and address challenges across the entire supply chain.

## Suggestions for Further Work

### *Expand Analysis to the Value Chain*

For both cocoa and nutmeg, this study found that enhancements to the market structure and institutional management would create the context in which to improve export competitiveness for these two products. In other words, the identified constraints are the product of weaknesses in the overall value chain, as opposed to just the supply chain (covering only product movement with a focus on logistics). Further research should look into how other factors, such as institutional management or labor policy, may be affecting the growth of these sectors.

Additional research should be done to identify promising strategies to engage a younger group of Grenadian entrepreneurs in nutmeg and cocoa production and incentivize the development of new business with growth potential. Existing market conditions do not favor innovation. Growth and expansion is possible in both industries if a greater number of exporters compete for a more diverse group of buyers, beyond traditional export markets. A context of heightened competition would also motivate exporters to confront the risks of introducing new, value added nutmeg- and cocoa-based products.

### *Expand Analysis to Perishable Products*

Grenada's potential to grow as an agricultural exporter lies beyond these two traditional exports in diversification to a wider range of high quality products, including tropical fruits and animal products (fish). In order to identify the steps necessary to harness this potential, LCAs must consider aspects of logistics that lie beyond these two high value, dry goods, particularly the cold chain and food safety systems. The cold chain, which refers to the seamless network of temperature-controlled storage and transport infrastructure and services, was beyond the scope of this analysis. A strong food safety system for perishable goods requires laboratories that offer a range of microbiological and chemical tests which are unnecessary for dry goods, and therefore also beyond the scope of this study. Additionally, time to export as well as storage and handling conditions have a disproportionately powerful effect on the quality and levels of product loss for perishable goods. An agriculture export promotion strategy for Grenada should include further diagnostic work to assess the country's cold chain, and identify public and private investments to strengthen the sector, minimize losses and ensure quality for greater volumes and varieties of exports.

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## Annex I. Production & Export Tables: Nutmeg & Cocoa

### NUTMEG

Tables (from the 2010-2011 Annual Agriculture Review – Grenada)

Nutmeg Subsector Performance Indicators	2010	2011
Nutmeg and Mace Exports as a % of Agricultural Export	33.4	35
Nutmeg and Mace Exports as a % of Total Exports	10	12
Nutmeg and Mace Exports % Contribution to Agriculture GDP	15.4	15

Year	Production of Green Nutmeg in lbs.
2003	12,935,274
2004	12,868,633
2005	3,545,091
2006	998,156
2007	1,197,241
2008	1,392,666
2009	1,573,944
2010	1,423,502
2011	1,808,467

Year	Nutmeg Export Value (EC\$) – Million	Nutmeg Export Quantity in lbs.
2003	39.5	5,208,924
2004	26.1	4,169,382
2005	29.5	4,232,615
2006	8.2	1,474,571
2007	8.9	1,792,010
2008	5.5	707,029
2009	6.3	662,405
2010	9.6	1,015,881
2011	9.8	724,577

Year	Number of Nutmeg Farmers Supplying the GCNA
2003	8,675
2004	8,670
2005	1,500
2006	1,650
2007	1,700
2008	1,750
2009	1,700
2010	1,800
2011	2,485

	2009	2010	2011	2013
<b>Price Paid Per Pound of Nutmeg</b>	EC\$ 2.00	EC\$ 2.50	EC\$ 4.00	EC\$ 5.00

## COCOA

### Tables (from the 2010-2011 Annual Agriculture Review – Grenada)

<b>Cocoa Subsector Performance Indicators</b>	<b>2010</b>	<b>2011</b>
Cocoa Contribution to Total Agricultural Exports (%)	17.5	18
Cocoa Contribution to Agriculture GDP (%)	4.5	5
Cocoa Proportion of Total Export Earnings (%)	7.5	8.5

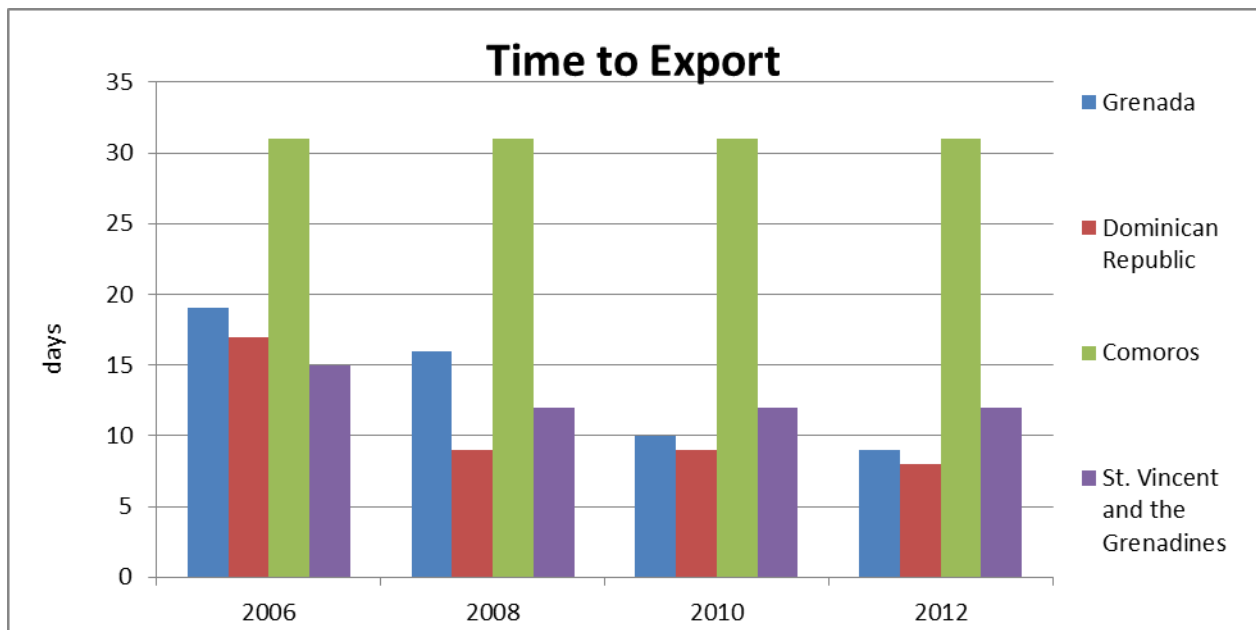
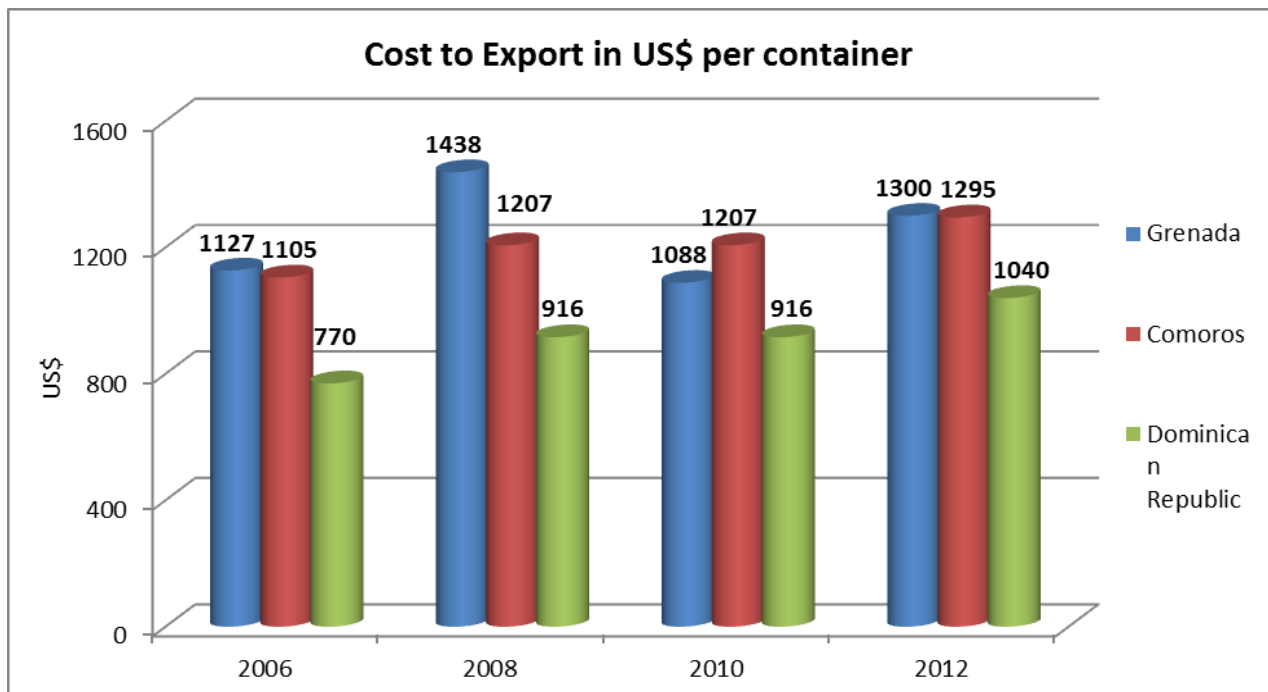
<b>Year</b>	<b>Production of Cocoa in lbs.</b>
2003	1,507,375
2004	1,829,987
2005	111,859
2006	169,724
2007	484,531
2008	783,989
2009	1,016,185
2010	1,052,581
2011	1,500,798

<b>Year</b>	<b>Cocoa Export Value (EC\$)</b>
2003	3,933,682
2004	5,504,532
2005	197,408
2006	748,180
2007	2,346,770
2008	3,697,703
2009	4,133,674
2010	5,155,964
2011	6,520,974

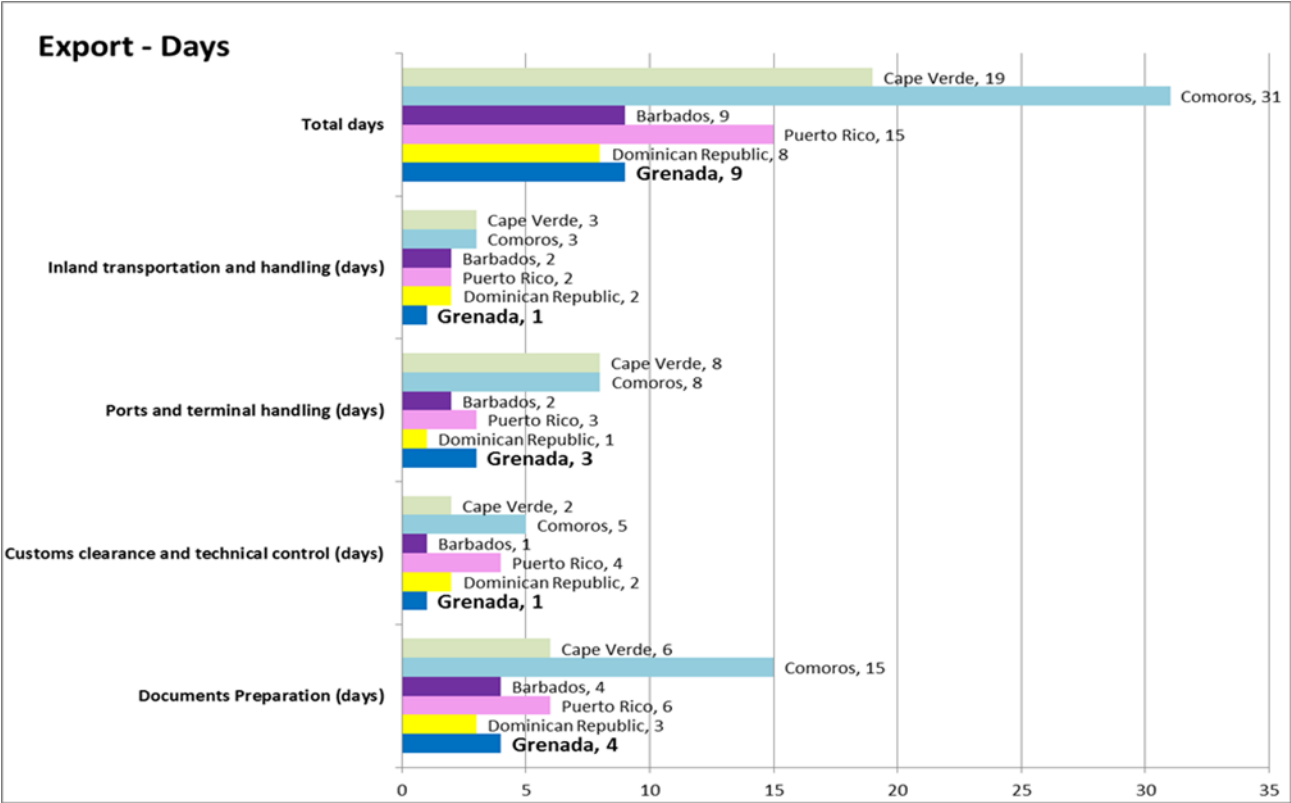
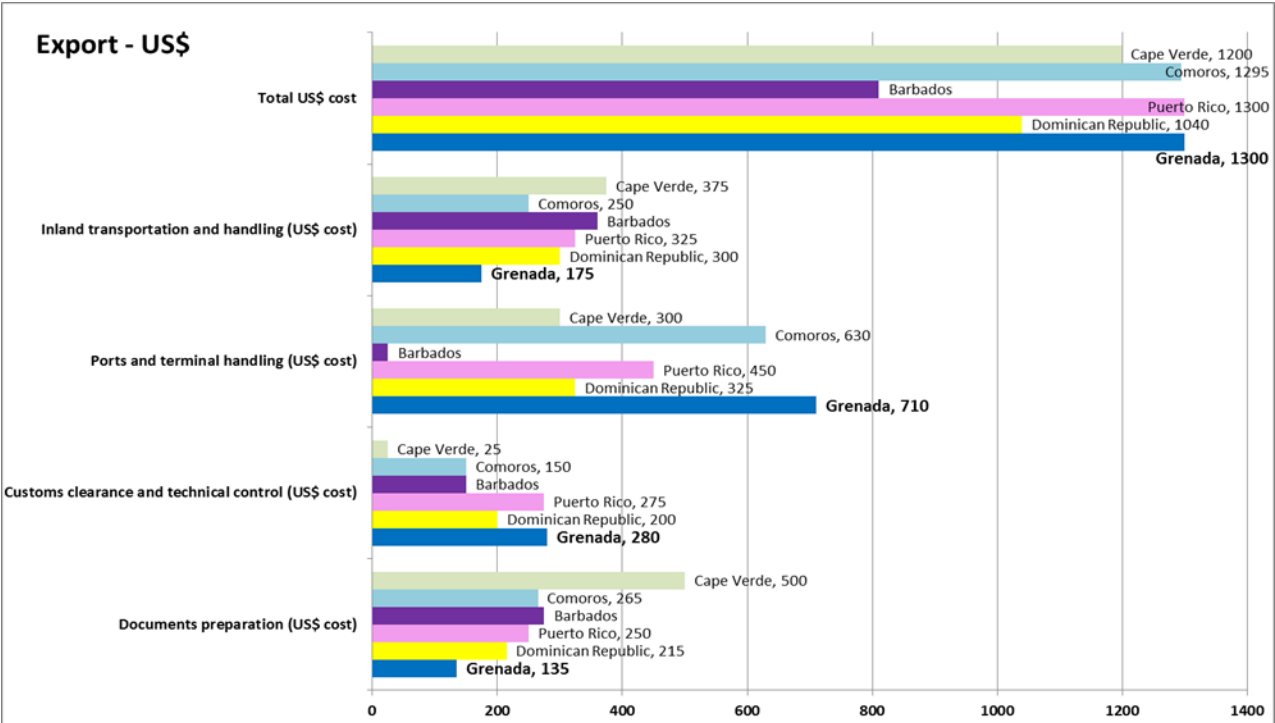
<b>Year</b>	<b>Number of Cocoa Farmers Supplying the GCA</b>
2003	7,000
2004	6,000
2005	1,100
2006	1,100
2007	2,000
2008	2,500
2009	3,000
2010	3,030
2011	3,200



## Annex II. Cost & Time to Export: Grenada in Comparison



Source for charts: WDI



Sources for charts: WDI and World Bank Doing Business 2013.

### Annex III. Comparable Cost Structures for 20' Containers to Netherlands

Cost Structures for a 20' Container to the Netherlands			
<i>cost per kilogram</i>			
		Nutmeg	Cocoa
Ground Transport: 1st Segment (From the Farm...)	\$	0.07	\$ 0.03
Time Burden	\$	0.20	
Packaging	\$	0.04	\$ 0.03
Ground Transport: 2nd Segment (...to Port)	\$	0.01	\$ 0.02
Port Loading	\$	0.01	\$ 0.02
Port Terminal Handling Charges	\$	0.00	\$ 0.00
Cargo Insurance	\$	0.18	\$ 0.03
Maritime Freight (to Netherlands)	\$	0.19	\$ 0.23
<b>Total Logistics (excluding insurance)</b>	<b>\$</b>	<b>0.59</b>	<b>\$ 0.33</b>
F.O.B. price per kg	\$	17.82	\$ 3.24

