

OECS Cocoa Value Chain Report



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Organisation of
Eastern Caribbean States



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ACRONYMS

BPD	Black Pod disease
CRM	Cocoa Related Matter
CRTSC	Cocoa Resource Technical Support Centre
DEXIA	Dominica Export Import Agency
EU	European Union
FAO	Food and Agriculture Organization
FFA	Free Fatty Acid
FFC	Fine Flavoured cocoa
FPR	Frosty Pod Rot
ft	Feet
GCA	Grenada Cocoa Association
ICCO	International Cocoa Organization
lbs	Pounds
MN	Million
NPK	Nitrogen Phosphate Potash
OECS	Organization of Eastern Caribbean States
QMS	Quality Management Systems
SME	Small and Medium Enterprises
SVCC	Saint Vincent Cocoa Company
USD	United States Dollar
WBD	Witches' Broom Disease
XCD	Eastern Caribbean Dollar

Executive Summary

DEVELOPING AN INTEGRATED OECS COCOA INDUSTRY

A. RATIONALE & CONTEXT

1. Value Chain Analysis of the OECS Cocoa Industry

This Study on the conduct of a value chain analysis of the OECS cocoa industry examined all activities in the chain from production to marketing; domestic, regional and extra-regional. The analysis is based on the conduct of face-to-face interviews of value chain actors in each of the OECS Member States as well as marketeers in the overseas markets. The main cocoa producers in the OECS were Dominica, Grenada, Saint Lucia and Saint Vincent and the Grenadines with the latter having a only a few growers characterized by a relatively young tree population. The value-added operations of the industry are largely underdeveloped with the few processors being mainly cottage scale. Commercial processors of chocolates and cocoa-based products are few.

2. Rationale for Development of an OECS Cocoa Industry

Sections 8, 9 and 10 presented the marketing report on the OECS Cocoa Industry – Section 8 focussing on wet and dry cocoa beans, Section 9 on marketing of processed products focusing on the characterization of the international market and Section 10 outlining a Marketing Strategy for the industry. Based on the strong and growing global demand for cocoa-based products, especially products based on fine and flavoured cocoa beans, we are of the view that cocoa production provides an attractive future. However, the opportunity is mainly in the chocolate and cocoa-based products market rather than the beans. While the global market for chocolates and cocoa-based products continue to grow, it is dominated by the larger established and branded manufacturers. Entry into this market entails significant promotional and marketing costs. On the other hand, the OECS tourism industry offers a potentially lucrative market for small scale manufacturers of these products of focus.

Based on the foregoing, we are of the view that there is a potentially attractive opportunity for a domestic cocoa industry in the OECS. It offers an opportunity to fill the void with respect to income, employment and economic contribution resulting from the decline in bananas. However, the industry is still relatively small and underdeveloped with a concentration on cocoa farming. Exploiting the potential opportunities offered by cocoa requires the development of an integrated cocoa growing – processing – marketing industry involving the development of all components of the value chain. Exploiting the industry potential requires a change in the value proposition with a focus on marketing of chocolates and cocoa-based products rather than beans.

3. Recommendation: Development of an Integrated Cocoa Industry

Above we have identified some of the main strengths of the OECS cocoa industry that could support sustainability and profitability. However, there are many issues that would need to be addressed to exploit these opportunities. Developing a viable and profitable cocoa industry is a long-term proposition requiring long-term commitment on the part of all actors – growers, processors, marketeers and governments. It calls for a holistic vision of the development needs of all aspects of the industry's value chain. In this regard, Member States would need to develop an attractive promotional programme and a package of support measures to

attract investments in the cocoa value chain including Cocoa farming, Processing and Marketing of high-end cocoa-based products.

We now outline some of the critical development support needs in growing and establishing a viable industry.

B. FARM-LEVEL DEVELOPMENT SUPPORT

At the farming level critical industry support includes the following:

1. Provision / access to suitable lands for expansion of production.
2. Building the capacity of a cadre of Specialist Master Trainers who would build the capacity of growers in the following areas:
 - i. Modern field layout and architecture for optimization of sunlight, transportation corridors for access of machinery, equipment, transport vehicles and accommodating field tours.
 - ii. Establishment of a 1-acre experiential learning plot in Lead (Hub) Farmers holding to facilitate satellite producers teaching and learning of precision cocoa-farming practices in:
 - a) cocoa agronomy and management,
 - b) pest & disease management,
 - c) tree management / pruning,
 - d) plant nutrition and management,
 - e) irrigation
 - iii. Re-orientation of cocoa from “*bean production*” to “*production of intermediary product for human food*”. This means adoption of best practices in food safety, quality assurance and other contextual characteristics such as environmental ecosystem / crop growth habitat.
 - iv. harvesting and post-harvest (selection, fermentation and drying) of beans to accentuate and promote best quality.
3. The provision / access to critical inputs:
 - i. Fiscal support for investments in production and agro-tourism facilities.
 - ii. Technical support e.g., diagnostic testing, genetic compatibility, pollination strategies, soil sampling for nutrient, heavy metals as well as disease identification.
 - iii. Adequate availability of Select Plant Genetic Material for different geographic agroecological zones.
 - iv. Creation of a comprehensive GIS system for cocoa as a tool for environmental interaction, resource intervention, risk aversion, traceability and marketing.

C. DEVELOPMENT OF THE PROCESSING & MARKETING SEGMENTS OF THE INDUSTRY

In the case of the processing segment of the value chain, this is largely underdeveloped. Promoting the growth and expansion of this segment of the industry is key to capturing the potential benefits of the industry. Critical support measures in encouraging investment in this component of the value chain include:

1. Fiscal incentives for investing in value-added operations including processing beans – wet and dry, manufacture of cocoa-based products.
2. Providing training/capacity building in innovation and entrepreneurship, new product development, processing technology, quality assurance and marketing, to both cottage scale and SME investors, with a focus on producing high-end and novel products including products utilizing unique terroir - island flavours, attributes/distinctive features, origins and development of brands.
3. Technical support in packing, marketing including web-based marketing/ market certification, traceability and quality assurance.
4. Quality Lab testing and certification facility.
5. Development on business investment profiles, training and accommodating field tours.

D. ADDITIONAL POLICY SUPPORT

I. Establishment of a Centralized Cocoa/Chocolate Facility for the OECS Industry:

We recommend the establishment of a **COCOA RESOURCE TECHNICAL SUPPORT CENTRE (CRTSC)** staffed as follow:

- i. A Cocoa Agronomist and Master Trainer
- ii. A Chocolate Maker¹ - differentiate the quality of the beans and origins (terroir and harvest), including Product Quality Assurance / Food Safety.
- iii. Consultant - (when required) Chocolatier and Confectioner

The Centralized facility should also establish and maintain:

- i. a germplasm bank,
- ii. a product development and teaching lab.

II. Technical Programmes – Provision of Key Industry Support

i. Programme to Improve Soil Fertility

A programme of soil improvement is recommended given the declining soil fertility present in the volcanic soils where cocoa is grown. This has resulted from leaching of nutrients, soil loss and sustained crop uptake. Organic systems such as composting, vermiculture, and biofertilizers can be promoted to restore soil organic matter, Cation Exchange Capacity (CEC), health and fertility of cocoa soils.

ii. Establish and Maintain Germplasm and Plant Propagation Support

Good germplasm is key to ensuring the high levels of productivity. The Identification and use of a group of commercial cocoa varieties (made up from ICS, GS, DOM, UF, TSH and other known desirable germplasm) for each island which must be clonally propagated as grafted plants and be made available to farmers. Farmers must be educated on the identification and characteristics of the individual varieties and the best agronomy in growing them to maximise their genetic potential for yield and fine flavour quality. These varieties must be established in clonal gardens for their conservation and utilization. Plant propagation capacity must also be properly developed and managed.

The plant pipeline thus developed will allow for the following:

- Replacement of aged cocoa tree stocks which have exceeded their 30-year economic life.
- Optimise current tree density plantings which are low in most islands (under 700 trees per Ha).
- Expansion of new acreages under cocoa to meet national production targets.

iii. Establishment of a Quality Management Systems (QMS)

The Development of QMS in the OECS cocoa industry is recommended with the main purpose to extract full value from *Bean to Bar*, quality assurance, product differentiation, traceability, flavour profiling. Infrastructure,

¹ This is the professional responsible for the production of chocolate from cocoa. It is the person that accompanies the entire process, from the planting of cocoa to the manufacture of chocolate bars. The chocolate maker knows how to differentiate the quality of the grains and origins (terroir and harvest) and needs to be always updated about the innovations.

<<https://www.cordonbleu.edu/news/professions-chocolate/en> >

functional field designs and layout, business management, agrotourism and marketing support with quality labs is key to developing a competitive industry.

iv. Mitigating Risks Management Support

Farmers need to have access to support to cope with the increasing risks associated with cocoa production such as preventing high losses incurred from rodent, parrot and other pests as well as diseases such as Black Pod and Witches' Broom, climate change, extreme weather events, cadmium etc.

v. Facilitating Farmer Economic Sustainability

Given competition within the cocoa value chain, industry growth and sustainability rely on a governance system that enables farmers to receive a commensurate share of the value in the trade and commercialization of cocoa via transparency, ultra-niche marketing, market intelligence, and value addition and retirement savings/investment plan.

vi. Project Implementation

Re-engineering of the OECS Cocoa Industry will require substantial financial, technical and policy support. Thus, we recommend that such a project be driven by a senior government minister (with OECS oversight), given the span of the interventions from primary agriculture, agro-processing, industrial development and cross-sector strategic alliances with other agencies such as Tourism and Bureau of Standards. This initiative will also require specially appointed **Project Management / Implementation Team** for project implementation, sourcing grant / investor financing, monitoring and control.

E. PROPOSED OECS COCOA INDUSTRY DEVELOPMENT MODEL

1. Context

The context for this proposal for an OECS Cocoa industry Development Model is the output from an analysis of the industry's value chain. The main findings of this analysis are as follows:

i. Strengths

- a. Cocoa beans produced in the OECS are fine flavoured which is a choice bean in the manufacturing of Chocolates and cocoa-based products and as such is highly sought after by Chocolatiers in the international market.
- b. The industry in the OECS, although, relatively small, has for a number of years an established cocoa farming segment.
- c. The OECS also has very good enabling agroecological conditions for high cocoa productivity.
- d. A few regional manufacturers who already have established business relationships with Chocolatiers in the foreign markets.

ii. Challenges

- a. The relatively low returns to growers and exporters of beans compared to Chocolate manufacturers.

- b. The high degree of competition from the well-established high-end Chocolatier in the international market.
 - c. Developing chocolates and cocoa-based products that could compete in the global market against the recognized brands.
 - d. Risks associated with climate change, increasing pest and disease incidence and decreasing soil fertility.
- iii. **Opportunities**
 - a. A tourism industry that could provide a good domestic market for chocolates, other manufactured products and tour services.
 - b. Opportunities for exploiting the trends in chocolate manufacture by infusion local /indigenous products that offer complementary flavours.
 - c. Potential for the industry to partially replace the decline in employment and income from banana industry.
 - d. Potential to exploit combined sustainability labelling such as “Sustainability, Volcanic Island, Eco Friendly, and associations such as Organic Certified” to attract better prices in a segmented consumer market.
- iv. **Weaknesses**
 - a. Productivity of cocoa growers in terms of volume beans produced per unit area is below that required for a competitive industry. A number of management factors account for this and needs to be addressed.
 - b. The postharvest / processing segments of the industry with respect to cocoa beans (both wet and dry) remains largely rudimentary and underdeveloped except in the case of a few operators.
 - c. The manufacturing segment of the industry (chocolates and cocoa-based products) segment of the industry is also underdeveloped except for a few operators.

2. Purpose of the Proposed Model

The proposed Model for the development of an OECS Cocoa Industry is to provide critical development support to the industry within Member States of the OECS by centralizing the technical support necessary from a Centralized Facility so as to achieve economies of scale in the provision of technical support that is comprehensive, covering all development needs of various operations of an integrated cocoa production – processing – manufacturing industry. It also allows for the recruitment of well qualified and competent technical staff to provide the necessary support.

3. Project Proposal

Table 15.1 below provides details on the Proposed Project Development Strategy for the Industry. It is structured into four (4) Development Component comprising 6 Development Phases and a number of specific activities. The development of the industry is assumed to require six (6) years; thus, activities have been scheduled in logical development sequence over a 6- year period (refer to Gantt Chart 15.1 below).

4. The Proposed Development Model

We are proposing the implementation of development activities of the OECS cocoa industry over a duration of 6 years. The programme entails all business aspects of the industry’s value chain. At the end, we expect a profitable and viable cocoa industry. Post-implementation, the role of the *Centralized Cocoa Technical Resource Facility* would be to continue providing technical support to the industry, ensuring its continued viability and profitability.

F. PROPOSED OECS COCOA INDUSTRY DEVELOPMENT PROJECT

Table 15.1: Proposed OECS Cocoa Industry Development Project

PROJECT COMPONENT	SCHEDULE/ Duration (mths)	Develop ment Phase	Schedule / Duration (mths)	Activity (Mths)
1. Preliminary Start-up Activities	0-6	1	0-6	PROJECT APPROVAL & START UPS 1.2 Policy Review /Project Approval 1.3 Establish OECS COCOA INDUSTRY PROJECT MANAGEMENT / IMPLEMENTATION TEAM (OECS CIPMI) Team 1.4 The OECS CIPMI to Elaborate on Project Design in Consultation with the Industry Stakeholders and the Member States 1.5 OECS to seek Support from Development Agencies for Project Implementation
2. Establish OECS COCOA RESOURCE TECHNICAL SUPPORT CENTRE (CRTSC)	7-36	2	7-12	Establish in house Cocoa Farming Technical Support Capacity in the COCOA RESOURCE TECHNICAL SUPPORT CENTRE (CRTSC) 2.1 Recruit Professional Staff to provide Technical Support to the Cocoa Farming Sector in the OECS a. Cocoa Agronomist b. Cocoa Entomologist 2.2 Establish a Field Lab to support the work of the Professional Staff 2.3 Staff to commence establishing a COCOA GERMPLASM PLOTS – to provide OECS Cocoa Farmers with quality planting material
		3	24 -36	Establish in house Cocoa Processing / Manufacturing Technical Capacity in the CRTSC 3.1 Recruit Professional Staff to provide Technical Support to the Cocoa Processing / Manufacturing Sector in the OECS viz; a. Cocoa Product Development Specialist b. Quality Assurance / Marketing Specialist 3.2 Establish Manufacturing / Product Development Lab (re: Product Development / testing)

Table 15.1: PROPOSED OECS COCOA INDUSTRY DEVELOPMENT PROJECT (cont'd)

PROJECT COMPONENT	SCHEDULE/ Duration (mths)	Develop ment Phase	Schedule / Duration (mths)	Activity (Mths)
3. Cocoa Farming Development Component	13-18	4	13-72	CONDUCT PERIODIC DIAGNOSTIC REVIEW OF COCOA FARMING IN THE OECS Purpose to identify: 4.1 Management Practices & issues impacting on Productivity & Efficiency of the Industry 4.2 Technical Support Needs including: i. Training in Management on Farm Practices ii. Needs for Quality Planting material and Other Inputs iii. Capacity building of Cocoa Extension Personnel in Member States 4.3 Financing Needs for the Development of Cocoa Farming and Industry Expansion 4.3 Identify Sources of Finance for Cocoa Farmers
		5	18-72	PROVIDE TECHNICAL SUPPORT TO THE COCOA FARMING COMPONENT OF THE INDUSTRY. Specifically: 5.1 Development & Deliver Outreach Training Programme for Extension and Other Technical Personnel in the Industry including: a. Cocoa Farming Husbandry b. Post-Harvest Technology

Table 15.1: PROPOSED OECS COCOA INDUSTRY DEVELOPMENT PROJECT (cont'd)

PROJECT COMPONENT	SCHEDULE/ Duration (mths)	Develop ment Phase	Schedule / Duration (mths)	Activity Mths
4. Cocoa Bean Processing & Manufacturing of Value-Added Cocoa Based Products		6	24 - 72	CAPACITY BUILDING IN PROCESSING & VALUE-ADDED MANUFACTURING 6.1 Conduct Needs Assessment of the OECS Industry with respect to: i. Training in Product Development ii. Business & Marketing Support iii. Financing 6.1 Conduct Training in Processing /Manufacturing of Value-Added Products 6.2 Conduct Training in Business Development re Manufacturing Cocoa Based Value Added Products 6.3 Identify financing Sources / Options for the Development of Valued Added Products, Business Investment Support and Marketing 6.4 Establish linkages to the Regional Tourism / Agro Tourism Sector to Exploit Market Opportunities for Cocoa Based Products 6.5 Conduct Training in Product Promotion / marketing Support

Gantt Chart 15.1: PROPOSED ROLLOUT OUT PLAN AND TIMELINE – OECS COCOA INDUSTRY DEVELOPMENT PROJECT

DEV. PHASE	Project Component / Activity	Schedule Duration (Mths)	Years					
			1	2	3	4	5	6
1	PRELIMINARY START-UP ACTIVITIES: Project Approval & Start Ups	0-6						
2	ESTABLISH OECS COCOA RESOURCE TECHNICAL SUPPORT CENTRE (CRTSC): Establish in-house Cocoa Farming Technical Support Capacity in the Cocoa Resource Technical Support Centre (CRTSC)	7-12						
3	Establish in-house Cocoa Processing / Manufacturing Technical Capacity in the CRTSC	24-36						
4	COCOA FARMING DEVELOPMENT COMPONENT Conduct periodic diagnostic review of cocoa farming in the OECS	13-72						
5	Provide Technical Support to the Cocoa Farming Component of the Industry.	18-72						
6	COCOA BEAN PROCESSING & MANUFACTURING OF VALUE-ADDED COCOA BASED PRODUCTS Capacity building in processing & value-added manufacturing, Product Promotion & Marketing	24-72						

PART A: INTRODUCTION

Section 1: Background, Terms of Reference (ToR) and Methodology

1.1 Background

This project is one of several initiatives aimed at contributing to the establishment of an Economic Union focused on promoting cooperation, harmonization, and integration among Organization of Eastern Caribbean States (OECS) Member States. The OECS, guided by its six (6) strategic objectives, *“works across its programmatic areas and in all Member States to consolidate the single economic space for enhanced development.”* In this regard, among the priority initiatives aimed at achieving the development goals of the Union is a focus on trade, food security and employment.

This Consultancy on the Development of the Value Chain of Three (3) Agricultural Commodities (Roots and Tubers, Cocoa and Fish) in OECS Member States is one initiative funded by the ACP TradeCom II Project aimed at deepening *“regional integration and integration into global markets through greater participation in regional and international value chains.”*

1.2 The Terms of Reference (ToR) and Purpose of the Consultancy

The purpose of this Consultancy is to identify the potential for growth and development of the selected commodities through the analysis of their value chains in OECS Member States. The scope of the Study includes the characterization of the value chains including the markets as a basis for identification of the Region’s comparative advantage in the production and marketing in both regional and international markets.

The ToR identified four (4) major tasks of the Study:

- i. Conduct of a situational analysis of the selected commodities in each of the six (6) OECS countries;
- ii. Mapping of the value chains as a basis for the conduct of an in-depth diagnostic evaluation of each with a view to identifying opportunities for growth and development;
- iii. Identify challenges and opportunities for the development of each industry and the formulation of recommendations for strengthening them;
- iv. Conduct validation and knowledge transfer workshops.

1.3 Objectives and Specific Results to be Achieved

The main objective of this Consultancy is to conduct an assessment of the roots and tubers, cocoa and fresh fish value chains and linkages in the agro-food/fisheries (agricultural and agro-based) sector in the OECS and to identify the Region's comparative advantage in the production and marketing of the identified commodities in both regional and international markets. This would form the basis for the development of appropriate regional and national support mechanisms (policies, investment proposals, programmes, etc.) to assist agro-based MSMEs in the region to expand the reach of the roots and tubers, cocoa and fresh fish and products made from them. In pursuit of the above, the ToR requires the following four (4) specific tasks comprising the main elements of the work in realizing the deliverables. These include:

Task 1: The Conduct of a Situational Analysis for Each of the Three (3) Commodities

This analysis focuses on identification of the national and enabling industry environment for the operation and development of each commodity in each of the Member State.

Task 2: Value Chain Mapping and Analysis

This includes:

- identification of all production and marketing of activities along the supply chain, both with respect to the primary target commodities as well as related value-added products;
- Identification of other activities / actors along supply chains that provide services and inputs in facilitating the operation of value chain operatives;
- Identification of strengths (including technology and comparative / competitive advantages) as well as weaknesses of operatives at each node in the value chain.

Task 3: Analysis of Input and Output Markets

This entails an analysis of the key markets for industry products, both the regional and international, with a view to identifying the *modus operandi* within these markets.

Task 4: Validation and Knowledge Transfer

To facilitate the validation of the findings of the Study, stakeholder workshops will be conducted in each Member State aimed at providing opportunities for feedback. This also provides the opportunity for knowledge transfer with respect to activities that could lead to enhanced business and industry performance, greater resilience and sustainability.

1.4 Methodological Steps

Our approach to the Study involved the following methodological steps as shown in Chart 1 below:

1. Conduct baseline studies related to value chain operation:
 - Baseline data collection, diagnostic review and analysis.
2. Analysis of the baseline data
3. Value Chain Mapping
4. Identification of opportunities for growth and improved financial performance
5. Develop Recommendations
6. Conduct Validation Workshop
7. Preparation of Final Report

1.5 Project Execution Strategy

A critical input for the conduct of this value chain study relates to the actual situation in Member States of the OECS on the operations of all actors involved in the industry including current practices, challenges, linkages and operations through the respective chains. It also requires an assessment of the policy, technical and regulatory support provided to the industry. In essence, the diagnostic analysis of the value chain depended heavily on field data.

Given the above requirements and the challenges presented by the COVID-19 pandemic, the Study relied on the appointment of field technical staff to conduct the surveys of the main value chain actors as well as background policy support in the respective countries (Antigua and Barbuda, Dominica, Grenada, Saint Kitts and Nevis, Saint Lucia, and Saint Vincent and the Grenadines).

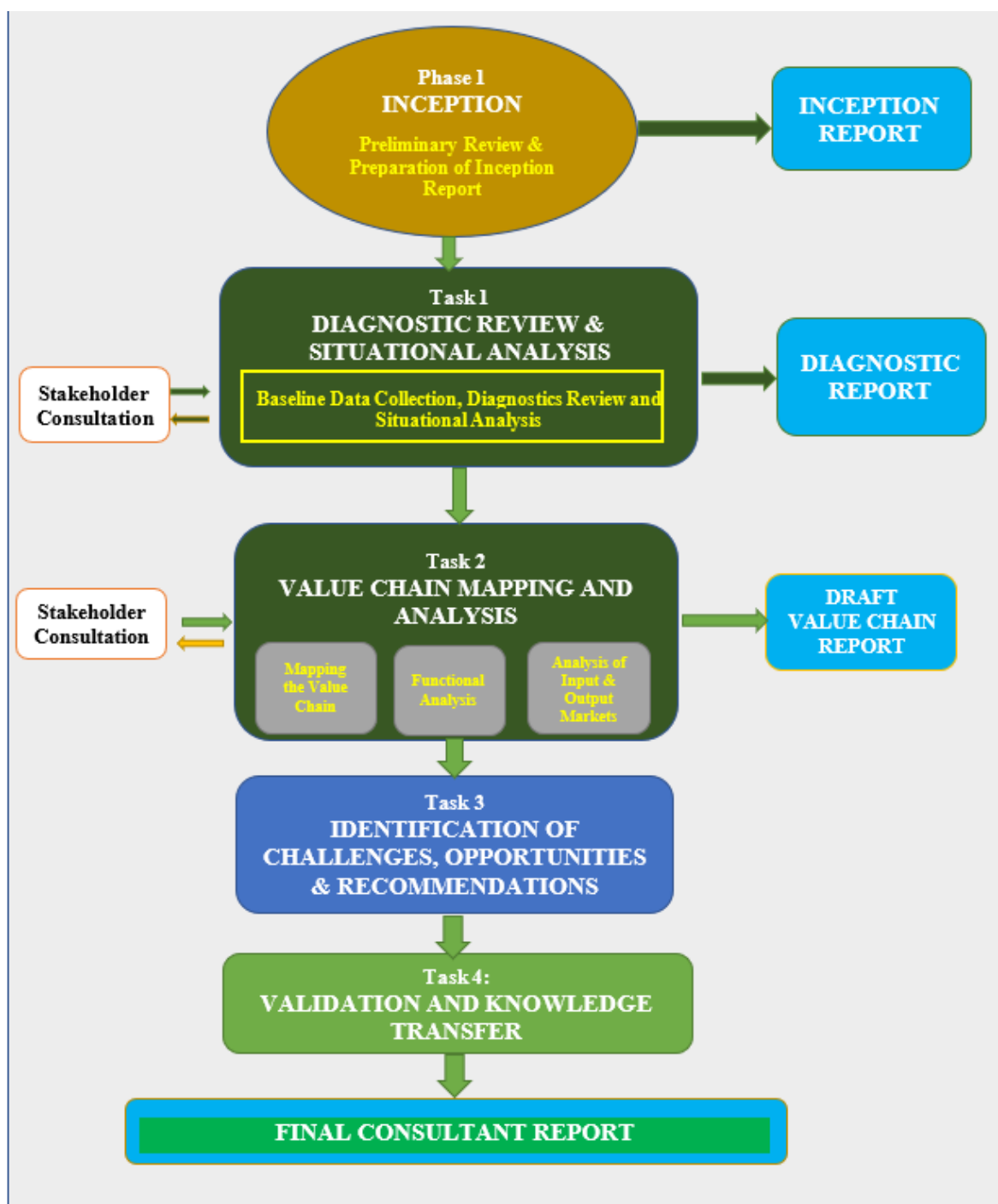
In this regard the team adopted the following strategy:

1. Firstly, we conducted an initial assessment of the industry in the OECS;
2. Secondly, we identified the key actors in the value chain and on that basis developed questionnaires for the collection of value chain analysis data;
3. Thirdly, field technical staff for each country were recruited and trained in the conduct of the various surveys relating to the main value chain actors;
4. Fourthly, the Project Management Team then reviewed and quality checked the completed survey questionnaires;
5. Fifthly, the Project Management Team conducted the analysis of the field data.

In addition to the collection of field data, the Study also entailed assessment of the markets, extra-regional and regional, for the selected commodities. This information, together with the field data were integrated to provide an overall evaluation of the performance of the

commodity and the identification of opportunities for improved performance and industry growth. Policy recommendations were developed on the basis of the foregoing.

CHART 1.1: FLOWCHART OF METHODOLOGICAL FRAMEWORK



PART B: PROFILE OF THE COCOA INDUSTRY IN THE OECS

Section 2: Overview of the Cocoa Industry in the OECS

2.1 Industry Size: Main Producers, Number of Farmers and Acreages

Among the OECS countries, Dominica, Grenada and Saint Lucia provide evidence that the cocoa industry has been an early contributor to the local agricultural economy. In some instances, cocoa production and processing has provided a linkage between agriculture and tourism. It has also created opportunities for domestic processing and manufacturing of cocoa-related products and allowed farmers to supplement their income especially where a guaranteed marketing arrangement exists. Although some of these marketing arrangements may appear to be unfavourable to small farmers given their relatively low levels of production and pricing offered as well as challenges related to pest and disease, hurricanes and other climate-related disasters; the industry persists, although limited in size. Within recent years, cocoa has also been growing in importance in Saint Vincent and the Grenadines.

In the OECS, cocoa is typically grown with a low level of inputs. Although cocoa may not be the primary crop, it serves an important role in the small farmer production system by supplementing rural income and employment and enhancing tourism on the islands through both consumer products and services – farm and factory tours. For the larger integrated operations, production follows more sophisticated producer-marketeer models, from “sustainably produced” to retail chocolate bars with different attributes.

The main cocoa producers in the OECS are Dominica, Grenada, Saint Lucia and Saint Vincent and the Grenadines. Production in Antigua and Barbuda as well as Saint Kitts and Nevis is limited to a few farmers. A survey of cocoa farmers was conducted in the major production areas within the islands. In these areas, it is estimated that the total number of farmers in the production areas was 652 with a total of 1,250.5 acres under cocoa production. Overall, 132 of these farmers responded positively to participate in the study; accounting for 20.25% of the target population. The estimated acreages and number of farmers is presented in Table 2.1 below. Annex Table 2.1 shows the disaggregated information.

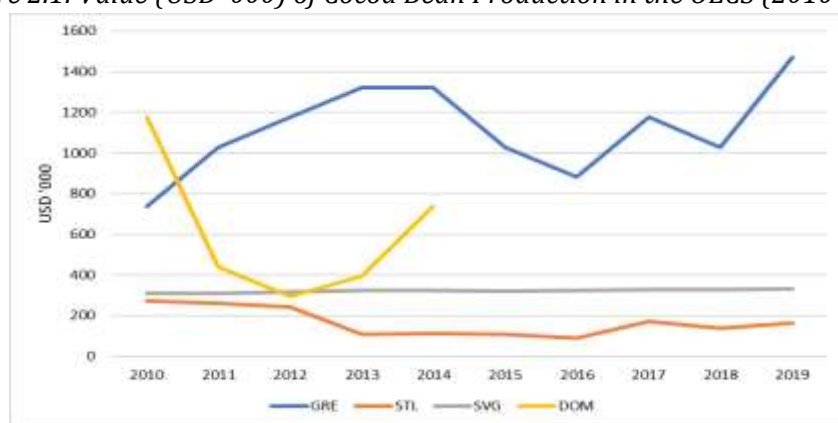
Table 2.1: Estimated Number of Farmers and Holdings under Cocoa Cultivation in Production Areas Surveyed by OECS Country

Country	Estimated Acreage (ac)	Estimated # of Cocoa Farmers
Dominica	163	238
Grenada	185	203
St Lucia	767.5	241
St Vincent & the Grenadines	135	70

2.2 Trends in the Value of Cocoa Bean Production

Due to the unavailability of production data in the public domain, data for the period 2010-2019 was extracted from the FAOSTAT database. Figure 2.1 and Table 2.2 illustrate the trends in production of cocoa by value for the OECS Member States. Grenada's production grew substantially after 2010 and by 2019, the estimated value had doubled the 2010 estimate. The data for Dominica was available up to 2014. The overall value of cocoa beans produced by Saint Lucia declined by an estimated USD 100,000 from USD 271,000 in 2010 to USD 163,000 in 2019. This study concedes that the FAOSTAT data provided for Saint Vincent and the Grenadines does not reflect the reality on the island based on the farmer survey and background information collected.

Figure 2.1: Value (USD '000) of Cocoa Bean Production in the OECS (2010-2019)

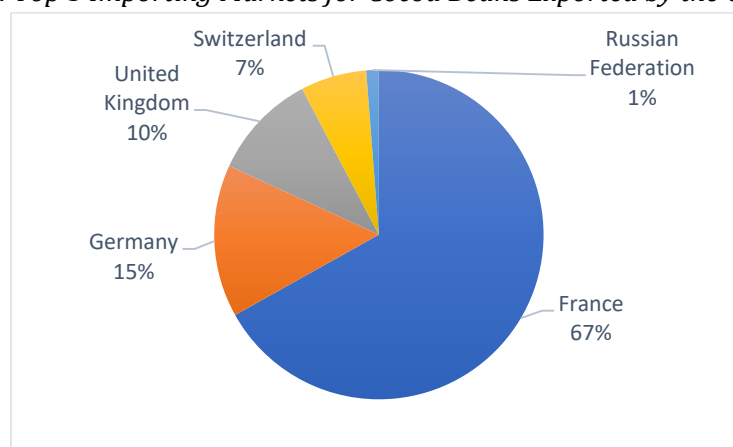


<i>Table 2.2: Trends in the Value (USD '000) of Cocoa Beans Produced in the OECS (2010-2019)</i>				
Year	DOM	GRE	STL	SVG
2010	1177	736	271	308
2011	441	1030	261	310
2012	294	1177	244	316
2013	394	1324	109	324
2014	736	1324	114	324
2015	NA	1030	110	321
2016	NA	883	89	324
2017	NA	1177	171	327
2018	NA	1030	139	330
2019	NA	1472	163	333
<i>Source: FAOSTAT Database (NA – Data unavailable)</i>				

2.3 Industry Export Marketing

As shown in Figure 2.2 below, total OECS export value of *HS 1801 Cocoa beans, whole or broken, raw or roasted* to the top five (5) importing markets were France (USD 1.74 MN), Germany (USD 0.39 MN), United Kingdom (USD 0.27 MN), Switzerland (USD 0.17 MN), and the Russian Federation (USD 0.32 MN).

Figure 2.2: Top 5 Importing Markets for Cocoa Beans Exported by the OECS (2021)



Data Source: ITC Trade Map

The four (4) cocoa producing OECS countries have created niche opportunities with chocolatiers primarily in these countries. Due to the renowned fine and flavour cocoa bean characteristics and the fact that local farmers and processors are willing to maintain the standards for ensuring high quality beans for their processors; they have been able to capture opportunities and participate in the wider global value chain. Generally, production

and processing are undertaken in the country while value addition, product development and marketing takes place in the metropole.

Cocoa generally fits into two (2) different segments of the value chain namely the domestic value-added market and the export trade. Importantly, the cocoa-producing and exporting OECS countries are among those designated by the International Cocoa Organization (ICCO) as producers of Fine and Flavour Cocoa (FFC): Bolivia, Costa Rica, Dominica, Grenada, Jamaica, Madagascar, Mexico, Saint Lucia, Trinidad and Tobago (all 100%), Colombia (95%), Venezuela (95%), Papua New Guinea (90%), Peru (90%), Ecuador (75%), Dominican Republic (40%), São Tome and Principe (35%) and Indonesia (1%).

PART C: COCOA-PRODUCING COUNTRY PROFILES

The main cocoa-producing islands in the OECS are Dominica, Grenada, Saint Lucia and Saint Vincent and the Grenadines. Negligible production and processing activities are found in Antigua and Barbuda and Saint Kitts and Nevis. This Part of the Report provides a snapshot of policies, programmes and projects directly targeting the development of cocoa production on the islands. Where this is absent, other supporting agricultural policies which may indirectly benefit cocoa production are highlighted. Sections 3, 4, 5 and 6 documents the experiences and views of cocoa farmers in these countries. The discussion provided is generally based on the data collected from field surveys.

Summary of the Main Characteristics of Cocoa Farming in the Four (4) Cocoa-Producing OECS Countries

A review of the farmer survey responses and background information on cocoa production in the OECS reveal several similarities in terms of their farm-level challenges as well as development and marketing experience. For ease of understanding from a regional perspective, the main findings are detailed below in Box 2.1 with broader discussion in the subsequent sections which profile individual country cocoa production status.

Cocoa farming in Saint Lucia benefitted from at least two significant and specific development projects in the past decade. While more general agriculture policy formulation is present in the other islands, the cocoa sub-sector's capacity appears to have only benefitted from general agriculture incentives and farmer training programmes rather than a targeted development strategy.

Box 2.1: Similarities in Farm-Level Challenges, Development and Marketing Experience in the OECS

1. A cursory scan of public policy in agriculture appears to be limited in terms of recognition and support for inclusive cocoa value chain development which has the potential to encourage industry and entrepreneurship beyond farm-level production to regional and international marketing.
2. The majority of farmers reported that their farm location and cocoa production area is within appropriate agroecological conditions to facilitate high productivity. However, data on acreages of cocoa reveal that the holdings are generally small with inter-cropping and other subsistence activities as the common production system.
3. Cocoa bean production levels are generally low when compared to production in other parts of the world. The main contributing factors to low productivity include limited choice of varieties, poor farming practices such as indifference to pruning and

Box 2.1: Similarities in Farm-Level Challenges, Development and Marketing Experience in the OECS

shade levels, tree management, field architecture, fertilization, treatment of pests and diseases and other best practices in production. Marketing appeal remains nonetheless, primarily driven by the fact that cocoa beans produced in the OECS are considered to be fine and flavoured cocoa.

4. Across the four cocoa-producing islands, farmers expressed a fear and apathy in accessing financing for cocoa operations. Money management and financial education as well as specific fiscal incentives to drive investment in key areas of the value chain or within farm operations are lacking.
5. While the main manufacturers of cocoa value-added products are in Grenada in other Member States there is only limited interest in manufacturing (cocoa balls, cocoa sticks). Knowledge and affinity for new venture creation and entrepreneurship on the value chain appear to be limited. Given the interest, this may also be an opportunity to build a cadre of processors of novelty (boutique) food products in the countries create inter-sectoral linkages with tourism and food services.
6. Each country's cocoa production profile presents a summary of farmers' suggestions to improve their productivity and profitability.
7. Production technology:
 - a. Tree planting density and pruning practices are highly variable thus impacting on productivity;
 - b. Farmers have limited choice of planting material (varieties and type – seedling, clonal cutting or grafting). They are constrained to plant whatever is available in the area at the time.
 - c. Farmers acknowledge the economic loss to their operations as a result of pests and diseases; however, not all farmers actively treat with these problems. Appropriate extension support to cocoa farmers appear to be lacking.
 - d. Generally, farmers utilize manual labour for field and tree maintenance as well as for on-farm transport. The labourer skillset and cost across the islands impact farming operations and its profitability. There is some utilization of light equipment such as brush cutters, mist blowers, pole pruners. Agricultural services and other equipment rentals such as tractor services are generally unavailable in the production areas or not accessed due to terrain and cost.

Section 3: Cocoa Production in Dominica

3.1 Sectoral Policies Impacting on the Dominica Cocoa Industry

A review of sectoral policies and development plans for Dominica's agricultural did not reveal the adoption of any specific strategy or targeted development thrust for the cocoa sub-sector including public sector financing and technical support for the industry. A brief description of broader policies is provided for context. Box 3.1 outlines several broad development plans and policies that may impact the wider sector.

Box 3.1: Government of Dominica Broad Sectoral Policies and Plans

	Policy Description
Medium-Term Dominica National Agriculture Policy 2021- 2030	To promote a sustainable and resilient agriculture and food system that supports conservation and sustainable use of Dominica's natural resources, preservation of biodiversity and ecosystems, while ensuring food and nutrition security, wealth creation, employment, diversified livelihoods, and rural development. <i>(GoCD. 2021. Medium Term Dominica National Agriculture Policy 2021-2030. Final Draft Policy.)</i>
Agriculture and Food Systems Transformation Roadmap for Dominica	The roadmap provides guidance on transformative actions required to improve the natural resource base, increase the resilience and sustainability of crop, livestock and fisheries farming systems, develop and expand risk-informed and risk-responsive markets and value chains, and address food and nutrition security challenges. <i>(FAO. 2021. Agriculture and Food Systems Transformation Roadmap for Dominica. Final Vision.)</i>
Dominica Agriculture Disaster Risk Management Strategic Plan 2020-2030	The Plan provides a pathway to mainstream disaster risk reduction and management and climate change adaptation into the cropping, livestock, fisheries, and forestry in the context of the sustainable management of environmental resources. <i>(Ministry of Agriculture, Food and Fisheries, FAO and UNDP. 2019. Dominica Agriculture Disaster Risk Management Strategic Plan 2020-2030. Draft.)</i>
Climate Resilience and Recovery Plan 2020-2030	Climate Resilient Dominica is about significantly reducing the impact of, and time to recover from, climatic and other natural shocks, as well as boosting the overall socioeconomic development trajectory of the country. <i>(GoCD. 2020. Climate Resilience and Recovery Plan 2020-2030.)</i>
National Resilience Development Strategy – Dominica 2030	The National Resilience Development Strategy is a developmental paradigm which seeks to climate proof (to be resilient against the destructive impacts of extreme weather events) the key pillars of national policy which are economic diversification, sustained sustainable and

Box 3.1: Government of Dominica Broad Sectoral Policies and Plans

Policy Description

- inclusive growth, employment creation and revenue generation, social development, social protection and poverty reduction, environmental management, and cultural preservation. Therefore, resilience for Dominica comprises of seven (7) multiple development objectives:
- i. The promotion of food security and self-sufficiency through Climate Resilience Agriculture and Fisheries Development.
 - ii. Enhancing the resilience of Ecosystems and sustainable use of natural resources (Forestry, Marine, Water resources)
 - iii. Enhancing Infrastructure Resilience.
 - iv. Promotion of Sustainable Human Settlements/Communities.
 - v. Provision of adequate and sustainable social protection systems with the ability to respond rapidly to the impact of shocks at the individual and household levels.
 - vi. Implementing a Comprehensive Risk Management Framework (including National Vulnerability Risk Resilience Fund) and pursuing the Low Carbon Development Pathway (the greening of the economy);
 - vii. Economic empowerment and innovations through sustainable Climate Financing.
- (GOCD. 2018. National Resilience Development Strategy Dominica 2030.)*

3.2 Dominica – Profile of Cocoa Production

Production Levels & Years in Production: As described previously, according to FAOSTAT (2022) data, cocoa bean production peaked in Dominica in 2016. Coinciding with the devastation associated with Hurricane Maria in 2017, the capacity of the sub-sector and its trajectory changed. Nonetheless, of the forty-three (43) cocoa farmers surveyed, their average years in cocoa farming remained relatively high (23 years) suggesting a level commitment and continuity despite the challenges. Seventy-two percent (72%) of farmers surveyed are located on undulating lands, the remainder on flat lands. They are all of the view that the terrain in their farming area was suitable for cocoa production.

Production System: The production system is typically inter-cropping which includes fruit trees, plantains, dasheen, and citrus primarily. While production continues post-disaster, there is little focus on processing at the farm-level. Only one (1) farmer employed sweat boxes of minimal capacity, three (3) had cocoa dryers but none with cocoa houses and only two (2) stored beans in bags.

Membership in Farmers Organization: Fourteen percent (14%) of farmers reported being members of farmer organizations for cocoa, Northeast Cocoa Producer Cooperative, suggesting that some opportunity does exist to provide strategic technical and other interventions to farmers as a collective; however, much of them operate independently. This

is perhaps the case as none of the farmers involved were able to identify specific actions and potential benefits that the farmer organization offers beyond providing cocoa seedlings to members at a subsidized price. Farmers generally utilize their own seedlings and grafted cocoa plants.

Production Inputs: Most the farmers (93%) reported applying fertilizer to their cocoa production with NPK = 16:08:24 and NPK = 12:12:17 being the most adopted whilst only 5% of them use fungicide treatments (Bellis, Titan 20, Mancozeb) and 79% employing weedicides (Weedless, Paraquat, Scorchers, Eliminator). Equipment generally utilized include power saws, brush cutters, motorized pole pruners and mist blowers. There are no service providers for tractor services or other machinery rentals in several areas. Manual labour and 4WD pick-ups are mostly utilized for field transport. Less than 10% of farmers regard their farming practice as organic. They do not use weedicide, synthetic fertilizer or herbicide on their farms and indicated the use of humus and organic material to fertilize.

Use of Borrowed Funds: Cocoa farmers in Dominica generally prefer to use their own funds in cocoa operations. Respondents expressed difficulty in accessing loanable funds, preference for family sources and only one (1) farmer reported doing business with the National Development Foundation of Dominica (12% interest rate).

Extension Support for Cocoa Farmers: Beneficial and specific extension training programmes for cocoa farmers included propagation, production and pruning, maintenance and post-harvest handling. These programmes are organized by the Ministry of Agriculture or the Dominica Export Import Agency (DEXIA).

Age of Cocoa Trees & Planting Material: Of the total tree stock reported by the farmers surveyed (4,285 cocoa trees), 47.3% are less than 5 years old, 21.28%, 11.4% were 20-30 years old and 20% were older than 30 years. Farmers reported utilizing whatever planting material that was available. They were generally unsure if the cocoa trees were derived from seedling, clonal cutting or grafting. None of the trees were specifically known to be Grenada Select (GS), Dominica Select (DOM) or other Trinitario and Forestaro varieties.

Field Architecture: Dominican cocoa farmers observe no specific standard of field architecture. Of the thirty-nine (39) responses to spacing of cocoa trees planted, 30% of farmers estimated 15ft x 15ft while 23% of them estimated 20ft x 20ft. Other farmers would have planted as close as 8ft x 8ft to as wide as 30ft x 30ft. The variability in density of cocoa fields impacts production volumes and productivity. An estimated 63% of farmers estimated having a planting density of less than 300 cocoa trees per acre, 33% estimated 300 to 600 cocoa trees per acre and only 5% with 600 to 1,000 cocoa trees per acre. Most of the farmers

(78%) practice pruning of cocoa trees with 73% of them preferring to maintain fields with less than 50% shade provided to adult trees.

Pests, Diseases & Weeds: In terms of losses due to pests, farmers reported being most impacted by squirrels and parrots to a lesser extent. These losses range from as low as 1% of total annual crop to as high as 70%. Wood ants was also identified as another major pest of concern. An estimated 51% of farmers reported using chemical pest control measures, 7% employ an integrated pest management approach and 35% did not treat with the problem. Of the twenty-nine (29) responses received, all farmers reported that Black Pod disease contributes to crop loss but also indicated that this is the least contributing factor. They were unable to directly identify the disease associated with greatest production loss. On average, farmers estimate that 8% of their production is lost to diseases. The majority of farmers (63%) do not employ any disease control measures while fifteen (15) of the forty (40) respondents use cultural techniques (sanitation, shade control etc). For weeds, 90% use manual and herbicide controls with only 10% using purely manual control.

Fertilizer Application: Of the thirty-nine (39) responses received, farmers used 0.6 lbs of fertilizer per tree while the modal rate was 0.25 lbs; generally, twice per year.

Productivity (Pods Per Tree): Thirty-three percent (33%) of responses indicated that the number of pods per tree averaged 16 to 20 while 29% reported 11 to 15 pods. Yields ranged from 1 to more than 30 pods per tree. Generally, farmers encourage a thick leaf mulch layer in cocoa fields as a soil and water conservation practice, very few utilized contour drains or intercropping systems for this purpose.

Box 3.2: Summary of Farmers' Responses on Measures to Improve Production and Profitability

**Do you have any suggestions for improving your total production from cocoa?
(42 responses)**

- More land for cocoa production (10, 24%);
- Access to better planting material (34, 81%);
- Training (22, 52%);
- Access and use of more affordable recommended inputs through industry marketing initiatives (e.g., bulk buying) (17, 41%)
- Financial Assistance (9, 21%)
- Availability of recommended fertilizers; (33, 79%)

**Do you have any suggestions for improving the profitability of your cocoa farming operations?
(43 responses)**

- Assistance in the purchase of field equipment (38, 88%);
- Establishment of a central fermentary in the area (33, 77%);
- Government assistance in controlling pest and disease (12, 30%);
- Development and introduction of new technology with respect to plant productivity (11, 26%);
- Development and introduction of technology to improve processing efficiency and / or product quality (7, 16%);

Box 3.2: Summary of Farmers' Responses on Measures to Improve Production and Profitability

- Introduction of labour-saving technologies to improve cost efficiency (28, 65%);
- Training in processing technology (21, 49%);
- Better market and pricing arrangement (30, 70%)
- Training in Business Management (6, 14%)

Section 4: Cocoa Production in Grenada

4.1 Sectoral Policies Impacting on the Grenada Cocoa Industry

Grenada has developed a National Agricultural Plan (2015-2030) aimed at promoting food security, income generation and poverty alleviation. According to a description provided by the FAO country profile, the Plan targets to increase exports of traditional crops, fish, fruits, vegetables, root crops, minor spices, and value-added products to international and regional markets.

The National Agricultural Plan was incorporated into the National Sustainable Development Plan (2020-2035). In recognizing the key issues affecting the cocoa industry (low production and availability of product to meet market demand, and low productivity which affects profitability, marketing and quality control); the document recommended specific strategies for the cocoa sector including:

- 1) Aggressive rehabilitation of the over 5,000 acres damaged by Hurricane Ivan and still not yet in production. The target is to increase cocoa production to 1,000 tons of dry cocoa per annum within the next fifteen (15) years. This should be achieved from increases in productivity and acreage in production. The required new plantings will be about 45,000 plants or 150 acres planted per year;
- 2) Development of Tech Packs for the efficient production of cocoa and promote use of available technology to raise productivity to an average of 1,500 lbs dry cocoa per acre. At the current average export of 400 tons with 3,172 acres under production, this is equivalent to 278 lbs dry cocoa beans per acre. The clones currently produced have the capacity to produce as much as 3,000 lbs/acre;
- 3) Branding of Grenada's cocoa using Geographic Indicators;
- 4) Improved marketing and the development and promotion of regional and international markets;
- 5) Increased investment in value-added products and other niche products such as organic cocoa.

4.2 Grenada – Profile of Cocoa Production

Production Levels & Years in Production: The cocoa sub-sector continues to recover post-hurricane disaster in the last decade, as described previously cocoa bean production (based on value) showed a generally increasing long-term trend over the 2010-2019 period. Of the twenty (20) cocoa farmers surveyed, their average years in cocoa farming remained relatively high at twenty-six (26) years suggesting a level commitment and continuity despite the challenges. From the survey 60% of farmers indicated that their farm was located on undulating lands, 30% on flat lands, while 10% described their farms as being on steep slopes; all twenty (20) respondents believed that the terrain in their farming area was suitable for cocoa production.

Production System: Cocoa production is typically inter-cropped with soursop, nutmeg, banana and plantains. There is little focus on processing at the farm-level. Only one (1) farmer employed sweat boxes of minimal capacity, two (2) farmers with cocoa dryers, one (1) cocoa house, and only (1) farmer stored beans in bags.

Production Inputs: Farmers generally utilize grafted cocoa plants with 32% of them specifying that it was their own seedlings and selected hybrids. The majority of farmers (74%) surveyed use fertilizers in cocoa production (NPK 12:08:24). None of the farmers surveyed use fungicides. Equipment generally utilized on cocoa farms include power saws, brush cutters, and mist blowers. There are no service providers for tractor services or other machinery rentals in several areas; if so, it was considered unaffordable. Manual labour and 4WD pick-ups are mostly utilized for field transport. An estimated 25% of farmers regard their farming practice as organic. They do not use any type of agro chemicals, but all indicated the use of manure as a soil ameliorant.

Use of Borrowed Funds: Cocoa farmers in Grenada generally prefer to use their own funds in cocoa operations. Some experienced difficulty in accessing credit while only one (1) farmer reported doing business with an unnamed bank (6% interest rate).

Extension Support for Cocoa Farmers: Training programmes for cocoa farmers included pest and disease control, site selection and land preparation, pruning and harvesting. These programmes are traditionally organized by the Ministry of Agriculture or the Grenada Cocoa Association (GCA).

Age of Cocoa Trees & Planting Material: Of the total tree stock (2,000 cocoa trees) reported by the farmers surveyed, 4% are less than 5 years old, 38% were 5-20 years old, 43% were 20-30 years old and 15% of cocoa trees were older than 30 years. Eight (8) farmers reported growing the Grenada Select (GS) varieties for higher yield, disease resistance, flavour and because plants were available in the area. Nine (9) others reported having the Trinitario varieties because of availability. Generally, farms have mixed varieties for higher yield, flavour and disease resistance but farmers were unsure if the cocoa trees were derived from seedling, clonal cutting or grafting.

Field Architecture: Cocoa farmers observe no specific standard of field architecture. Of the nineteen (19) responses to spacing of cocoa trees planted, 58% of farmers estimated 15ft x 15ft while 21% of them estimated 12ft x 12ft. Other farmers would have planted as close as 8ft x 10ft. The variability in density of cocoa fields impacts the resulting production volumes and productivity. The majority of farmers (95%) estimated having a planting density of less than 300 cocoa trees per acre with the average age of cocoa trees being 23 years old. Most

farmers practice pruning of cocoa trees with all of them preferring to maintain fields with less than 50% shade.

Pests, Diseases & Weeds: In terms of losses due to pests, farmers reported being most impacted by squirrels. These losses range from as low as 0.5% of total annual crop to as high as 10%. Cocoa beetles and wood ants were also identified as major pests of concern. An estimated 63% of farmers reported using integrated pest management strategies while 37% use what was described as a cultural approach. Some 16% of farmers surveyed did not treat with the problem. Black Pod disease contributes to crop loss with much less farmers reporting Witches Broom and Ceratocystis Wilt as major problems. Farmers were unable to estimate the annual production loss from diseases. Fifteen percent of the farmers do not employ any disease control measures while about half use cultural techniques (sanitation, shade control etc). Manual weed control is employed by the majority of farmers (60%) while, 20% use both manual and herbicide controls, and the remaining 20% use manual and mechanical controls.

Fertilizer Application: On average farmers apply 0.3 lbs of fertilizer per cocoa tree while the modal rate was 0.25 lbs generally twice per year.

Productivity (Pods Per Tree): Approximately one half of the farmers reported that the number of pods per tree averaged 16 to 20 while 35% reported 21 to 30 pods. Generally, farmers encourage a thick leaf mulch layer in cocoa fields and develop terracing and contour drains as a soil and water conservation practice.

Membership in Farmer Organizations: The majority of farmers (70%) reported being members of farmer organizations for cocoa, Grenada Cocoa Association (GCA), suggesting that opportunity does exist to provide strategic technical and other interventions to farmers as a collective. However, some of them operate independently. While few farmers were uncertain of the benefits that the GCA provided to directly assist with cocoa farming, others indicated secured or guaranteed market, subsidized fertilizers and extension support.

Box 4.1: Summary of Farmers' Responses on Measures to Improve Production and Profitability

Do you have any suggestions for improving your total production from cocoa?
(42 responses)

Do you have any suggestions for improving your total production from cocoa?
(20 responses)

- More land for cocoa production (11, 55%);
 - Availability of recommended fertilizers (11, 55%)
 - Access to better planting material (12, 60%);
- Access and use of more affordable recommended inputs through industry marketing initiatives (e.g. bulk buying) (16, 80%)

Do you have any suggestions for improving the profitability of your cocoa farming operations?

(43 responses)

Do you have any suggestions for improving the profitability of your cocoa farming operations?

(20 responses)

- Development and introduction of new technology with respect to plant productivity (11, 55%);
 - Introduction of labour-saving technologies to improve cost efficiency (18, 90%);
 - Development and introduction of technology to improve processing efficiency and / or product quality (9, 45%);
 - Assistance in the purchase of field equipment (14, 70%);
 - Establishment of a central fermentary in the area (5, 25%);
 - Government assistance in controlling pest and disease (16, 80%);
- Better market and pricing arrangements (13, 65%)

Section 5: Overview of Cocoa Production in Saint Lucia

5.1 Sectoral Policies Impacting on the St Lucia Cocoa Industry

The current *Agriculture Policy Framework and Strategy (2016-2021)* for Saint Lucia focuses on key priorities including:

- i. Agriculture diversification based on improved research and development and utilization of improved technologies;
- ii. Resuscitation of the banana industry;
- iii. Enhancing national food and nutrition security;
- iv. Reduction in the food import bill;
- v. Agro-processing and agribusiness development;
- vi. Market development - domestic and export;
- vii. The development of appropriate institutional structures, mechanisms and human resource capacities within the Agriculture Sector Institutions, including the linkages and partnerships;
- viii. Increase youth and women involvement in agribusiness;
- ix. Effective management and utilisation of fisheries;
- x. The protection and sustainable utilisation of natural resources (land, water and forestry); and
- xi. Disaster risk reduction and climate change adaptation.

Saint Lucia's Sectoral Adaptation Strategy and Action Plan for the Agriculture Sector (Agriculture SASAP) 2018-2028 provides a snapshot of cocoa-specific projects with lessons learned and key success factors.

Project	Total Investment Cost	Donor/ Sponsor	Responsible Institutions	Direct Beneficiaries Targeted
Cocoa Revitalization Project National project Period: 2008-2009 Status: completed	N/A	Caribbean Community Climate Change Centre (5Cs)	Department of Agriculture, Fisheries, Natural Resources and Cooperatives	Farmers
Lessons Learned and Key Success Factors	Partially responsible for an expansion of the area under cocoa production in Saint Lucia by 300 acres, particularly in Soufrière, Errad, Anse la Raye, Canaries, Micoud, Castries Rural and Vieux Fort Rural.			

Project	Total Investment Cost	Donor/ Sponsor	Responsible Institutions	Direct Beneficiaries Targeted
Cocoa Agro Forestry Project National project Period: 2013-2014 Status: Completed	USD 214,250	European Union Global Climate Change Alliance (GCCA)	5Cs and implemented by the Ministry of Sustainable Development, Energy, Science and Technology	Farmers
Lessons Learned and Key Success Factors	Initiated to implement sustainable adaptation activities related to cocoa cultivation. Cocoa, mango and citrus plants were used for slope stabilisation and to replace non-productive banana fields with cocoa plants.			

5.2 Saint Lucia – Profile of Cocoa Production

Production Levels & Years in Production: As described previously, cocoa bean production by value declined substantially until 2016 then showed some recovery in Saint Lucia perhaps driven by the Cocoa Revitalization Project Cocoa (2008-2009) and the Agro Forestry Project (2013-2014). Of the fifty-four (54) cocoa farmers surveyed, their average years in cocoa farming remained relatively high at nineteen (19) years suggesting a level of commitment and continuity despite the challenges. Only 11% of farmers regard their farming practice as organic. They do not use chemical fertilizers and pesticides. About one half of the farmers are located on undulating lands, 37% on steep slopes and the remainder on flat land. Most farmers considered their lands to be suitable for cocoa farming.

Production System: Importantly, of the 52 responses to farmers' involvement in other cocoa-related business beyond production, 36 reported wet and dry bean processing, value addition and export. Together, they operate on an average of 18.97 acres with holdings ranging from 0.5 acres to 238 acres inter-cropped with bananas, plantains, root crops and citrus primarily. There is moderate focus on processing at the farm-level; only thirteen (13) of the fifty-four (54) farmers surveyed employed sweat boxes, 7 cocoa houses, 3 cocoa dryers, and 12 farmers stored beans in bags.

Membership in Farmers Organization: Only 13% of farmers reported being members of any of the available farmer organizations for cocoa - Premium Cocoa Producers Cooperative Society, Hotel Chocolat, Beausoleil Sustainable Agribusiness Group. As a result the majority of farmers were unable to identify potential services provided by these organizations beyond offering cocoa seedlings to members at a subsidized price and training.

Production Inputs: Most farmers use fertilizers in cocoa production with NPK 16:08:24 or applying manure. Only 46% of them use fungicide treatments (Bellis, Kocide, Mancozeb) and 78% of farmers surveyed employ weedicides (Gramoxone, Touch Down). Equipment generally utilized include power saws, brush cutters, motorized pole pruners and mist blowers. There are no service providers for tractor services or other machinery rentals in several areas. Manual labour and 4WD pick-ups are mostly utilized for field transport. Farmers generally utilize their own seedlings and grafted cocoa plants. On average, of the 49 responses received, farmers used 0.52 lbs of fertilizer per tree while the modal rate was 0.25 lbs generally twice per year.

Use of Borrowed Funds: Cocoa farmers in Saint Lucia generally prefer to use their own funds in cocoa operations. Some expressed difficulty in accessing loans while 1 farmer reported doing business with a credit union (6% interest rate).

Extension Support for Cocoa Farmers: Specific extension training programmes for cocoa farmers included propagation, production and pruning, chemical use, post-harvest handling and quality management of beans. These programmes are organized by the Ministry of Agriculture, CARDI, Hotel Chocolat or the Premium Cooperative Society.

Age of Cocoa Trees & Planting Material: Cocoa trees on average are 15 years old. Of the total tree stock (5,500 cocoa trees) reported by the farmers surveyed, one quarter were less than 5 years old, one half was less than 20 years old, 11% were 20 -30 years and 13% of were older than 30 years. Grenada Select (GS) and Dominica Select (DOM) varieties are not grown but other Trinitario varieties which farmers believed possess higher yield potential, better flavour and were disease resistant are generally preferred. Farmers were generally unsure if the cocoa trees were derived from seedling, clonal cutting or grafting.

Field Architecture: Saint Lucia cocoa farmers observe no specific standard of field architecture. Of the 53 responses to spacing of cocoa trees planted, 34% of farmers estimated 10ft x 10ft while 15% of farmers estimated 12ft x 12ft. Other farmers would have planted as close as 8ft x 8ft to as wide as 20ft x 20ft. Approximately one half of farmers estimated having a planting density of less than 300 cocoa trees per acre whereas about one third estimated a density of 300 to 600 cocoa trees per acre and only 2% of farmers estimated 600 to 1,000 cocoa trees per acre. Most farmers (83%) practice pruning of cocoa trees and 74% of them preferring to maintain fields with less than 50% shade provided to adult trees.

Pests, Diseases & Weeds: In terms of losses due to pests, farmers reported being most impacted by squirrels. These losses range from as low as 10% of total annual crop to as high as 90%. Approximately one half of farmers reported using chemical-related pest control

measures and 15% employed integrated pest management. The majority of farmers (98%) reported that Black Pod diseases accounted most of their crop loss. Farmers estimate that approximately one half of their production was lost to diseases. Generally, farmers employ cultural techniques (sanitation, shade control etc) and fungicides in an attempt to treat with disease problem. In terms of weed control most farmers (77%) use manual and herbicide controls while the others use manual and mechanical approaches.

Productivity (Pods Per Tree): An estimated 21 farmers or 39% of responses reported that the number of pods per tree averaged 16 to 20 while 22% reported 21 to 30 pods. Yields ranged from 6 to more than 30 pods per tree. Generally, farmers encourage a thick leaf mulch layer in cocoa fields, develop contour drains and protect banks of drainage channels and rivers as soil and water conservation practices.

Box 5.1: Summary of Farmers' Responses on Measures to Improve Production and Profitability

Do you have any suggestions for improving your total production from cocoa? (54 responses)	Do you have any suggestions for improving the profitability of your cocoa farming operations? (54 responses)
• Access to better planting material (44, 82%); • Training (45, 83%); • Availability of recommended fertilizers (41, 76%); • Access and use of more affordable recommended inputs through industry marketing initiatives (e.g. bulk buying) (30, 56%) • More land for cocoa production (19, 35%)	• Development and introduction of new technology with respect to plant productivity (45, 83%); • Introduction of labour-saving technologies to improve cost efficiency (30, 56%); • Development and introduction of technology to improve processing efficiency and / or product quality (33, 61%); • Government assistance in controlling pest and disease (39, 72%); • Training in processing technology (30, 56%); • Assistance in the purchase of field equipment (32, 59%); • Better market and pricing arrangements (40, 74%); • Establishment of a central fermentary in the area (23, 43%); • Training in business management (25, 46)

Section 6: Profile of Cocoa Production in Saint Vincent and the Grenadines

6.1 Sectoral Policies Impacting on the Saint Vincent and the Grenadines Cocoa Industry

While Saint Vincent and the Grenadines has an Agriculture Modernization & Development Programme as well as other sectoral programmes, these provide no specific support for the cocoa industry. A snapshot of the major projects and programmes are presented below.

Project Description	
Agriculture Modernization & Development Programme	Reduction of the food import bill by targeting specific commodities for local consumption and developing a commodity approach to marketing.
Soil Fertility Mapping Project	The Government of Saint Vincent and the Grenadines in collaboration with the Kingdom of Morocco has embarked on this web-based system that will assist farmers in knowing the fertility status of each area and information on the adequate fertilization of crops.
Watershed Project	Management of watershed areas and the protection of natural resources under the Global Climate Change Alliance Project.
Land Bank Programme	Establishment of a land bank register and database software with available lands for purchase or lease.
National Economic and Social Development Plan (2013-2025)	The 2013-2025 Plan seeks to improve on the shortcomings of the previous ones and to outline a strategy to achieve sustainable economic growth, job creation, and poverty reduction leading to the improvement in the quality of life for Vincentians.

6.2 Saint Vincent and the Grenadines – Profile of Cocoa Production

Production Levels & Years in Production: The cocoa industry in Saint Vincent and the Grenadines is relatively small in comparison to the other main OECS producers. On a value basis, bean production over the years 2010-2019 period have been minimal. Of the 12 cocoa farmers surveyed, their average number of years' in cocoa farming was relatively low at 10 years suggesting a relatively new interest in the industry. The acreage of cocoa has grown steadily and over the last 5 years has expanded to over 500 acres with the rehabilitation of several old plantations and the establishment of new ones. Most of the cocoa farms (75%) are located on undulating lands which farmers indicate are suitable for production.

Production Systems: Cocoa is typically inter-cropped with avocado, plantain, coconut, and root crops. There is little focus on processing at the farm-level. Only 1 farmer utilized sweat boxes, 1 cocoa house, 1 dryer and that farmer utilized storage bags for beans. Twenty five percent (25%) of farmers regard their farming practice as organic.

Membership in Farmers Organization: Most of the producers in the industry are associated with the Saint Vincent Cocoa Company (SVCC) suggesting that opportunity does exist to access technical support as well as guaranteed market for their beans. However, a few operate independently. The SVCC is the major driver behind the industry and has provided planting material, inputs and technical services to the farmers. The company also purchases wet beans from farmers for processing. These beans are either processed into chocolate or exported.

Production Inputs: Most of the farmers (92%) use fertilizers in cocoa production with NPK 12:12:17 being the most adopted whilst only 42% of them use fungicide treatments (Banrot, Benlate, Rydomil) and 11 out of 12 farmers used weedicides (Paraquat primarily). Equipment generally utilized include power saws, brush cutters, motorized pole pruners and mist blowers. Manual labour and 4WD pick-ups are mostly utilized for field transport.

Use of Borrowed Funds: Similar to farmers in the other OCES cocoa-producing countries, farmers in Saint Vincent and the Grenadines generally prefer to use their own funds for production-related expenses.

Extension Support for Cocoa Farmers: Cocoa farmers have access to training programmes offered by the Ministry of Agriculture. These include pruning, field management and disease control.

Age of Cocoa Trees & Planting Material: Of the total tree stock (1,200 cocoa trees) reported by the farmers surveyed most (96%) are 5-20 years old. Most of the production is based on Trinitario varieties. Farmers were generally unsure if the cocoa trees were derived from seedling, clonal cutting or grafting.

Field Architecture: Cocoa farmers in Saint Vincent and the Grenadines observe no specific standard of field architecture. Of the 12 responses to spacing of cocoa trees planted, 4 farmers estimated 12ft x 12ft. Other farmers would have planted as close as 8ft x 8ft and as wide as 12ft x 14ft. This variability impacts the density of cocoa fields and the resulting production volumes and productivity. All farmers estimated having a planting density of 300 to 600 cocoa trees per acre.

Pests, Diseases & Weeds: In terms of losses due to pests, farmers reported being most impacted by squirrels. These losses average 5% of total annual production. Approximately 42% of farmers reported using chemical-related pest control measures while others used a cultural approach or did not treat with the problem. Of the 12 responses received, 83% of farmers reported that Black Pod disease is the most contributing factor to crop loss (10% average). All respondents use either cultural techniques (sanitation, shade control etc) or fungicides for disease control. For weeds, 67% use manual and herbicide controls.

Fertilizer Application: On average, farmers used 1 lb of fertilizer per tree generally twice per year. All 12 farmers surveyed practice pruning of cocoa trees with 73% of them preferring to maintain fields with less than 50% shade provided to adult trees. An estimated 8 farmers or 67% of responses reported that the number of pods per tree averaged 16 to 20 while others were marginally higher. Generally, farmers encourage a thick leaf mulch layer in cocoa fields as a soil and water conservation practice.

Box 6.1: Summary of Farmers' Responses on Measures to Improve Production and Profitability

Do you have any suggestions for improving your total production from cocoa? (12 responses)	Do you have any suggestions for improving the profitability of your cocoa farming operations? (11 responses)
• Availability of recommended fertilizers (11, 92%) • Training (8, 67%) • Access and use of more affordable recommended inputs through industry marketing initiatives (e.g. bulk buying) (11, 92%)	• Introduction of labour-saving technologies to improve cost efficiency (10, 91%) • Assistance in the purchase of field equipment (8, 73%) • Government assistance in controlling pest and disease (10, 91%) • Training in Business Management, Technology (7, 64%) • Better market and pricing arrangement (6, 55%)

PART D: VALUE-ADDED OPERATIONS ACROSS THE VALUE CHAIN

Section 7: OECS Cocoa Industry Value-Added Operations

7.1 Introduction

In addition to the cocoa farmers, the Cocoa Value Chain is also characterized by distinct operators as follows:

- Wet Bean Processors
- Dry Bean Processors
- Cocoa Value-Added Product Processors
- Domestic Marketeers of Cocoa-Based Products
- Export Marketing of Beans and Cocoa-Based Products

Questionnaires were developed, aimed at surveying a sample of the various value chain operators. However, field staff indicated that generally there were limited numbers of value chain operators in each of the OECS Member States. Additionally, cocoa value chain operators were generally unwilling to provide interviews and share information on their cocoa processing operations.

Overall, the farmer response rates were highest across the cocoa-producing islands. Although the other actors on the value chain were fewer and less responsive, it did assist in explaining a general situation. Secondary data verified by in-country field staff reports of the functioning of actors are also included in the discussions.

7.2 Wet Bean Processors

More often, farmers engagement in cocoa processing at the farm-level primarily entailed wet bean processing. The pods are cracked to obtain wet beans which are sold to buying agents or processors who, utilizing appropriate fermenting techniques, technology and practices, dry the beans for either export destinations or domestic value addition. Value-added cocoa products in the four cocoa-producing OECS countries more popularly include couverture chocolate, chocolate bars, cocoa powder, cake, liqueur, balls and sticks. These cocoa-based products are also exported either directly or indirectly by catering for Mode 2 Tourism demand on the islands. There is also a growing nutraceutical market.

Fermentation

The larger-scaled wet bean processors typically engage in fermentary operations and other processes to produce dry beans. Fermentation is practiced for the following reasons:

- To halt the germination process of the beans, after the first 2 days of the process;
- To remove most of the mucilage or pulp from around the bean;
- To reduce the moisture content within the bean; and most importantly;
- To develop chocolate aroma and the particular flavour of the beans.

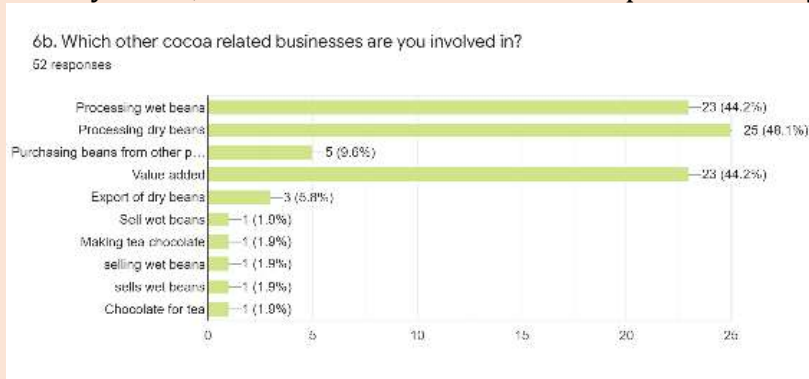
Proper fermentation is very important to achieve the full flavour profile of the cocoa beans. During the fermentation process, the sugars present in the pulp are first converted to alcohol by yeasts. The alcohol is then converted to acetic and lactic acid by special bacteria which results in further increases in temperature of between 45 to 50°C. The high acid content penetrates the bean resulting in the death of the beans and it triggers enzymatic processes which degrades protein and sucrose into amino acids and peptides which are the flavour precursors. The substances responsible for the purple colour of the bean are destroyed contributing to a lowering of the bitterness and astringency levels. This then allows for the development of chocolate aroma and flavour potential within the bean.

The fermentation process takes 6 to 8 days to complete. This is accompanied by a fall in the temperature within the bean mass and a plumping of the beans. It is recommended or preferable to conduct the fermentation process in approved wooden fermenting or sweat boxes. The preferable timber to construct the box can be cedar, tapana, cypre, crapaud or even untreated white pine.

The size of the box will depend on the production from the particular estate, and this is further guided by the fact that boxes should be filled and closed in a single day (do not exceed 2 days in this situation). The minimum quantity of wet beans for a good fermentation is 90 to 100kg (between 700 to 900 pods). This can be achieved in a box of dimension 50cm x 50cm x 50cm (1.6ft x 1.6 ft x 1.6 ft), while a sweatbox of dimension 1.2m x 1.2m x 1.2m (3.9 ft x 3.9 ft x 3.9 ft) can hold between 900 to 1000kg (1984 to 2,204 lbs) of wet beans. Ensure that the depth of the wet cocoa in a larger box is between 60cm and 105cm (1.97 ft x 3.44 ft).

The beans are turned in the sweatbox every 48 hours or two times during the entire period. This process of turning is important as it ensures the even heating of the beans, allows air to enter the ferment, breaks up any lumps and prevents the formation of mold on the beans. If beans are not “turned”, they will not ferment properly and will become moldy and bad smelling.

The survey data for the OECS producers showed that 44% of farmers undertake wet bean processing, 48% process cocoa into dry beans, and 44% do other value-added products. Only 10% of respondents purchase beans from other farmers. An estimated 88% of those surveyed did not have sweat boxes. From those who had, 28% had five boxes, 14% had four boxes, 14% had two boxes and 14% had one box. The capacity of the boxes averaged 200 lbs of beans with most others having between 250–400 lbs.



7.3 Dry Bean Processing

After fermentation, the cocoa beans must be taken out and immediately spread on the floor of a cocoa house or some other wooden surface to dry. Spreading beans on a concrete or asphalt surface is not recommended. If drying is not started immediately, the cocoa beans will keep fermenting and rot. Direct natural sunlight drying produces the best quality in cocoa.

At the end of fermentation, the moisture content of the bean is approximately 60%, and this must be reduced to between 6.5 to 7% for storage and shipping. The removal of moisture over the first two days of drying must be a gradual process to allow the changes that occurred during fermentation to be properly completed. Drying is complete when beans are crispy and have lost elasticity when pressed in the hand. This is by 6 to 7 days during normal dry weather, while in rainy periods this will require a longer time. During drying, the beans should always be protected from rains and other conditions that will produce mold. Too slow or inadequate drying will also cause mold growth. Again, these precautions are observed to prevent contamination from Ochratoxin A produced by molds.

Routine testing of dry beans includes physical (debris, bean count, defects, colour, fissuring), chemical (cadmium, pesticides), biological (insects, microbial, internal mold) procedures. While season (weather and rainfall) alter the dominant flavour traits of the beans; Dominica, Grenada, and Saint Lucia are designated by the International Cocoa Organization (ICCO) as producers of fine and flavour cocoa.

To finance both wet and dry bean processing activities, the survey found that either specific loans and considerations are not easily available, cost of borrowing too high or collateral

required is onerous. Regardless of financing, processors have been building capacity with harvest and post-harvest technology, bean fermentation and drying, packaging and storage of dried beans, quality attributes of cocoa beans (wet & dry), business management, and marketing and sales.

Cocoa Bean Drying Houses: Only 7% of farmers surveyed in the OECS cocoa-producing countries had a cocoa bean drying house. That is, most farmers did their bean drying on open ground on the farm holding. The sizes of the drying houses ranged from 5ft x 5ft to 60ft x 15ft. From 131 respondents, only 7% had dryers. Capacity ranged from 100 lbs to 600 lbs / batch.

Box 7.1: Best Known Practices for Storage of Beans

- i. Beans should be placed in sanitized food grade containers or bags e.g., jute bags, 2mm plastic bags, GrainPro Bags® or sealable plastic containers.
- ii. The relative humidity (RH) in storage room should be maintained at less than or equal to 70%. This can be maintained with the use of a dehumidifier.

While new Jute bags are commonly used for packing dry beans, 86% of respondents indicated that they did not have these bags. For those who had bags, capacity of the bags ranged from 50 to 150lbs and the majority had only 2 bags.

7.4 Value-Added Processing

In addition to being recognized for its fine and flavoured cocoa beans, the OECS islands also produce cocoa-based products with local, regional and international appeal such as cocoa sticks / balls / cake, instant and ground drinking cocoa, chocolate bars, cocoa nibs as well as nutraceuticals within the cottage industry. On average, value-added processors have remained in the business for 10.5 years creating backward linkages within their islands and focusing on outward orientation with shorter-term partnerships and business relationships. Some value-added processors such as the Belmont Estate in Grenada are vertically integrated suggesting that they grow, ferment, dry, and process their own beans.

The main quality factors in cocoa beans that are essential or required for value-added products are aroma, flavour, colour, purity, consistency, organic and cocoa butter content. Geographic location of the production areas of the cocoa beans is not as important to processors as a quality factor. Put together, these usually determine the choice of supplier or the selection of dried cocoa beans for value-added processing. On average, value-added processors pay XCD 9.60 / kg for 'Grade 1' dried cocoa beans.

The major challenges in exploiting the opportunities for growth include lack of processing equipment, insufficient capacity and product volume, market structure (controlled by

dominant firms), maintaining traceability and food safety requirements, meeting quality standards of competitors, high cost of advertising and promotion, understanding export marketing and cost of freight. The need for human resource training along the value chain across many skillsets from food science and production to marketing and sales have been identified as a challenge. This is in addition to calls for improved marketing and business facilitation to support the performance and profitability of the value-added business for cocoa-based products.

7.5 Value-Added & Cocoa-Based Products: Saint Vincent Cocoa Company

In the case of Saint Vincent and the Grenadines, the Saint Vincent Cocoa Company basically covers the entire value chain. Initially this was a government-operated facility but subsequently (2015/2016) the company was vested with a local business. The company continued to support farmers through providing most inputs, field management and purchased all wet beans. The company processes cocoa beans into a crude cocoa (average 40 lb block) for export primarily. Small volumes of beans were still exported to the United Kingdom. The company produces chocolate bars for the local market.

However, within the last 18 months the company commenced harvesting its own cocoa from approximately 300 acres of production. It plans to rehabilitate or develop new fields amounting to 800 acres over the next few years. This essentially cut its reliance on independent farmers and allows the company to dominate the value chain for cocoa and cocoa-based products on the island.

7.6 Value-Added & Cocoa-Based Products: Grenada

In Grenada, the Grenada Cocoa Association remains the flagship for the sector. The Association is a monopoly exporter for cocoa beans. Farmers are offered a guaranteed market for both wet and dry beans. While the medium to large estates such as Belmont Estate and Crayfish Bay Organics are involved in value chain activities, they cannot export cocoa beans out of Grenada. These value-added processors go on to service export markets for cocoa-based products, domestic and tourist consumption. These estates do not usually purchase from farmers but rather grow or produce beans for themselves. Farmers either sell to the Association or artisans on the island who operate within the informal sector and which makes it difficult to quantify their activities. Nonetheless, an estimated 25 artisans are involved in value-added activities along with 5 wet/dry bean processors on the island.

Typical practices for receiving and purchasing wet beans from farmers include proper equipment for testing, scales for weights (calibrated), sanitary reception area / table, waste determination system, and documentation to support traceability. Purchasing wet beans is

usually done on the basis of quality. Where the processor is also a grower, information is usually recorded on harvesting. Food safety issues relating to decay are sometimes encountered. Quality is determined by size of wet beans and its freshness in appearance. Condition and degree of fermentation is also considered. Fermentation boxes are utilized but with appropriate sanitation procedures to avoid food safety hazards.

In Grenada, Crayfish Bay Organics has its operations certified by the Certification of Environmental Standards (CERES). CERES is accredited and registered to certify according to the following standards:

i. Regulation (EC) 834/07,	ii. 4C Common Code for the Coffee Community,
iii. NOP (see USDA website),	iv. C.A.F.E. Practices,
v. JAS Organic,	vi. UEBT - Union for Ethical Bio Trade,
vii. GLOBAL G.A.P.,	viii. SPP - Simbolo de Pequenos Produtores,
ix. UTZ CERTIFIED,	x. Fair TSA - The Fair-Trade Sustainability Alliance,
xi. Rainforest Alliance,	xii. Bird-friendly coffee.

CERES certifies well-defined procedures and policies for a range of stakeholders including farmers and farmer groups, beekeepers, wild collection companies, processors, traders, and certification of substances used for organic production such as fertilisers, pesticides or processing aids.

7.7 Cocoa-Based Products Marketing & Development Strategies

A common trend of thought and conversation among cocoa value chain actors surveyed in the OECS was that cocoa-based products sold to tourists on the islands qualified as exports. Export marketing, developing markets abroad for cocoa-based products or further exploring the range of possibilities in cocoa processing were not immediately in their line of sight. The fact remains that cocoa is a key ingredient or input for many applications in food and confectionery, pharmaceuticals, nutraceuticals as well as tourism potential for example. The high-valued fine and flavoured cocoa (Trinatario and Grenada Select varieties) is grown and processed in the OECS countries and remains a basis to promote the extraction of the highest economic return for local actors in that value chain.

Beans can be traded for up to USD 7,000-8,000 / MT with value-added cocoa-based products exceeding this market potential. However, the trade in cocoa beans happens outside of public glare and traditional market information. International companies usually negotiate and contract with farmers or processors directly with guideline specifications and requirements

for processing and treatment of beans. Most beans are traditionally exported to large international manufacturers as compared to locally produced confectionery.

Beyond food and confectionery, consideration should also be given to the fact that new varieties of cocoa possess butterfat levels of 50 % and more. Addressing the research gap to promote nutraceuticals with respect to levels of oxidants for example, can assist with industry development by allowing and informing investments into different segments of a modern cocoa industry. Matching attributes of cocoa beans and cocoa-based products to geographic origin, agroecological zones, soil type, or other characteristics can also assist in marketing, product development and intellectual property.

Promoting an inclusive, modern cocoa industry for the OECS countries should consider key strategies and areas of focus including market segmentation, modernizing the marketing system, ultra-niche marketing, building deeper linkages in manufacturing and tourism either at the local or regional level, identifying investment capital for modernization of the value chain and eliminating an unbalanced focus on farm-level subsidies and support.

Rather, developing production incubators tied to national production targets and other key performance indicators would help to aggressively drive and sustain critical mass in bean production for value chain expansion. The production incubator model may be structured according to feasibility studies to identify the optimal scale of production, field architecture, soil type, variety, and planting material (grafted, clones etc). For marketing and product differentiation, the microlot approach can be adopted similar to coffee industry marketing. The concept means that there has been investigative and experimental input by the buyer, grower or both, to produce the cocoa beans with special characteristics.

PART E: MARKETING OF COCOA BEAN AND COCOA-BASED PRODUCTS

Although the OECS cocoa industry is relatively small and under development, it is characterized by a range of marketing channels for its various products. These include the following:

1. On-farm sales of wet beans;
2. Sale of wet beans to dry bean processors or processors of cocoa-based products;
3. Sale of dry beans to domestic processors of cocoa-based products;
4. Sale of dry beans to the regional and international market;
5. Direct sales of dry beans to overseas cocoa-based product processors.

In this part of the Report, we discuss and identify the operational aspects of these channels with a view to identifying opportunities and challenges for marketing of OECS cocoa industry products.

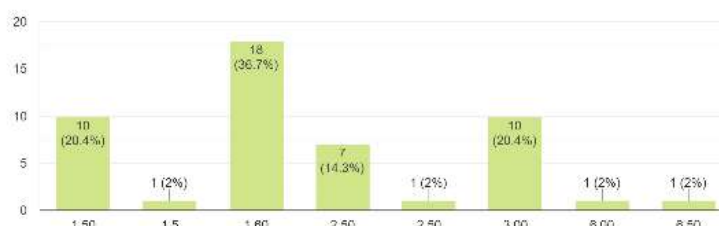
Section 8: Marketing (Wet and Dry Beans)

Wet beans are readily sold *ex-farm* to dry bean processors, cottage-scale processors or exporters of dry beans. These marketing channels are relatively simple and largely underdeveloped; except in the case of buyers who export to overseas processors as they require certain quality standards.

Prices of both wet and dry beans show significant variability and often depends

on the entity that is purchasing the beans. Our survey of prices received by farmers for wet beans shows significant variability. Our sample of 49 farmers reported prices received for wet beans ranged from XCD 1.50/lb to XCD 3.00/lb. Farmers in Saint Vincent and the Grenadines received the lowest prices while farmers in Saint Lucia earned almost twice the above prices. Overall, the modal price received for wet beans was XCD 1.60.

58b. Please enter the price/lb of wet beans:
49 responses



Out of a sample of 130 responses, none of the farms sold to fermentaries and only 12% sold beans to a dry processor or wholesaler. Prices received for wet beans from this type of processor ranged from XCD 2.50/lb to XCD 6.00/lb. Prices received for dry beans from the dry processor or wholesaler ranged from XCD 5.00/lb to XCD 10.00/lb with prices to exporters of dry beans at XCD 7/lb (Table 8.1).

Table 8.1: Prices Received for Cocoa Beans (Dry & Wet)

Cost / Price Point	Type of Bean	Price (XCD/lb)
Av. Farmgate Prices	Wet	2.20
Dry Processor / Wholesaler	Dry	6.00
Exporter Prices (Av.)	Dry	7.00

Of 122 responses received from cocoa farmers in the OECS, 25% indicated that buying agents is their preferred choice of buyer because they provide an available market or guaranteed sale, quick payment and less transaction hassle. An estimated 7% of farmers prefer to sell to dry bean processors because of their larger volumes and better prices. About one third of respondents preferred selling to manufacturers of cocoa-based products because they purchase both wet and dry beans, provide cash on delivery and buys larger volumes.

Section 9: Global Markets for Cocoa Beans & Cocoa-Based Products

9.1 Trends in the Global Market for Cocoa Beans & Cocoa-Based Products

In 2017, an estimated 43% of global cocoa consumption came from the chocolate confectionery industry. The size of the chocolate confectionery industry has been growing over the last decade from USD 150.8 billion (2012) to USD 208.15 billion (2020) and is forecasted to reach USD 223.6 billion by 2025 (Statista, 2021). The volume of the chocolate confectionery reached 1.55 million metric tons in 2019 (Euromonitor Consulting, 2020).

Key identified trends in relation to demand from specific countries and regions for cocoa beans, primary processed products and finished cocoa-derived products are highlighted below.

Cocoa Beans	Cocoa bean grindings are used as an approximation for cocoa bean demand. The main cocoa grinding countries are Côte d'Ivoire, the Netherlands, Indonesia, Germany, the United States of America (USA), Malaysia, Ghana, Brazil, France, Canada, Turkey, Spain, Singapore, Belgium, Belgium, Italy, the Russian Federation, Peru, Cameroon and Mexico (ICCO 2021). Canada is forecasted to increase its grindings from 80,000 metric tons to 100,000 MT (2020/2021).
Cocoa Paste/Liquor	For the past five years (2015–2020), the Netherlands has been the largest importer of cocoa paste followed by the USA, Germany, Belgium, France, Poland, Spain, Russia, Italy and Canada. The USA was also a large importer of cocoa paste in 2020, importing 132,000 metric tons with a value of USD 427 million (ITC TradeMap, 2021).
Cocoa Powder	Top 10 importers of cocoa powder are the USA, Netherlands, Russia, China, Germany, Turkey, France, India, Philippines and Belgium.
Chocolate	The other top importers of chocolates are Germany, France, Netherlands, Poland, Canada, Belgium, Japan and Spain.

9.2 Innovations in Chocolate Ingredients and Products

The growth of the chocolate confectionery industry has been increasing given its appeal to all ages of consumers. Several trends help in driving the growth of this market such as vegan chocolates or the acknowledged absence of animal dairy products, innovative ingredients and flavours, and single-origin/premium chocolate ingredients. (Fortune Business, 2021)

Consumers are interested to try new flavours in their food, hence the demand for innovative chocolate flavours. Inclusion of cleaner ingredients, indulging flavours and flavour combinations and use of rare and fine cocoa are certain trends adopted by manufacturers to provide healthier chocolate options for consumers. The market is primarily driven by evolving consumer preferences for innovative confectionery products.

Introduction of Healthy Ingredients

New innovative ingredients used in the chocolate industry include citrus flavours, vegetables, nuts, cereals, unusual fruits, rare cocoa, florals, a combination of flavours, and others. Usage of healthy ingredients such as stevia, honey, lactose-free chocolate ingredients, usage of non-hydrogenated fats, and others in chocolate products have provided wider options for diabetic populations. These innovations notably help in driving the growth of various chocolate products.

Growing Demand for Premium Dark Chocolates

The influence of the organic and clean label trend is strongly complementing the demand for premium dark chocolates made with organic ingredients. Consumers in the USA and Europe are more informed about the health benefits of dark chocolate and as the overall demand for packaged products is high, they are increasingly inclined toward opting for dark chocolate as a dessert option. Another major growth driver is the branding of seasonal and premium dark chocolates as gifts, primarily attracting consumers who are influenced by the price, packaging, ingredients, authenticity and the buying experience.

Savoury Over Sweet: Demand for Unique Flavours to Drive the Market

Chocolates are widely consumed as a snack in various countries and therefore inclusion of savoury ingredients is a good selling point. Savoury flavours are obtained from some combinations such as salt and sweet, fruits and botanicals, and hot and spicy. The demand for flavour inclusions has always dominated the demand for plain chocolates. Craft chocolate makers have recognized these demands and are incorporating these new flavours in their products. Salted caramel and sea salt continue to be the popular flavours. Chili, turmeric, and ginger flavours are the innovative flavour blends in the industry.

These products help demonstrate that chocolate serves as a great base for layering and building new flavours.

Sugar Alternative Solutions: Demand from the Diabetic and Obese Population

Sugar alternatives have gained immense popularity in the chocolate industry. As the rate of diabetic population increases, the demand for sugar alternatives increases too. The most popular claim in the battle of sugar is “low/no sugar”, which is expected to increase. Consumers are comfortable with natural sweet flavours present in chocolates, as compared to any chemical sugar alternatives. The usage of natural sweeteners such as honey and stevia has gained more popularity in the confectionery industry.

Sustainable and Clean Ingredients: Rising Trend for Clean-Label Products

Organic ingredients are seen as more natural and healthier, hence there is a continued demand for organic cocoa and chocolate ingredients. This trend is well established in Europe and gaining traction in the US and Asian markets. The biggest organic growth is seen in ice creams and chocolate confectioneries.

Apart from organic products, the clean and clear labelling trend is observed. A clear and succinct ingredient label provides a good opportunity to add value to food products. The use of real and natural ingredients such as fruits and plant parts provide a natural taste to chocolates and is one way to deliver cleaner chocolates.

Manufacturers are reducing the usage of chemical additives such as emulsifiers and preservatives in their cocoa products. Many companies are utilizing sunflower lecithin, which is a healthier and cleaner ingredient in chocolate products. For consumers preferring less processed and healthier food, the use of raw cacao is trending from using slow roasting and cold pressing options to preserve the nutritional content of the cocoa. Nutraceutical chocolates provides a very healthy option.

Improved Healthy Solutions: Usage of Healthy Ingredients and Cannabis

Although still niche, the usage of vegetables in chocolates is gaining popularity in Asian countries especially China. Examples are vegetable-chocolate combos of potato chips and chocolate, edamame and chocolate, wasabi and chocolate, and purple sweet potato and white chocolate.

The use of nuts and breakfast cereals have been trending for years and is still expected to continue. Hazelnuts, peanuts, almonds are pistachios are mainly utilized. New cereals gaining popularity are muesli, granola, and quinoa. Now trending is the use of immunity boosting herbs and spices as a response to Covid.

Recreational marijuana is now trending in various European countries and Canada and marijuana is incorporated in edibles such as candies and chocolates.

Packaging

Vendors in the chocolate market are introducing a range of new and creative packaging (recyclable and plastic free) and branding to attract customer attention in order to increase shelf life and revive customer interest. It helps in capturing interest and curiosity of consumers and is often considered an extension of the brand value.

Box 9.1: Other Recent Trends and Innovations in the Chocolate Industry

- A growing e-commerce space, accelerated by the COVID-19 pandemic;
- Use of directly sourced cocoa beans with 100% traceability from farms to consumers;
- Brands providing greater transparency in climate and environmental labelling (carbon and water footprint);
- Minimally processed (careful temperature control) to retain nutrients and flavour of original cocoa beans;
- Ethically-sourced ingredients;
- Use of more functional ingredients e.g., Protein, fibre, pre-biotics and pro-biotics;
- Ethical chocolates with UN Sustainable Goals (SDG) impact.

9.3 The Market for Fine and Flavoured Cocoa (FFC)

Cocoa is an important agricultural product in the global economy. World production in 2019 reached over 5 million metric tons representing a 33% increase in the last 10 years (FAOSTAT, 2021). The demand for cocoa and its products is all forecasted to continue its increasing growth trend. The global chocolate industry is currently valued at an estimated US \$200 billion dollars.

Fine or Flavour grades of cocoa are of different types, each having its own characteristic flavour. These are required by some chocolate manufacturers who are willing to pay a premium (CAOBISCO/ECA/FCC (2015)). These are mainly used in the manufacture of specialty chocolates and are usually from a blend of different types of beans, but more commonly from single origins, to give a distinctive flavour profile to the finished chocolate.

Global fine and flavoured cocoa (FFC) markets are becoming more niched, highly specialized and environmental, social, and governance (ESG)-oriented with best quality as an absolute requirement. These markets have their own supply and demand characteristics and are quite lucrative with an annual value of over USD 4 billion. The demand for FFC has been growing rapidly as a result of the health benefits of certain chocolates, emerging artisan and bouquet chocolatiers, heightened consumer awareness and expansion of markets in Asia,

Russia and Brazil. Specialized, differentiated origins of premium quality FFC beans are known to fetch over USD 7000 per metric ton. Quality in the FFC marketplace is now strongly linked to sustainability, traceability and certification mechanisms.

The cocoa industry in the Caribbean currently comprises eleven cocoa-producing countries. In most of these countries, production is low but still, the Caribbean region plays a very special and important role in the global cocoa economy due to the types of cocoa beans grown here. Again, three of the islands in the OECS are listed by the ICCO as 100% exporters of fine or flavour cocoa, these are Grenada, Dominica and Saint Lucia (ICCO 2019). This is an important springboard for sector development.

Section 10: Proposing a Marketing Strategy for the OECS Cocoa Industry Products

10.1 Key Features of the Market for Cocoa Beans

Investments in cocoa production is an attractive proposition for those countries that have the capacity to produce the highly demanded FFC beans. Unlike many agricultural commodities, countries that produce FFC beans have access to a global market that is largely unsatisfied and one that continues to grow. The high demand for FFC beans is driven by the impressive growth of high quality and high-priced chocolates and cocoa-based products. This growth in demand is also driven by the increasing varieties of chocolate products characterized by innovation in taste, ingredient composition and marketing. Competition among high-end chocolate manufacturers tend to drive innovation both with respect to the intrinsic products as well as marketing strategies thus expanding product range and quality. This in turn increases the demand for cocoa beans that have particular flavours and taste as well as the preference to source supplies from bean producers who practice sustainable farming, including labour welfare.

While the global market for FFC beans is strong and growing, the history of the industry suggests that the manufacturing segment of the industry captures most of the profits that emanate with the residual accruing to growers and farm workers unable to support a “living wage” or income².

Strategically, countries that have the capacity to produce FFC beans and are desirous of investing in the cocoa industry should aim for an integrated cocoa growing and processing industry. In order to capture the potential high profits of the industry the focus should be on developing a high-end manufacturing component rather than simply selling beans.

10.2 Case for an Integrated Growing / Processing Cocoa Industry: SWOT Analysis

Among the main strengths of the OECS cocoa industry is the fact that it has the capability to produce FFC beans. The four (4) cocoa-producing OECS member states have the natural advantage of suitable agroecological and climatic conditions which are ideal for cocoa farming. While the industry is relatively small, opportunities exist for its expansion and growth of the production base. The Study also found that there is an interest on the part of farmers, investors, small scale entrepreneurs and the governments in developing the industry. The growth of an integrated cocoa industry offers the opportunity to compensate

² Comparative study on the distribution of value in European chocolate chains., Food and Agriculture Organization of the United Nations. Research report. < <https://www.eurococoa.com/wp-content/uploads/Comparative-study-on-the-distribution-of-the-value-in-the-European-chocolate-chains-Full-report.pdf>

in part for the decline in income and employment from bananas. These islands have a potentially lucrative market for chocolates and cocoa-based products in its tourism sector inclusive of both stayover and cruise ship visitors. The availability of high quality locally produced chocolates and cocoa-based products capturing the unique island flavours should experience strong demand in this market.

Having identified some of the main strengths which could support a profitable cocoa industry; there are many issues that would need to be addressed to exploit these opportunities. Developing a viable and profitable cocoa industry is a long-term proposition requiring long-term commitment on the part of all actors – growers, processors, marketeers and governments. It calls for a holistic vision of the development needs of all aspects of the industry's value chain. In this regard Member States would need to develop an attractive promotional programme and a package of support measures to attract investments in the cocoa value chain including cocoa farming, processing of cocoa beans into high-end cocoa-based products and product promotion and marketing.

Box 10:1 Critical Development Support Needed to Grow and Establish a Viable Cocoa Industry

- A. At the farm-level, critical industry support includes the following:*
1. Provision of access to suitable land for expansion of production
 2. Training and capacity building for growers with respect to:
 - a. cocoa agronomy and management
 - b. pest & disease management
 - c. tree management / pruning
 - d. plant nutrition and management
 - e. irrigation
 - f. harvesting and post-harvest
 3. The provision of critical inputs:
 - a. Fiscal support for investments in production
 - b. Technical support e.g., diagnostic testing, soils sampling, disease identification
 - c. Availability of Select seedlings
- B. In the case of processing segment of the value chain; this is largely undeveloped. Promoting the growth and expansion of this segment of the industry is key to capturing the potential benefits of the industry. Critical support measures in encouraging investment in this component of the value chain include:*
4. Fiscal incentives for Investing in value added operations including processing beans – wet and dry, manufacture of cocoa-based products

Box 10:1 Critical Development Support Needed to Grow and Establish a Viable Cocoa Industry

5. Providing training/capacity building in processing technology, quality assurance and marketing, to both cottage scale and SME investors with a focus on producing high end products including products utilizing unique island flavours
6. Technical support in packing, marketing / market certification and quality assurance
7. Food Lab testing facility

PART F: IMPROVING FARM PRODUCTIVITY

Section 11: The Productivity Gap - Cocoa Farming in the OECS

11.1 Introduction

Productivity of cocoa trees is key to unlocking their genetic bearing potential in relation to the growing environment of climate and soils plus farmers use of best suitable agronomic practices. Accordingly, in an attempt to evaluate cocoa farming productivity in the OECS farm surveys were conducted as part of the industry value chain study. The study collected information on the main factors impacting on the productivity of cocoa farming inclusive of environmental factors and management practices.

Among the data collected the following were considered the main influencing:

1. Agroecological conditions in the growing areas such rainfall, soils, terrain
2. Genetic varieties of the cocoa trees
3. Planting density from close to wide giving no of trees per ha
4. Pruning and shade regime
5. Plant disease management
6. Pest management
7. Nutrition management – application of fertilizers and other nutrients
8. Age of trees
9. Planting density from close to wide giving no of trees per Ha

11.2 Estimating Productivity & The Productivity Gap – The Analytical Model

For the purpose of estimating cocoa productivity at the farm level, an Analytical Model was developed as part of this Study. The application of the Model was based on data collected from the survey of cocoa farmers including information on the agroecological conditions in the growing areas as well as management factors as reflected in the crop production practices of farmers in the four (4) major OECS cocoa-producing islands. The analysis is based on samples of ten (10) farms on each island.

Based on good management practices and suitable climatic and agroecological conditions our Specialist Cocoa Agronomist on the team benchmarked the yield potential as 900 kg/ ha of dry beans assuming pure stand basis.

The nine (9) factors considered important in determining yield of cocoa trees can be grouped in three (3) clusters, ranging from those with the greatest influence in productivity to the medium influence to those with the lowest level of influence, although still significant.

These clusters are presented below:

Group 1: Adequate Rainfall including Good Seasonal Distribution

Cocoa thrives in regions with good rainfall levels as well as good seasonal distribution. The rainfall levels and distribution in the cocoa growing areas in Dominica, Grenada Saint Lucia and Saint Vincent & the Grenadines appear ideal for cocoa farming. However, an emerging risk with respect to rainfall is climate change. Climate change events are to be monitored, especially subtle changes that can be taking place in the two main seasons (dry and wet) in terms of duration and levels of precipitation.

Group 2: Soils, Genetics, Nutrition and Pruning/Shade Management

The volcanic soils of the OECS are an important natural resource with good texture and pH. However, over the years its natural fertility has declined from leaching and soil loss (accelerated in sloping terrain with heavy precipitation) and crop removal. Accordingly, nutrient management is required to build back stocks of low nutrients, organic matter content and declining CEC values. Adequate nutrition will foster optimum flowering and fruiting with improved varieties, and this is further enhanced from shade regulation and proper tree architecture from regular pruning of trees.

Group 3: Pest Management, Disease Management, Plant Density, Age of Trees

Losses from pest (rodents and parrots) and diseases must be minimized to under 5%; cultural practices of good tree and field sanitation drives this process. Attention to making more productive use of land in terms of tree stocks per unit area is required. The intercropped model gives the option to have a minimum of 1,100 trees ha⁻¹ plus other high value fruits and bananas. Aged cocoa tree stocks (>30yrs) should be actively replaced to maintain sustainability in the future.

11.3 Estimates of the Productivity Gap & Recommended Targets for Increased Yield in Cocoa

Samples of farms were selected for the analysis from those surveyed - 10 farms each from Dominica, Grenada, Saint Lucia and 5 farms from Saint Vincent and the Grenadines. The estimation of current cocoa productivity levels among the farms surveyed was based on these samples.

For each farm, the nine influencing factors identified above were scored using scores 1 to 9, where:

- A score of 1 reflected very poor conditions and minimal contribution to the yields achieved.
- A score of 5 represented average suitability and contribution to potential at an average level.
- A score of 9 representing excellent conditions for cocoa production and the highest contribution to potential yield.

The main environment and management factors impacting on cocoa production/productivity were used in estimating the following:

- i. Current level of crop productivity based on environmental factors and **current management practices**.
- ii. Potential level of crop productivity based on environmental factors and **improved management practices**.
- iii. **The Productivity Gap** equals the potential average productivity for the sample of farms assuming improved management minus current estimate of productivity.

Annex Table 11.1 presents the overall model construct.

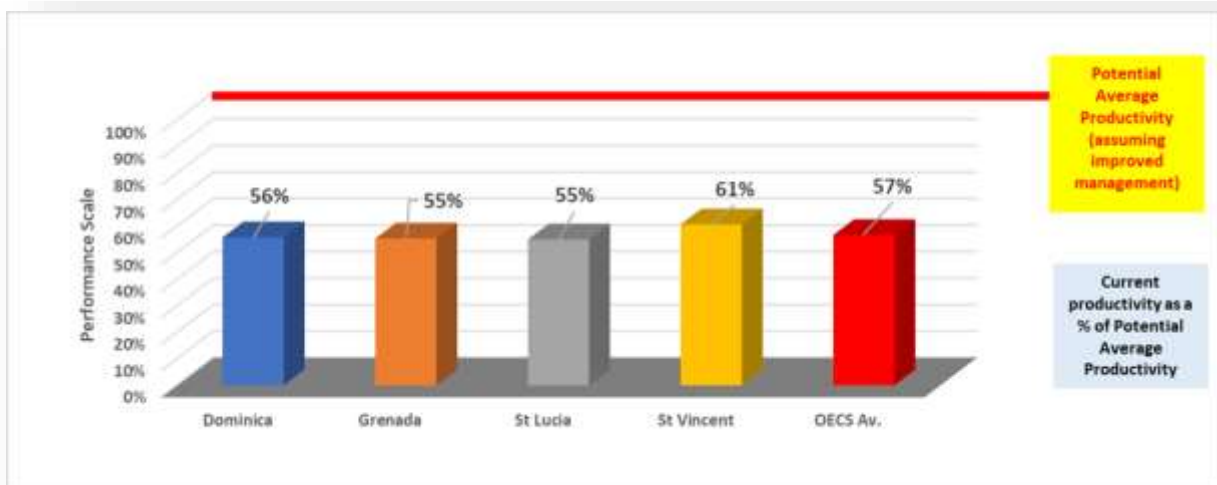
We provide in *Table 11.1* below a summary of the results of the analysis of our estimate of the average current level of crop productivity in each of the main cocoa growing islands. The average productivity in Dominica, Grenada and Lucia is similar ranging from 381 – 386 kg /Ha (dry bean basis). Our estimate of the current productivity level in Saint Vincent and the Grenadines is above the other three islands at 420 kg /Ha.

The maximum estimated productivity assuming good management practices is 692 kg /Ha thus indicating a potential crop productivity Gap of 306 kg /Ha for Dominica, 309 kg /Ha for Grenada and 311 kg/ha for Saint Lucia. Saint Vincent & the Grenadines has a crop productivity Gap of 272 kg /Ha (*Table 11.1 & Figure 11.1*). The crop productivity Gap thus reflects the potential for improved yields of cocoa beans assuming good management practices. Training and capacity building are therefore critical in improving yields and farm income.

Table 11.1: Estimation of Cocoa Productivity in the OECS

Indicators	Dominica	Grenada	St. Lucia	St Vincent & The Grenadines	OECS Av.
Estimated Current Average Productivity based on Current Management Practices (Kg/Ha)	386	383	381	420	392
Potential Average Productivity (assuming improved management) (Kg/Ha)	692	692	692	692	692
Yield Gap (Kg/Ha)	306	309	311	272	300
Current productivity as a % of Potential Average Productivity	56%	55%	55%	61%	57%

Figure 11.1: Average OECS Cocoa Farm Performance



Contribution of Various Environmental and Management Factors to Cocoa Crop Productivity: The nine (9) environmental and management factors that were considered important in determining crop productivity were presented earlier in Section 11.2. Figure 11.2 presents an index reflecting the contribution of each factor to estimated current yields. Assuming improved / good management practices the maximum average score is 9. Thus, the Gap between the maximum score of 9 and current score indicates the scope for each factor in terms of contributing to improved crop performance.

Figure 11.2: Environmental & Management Factors Impacting on Cocoa Productivity in the OECS: Indicators of Productivity based on Current Management Practices



Section 12: Recommended Best Practices for Improved Cocoa Yields

Given the findings of the Analytical Model on estimates of the Productivity Gap in cocoa farming in the OECS we now provide recommendations on Best Management Practices with respect to key influencers of yield levels, thus closing the gap in productivity.

12.1 Field Layout & Planting Density

Field Layout: Field orientation is important for capturing sunlight. Thus, tree rows should be placed in a north-south direction to capture sunlight during morning and evening and avoidance of self-shading. Where mountain ranges are present and create shade, design orientation should also take this into consideration in terms of additional or less shade trees required for field designs. Both plantation design and planting density depends on many factors such as clone or variety to be planted, fertility and topography of the land, shade, agronomic practices, pruning and harvesting methods and level of mechanization.

Tree Spacing: Tree spacing used in the industry include the Traditional System, Standard, as well as Semi-Intensive and High-Density. Traditional spacing is 12ft x 12ft using 300 trees/ac while Standard spacing is typically 10ft x 10ft utilizing 400 trees/ac. Higher density plantings include Semi-Intensive which uses an 8ft x 8ft spacing or 650 plants/ac. The High-Density planting uses 6ft x 6ft or 1200 plants/ac. As shown in Table 12.1 below, with increasing mechanization, farmers may use 12ft x 6ft thereby allowing for vehicles and machinery to traverse the field.

Table 12.1: Benchmark - Tree Stock per Unit Area of Land

Classification	Trees / Acre	Spacing (Ft)
Traditional	300	12 x 12
Standard	400	10 x 10
Semi-Intensive	650	8 x 8
High-Density	1200	6 x 6
Hedge row	600	12 x 6
Hedge row	720	10 x 6

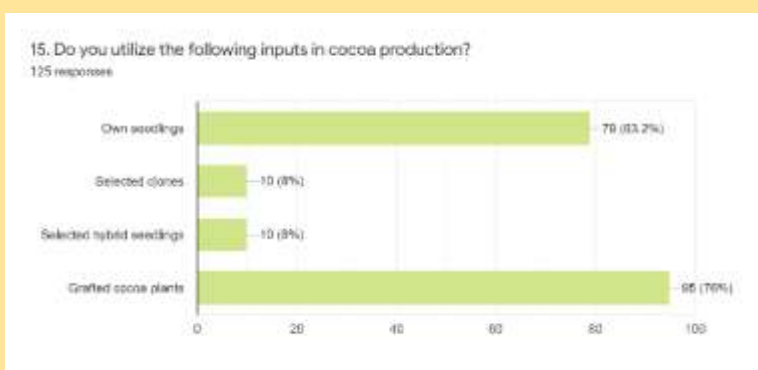
Windbreaks: Cocoa is sensitive to wind and where the field is exposed to strong winds, the protection of windbreaks is essential. Young trees are particularly more vulnerable than mature ones. Windbreaks are positioned perpendicular to the prevailing wind direction. As a rule of thumb, a windbreak provides protection for a distance 10 times its height.

Choice of cultivars: Utilize cocoa varieties which are preferably self-compatible and or cross-compatible, high yielding (low pod index 15-20), possess multi-disease tolerance to both Black Pod and Witches' Broom diseases, has desired flavour quality traits and conforms to the production of fine or flavour cocoa.

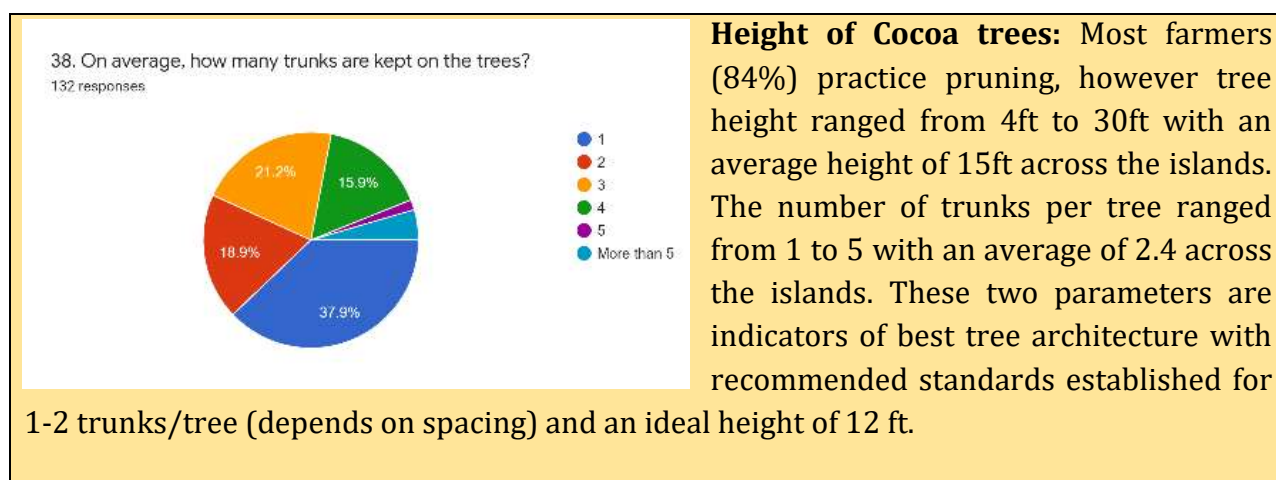
Planting material selection: Cocoa may be cultivated using seedlings, rooted clones and/or grafted clones. The choice depends on availability of desired genetic material, resources and expertise in the country.

Cocoa varieties

Source of planting material: 63% of farmers use their own seeds as a source to propagate plants. This results in open pollinated trees having limited yield potential and questionable genetic value. An estimated 76% of farmers had access to grafted plants, highest in Grenada and to a lesser extent in Saint Vincent and the Grenadines followed by Saint Lucia and Dominica. The use of clonal grafted trees will assure better agronomic performance and disease tolerance based on the traits of the selected clone used. An estimated 12% of farmers used 20 ft x 20 ft while 23% used 15ft x 15 ft. Only 15% of farmers surveyed used 12ft x 12ft.



Density of cocoa trees: 60% of farmers have a cocoa tree stock density of less than 300 trees per acre. In Grenada, 98% of the cocoa farmers reported this low tree density level. Considering Dominica (62%) and Saint Lucia (59%), these contributed to the high average value. All the farms in Saint Vincent and the Grenadines registered higher levels between 300 to 600 trees per acre. Low stocking rates will negatively impact on cocoa production volumes produced per unit area of land. A minimum tree density of 400 trees per acre is desirable.



There is the opportunity for the many farms exceeding these benchmarks to reduce tree height and remove excess trunks through pruning operations. Saint Vincent and the Grenadines with its young tree stocks is already on the wrong course of keeping 3 to 5 trunks per tree. Following the recommendations will provide a good booster for the young tree population across the islands. To become productive, tree management should be combined with other best practices of shade management, optimum nutrition and pest/disease control. The table below provides the average tree height (ft), number of trunks and their ranges for the respective islands.

Table 12.2 Cocoa Tree height and Number of Trunks by Island

Country	Avg. Tree Height (Range) (ft)	No of trunks and (ranges)
Saint Lucia	15.3 (6 to 20 ft)	2.3 (1 to 5)
Saint Vincent and the Grenadines	7.9 (5 to 11)	3.4 (3 to 5)
Grenada	16 (10 to 30)	2.0 (1 to 4)
Dominica	14 (4 to 30)	2.1 (1 to 5)

12.2 Three (3) Major Pests and Management Options

In the Caribbean major pests of cocoa are the cocoa beetle, rodents and birds.

The Cocoa Beetle: The cocoa beetle is a Carambycidae beetle, *Steirastoma breve* which is widely found over Latin America and the Caribbean and is the main reported pest in some of the countries. The larvae and the adult (beetle) stages of this insect cause severe damage to the stems, trunks and branches of the cacao plant. This prevents the normal development of the flower cushion which affects the production of flowers and fruits. Medium to heavy infestations will require control from spraying with insecticides.

Rodents and Birds: Rodents found damaging cocoa pods are rats and squirrels which both chew through the pod shell of ripened pods to feed on the beans. Rats are a serious problem in some islands and are controlled by using baits which are set by placing a rodenticide in the hollow parts of bamboo cuttings and tying them on the branches of trees, out of the reach of other animals. Squirrels are controlled by shooting using firearms.

12.3 Major Diseases and Management Options

The major diseases of cocoa in the Caribbean are Black Pod Disease and Witches' Broom disease. An awareness of Frosty Pod Rot is necessary since it represents an invasive alien threat to the OECS cocoa-producing islands.

Black Pod Disease: Black Pod disease (BPD) is caused by a fungus called *Phytophthora palmivora* which results in widespread destruction of cacao worldwide. It attacks several parts of the plant, but the most severe damage is on fruits, especially those that are nearly ripe. Management of the disease is achieved by using an Integrated Pest Management approach which seeks to remove excessive moisture and shade, create better ventilation of trees and reduce the inoculum load by combining the following practices:

- Cultural methods which include removal and destruction of diseased plant material, optimum regulation of shade,
- Chemical control by use of copper-based fungicides, and
- Use of resistant or tolerant cocoa varieties to BPD. Some cocoa varieties such as ICS 95 show more tolerance to the disease.



Black Pod disease

Witches' Broom Disease: Witches' broom disease (WBD) is caused by a fungus called *Moniliophthora perniciosa* (formerly *Crinipellis perniciosa*) resulting in abnormal growth and lesions on the shoots, branches, floral cushions and fruits. It also attacks nursery seedlings. The symptoms of the disease are characteristic shoots or brooms caused by swelling of an infected terminal or axillary bud. The control measures are similar to Black Pod disease, but emphasis is placed on using disease tolerant and resistant varieties such as some of the TSH selections.



Frosty Pod Rot

Frosty Pod Rot: Frosty Pod Rot (FPR) or Moniliasis is caused by a fungus called *Moniliophthora roreri*. This devastating disease is present in most of the cocoa growing countries of South America including Venezuela and all of the countries in Central America.

Jamaica was badly affected after introduction about 8 years ago. Other cocoa growing countries of the OECS need to be on high alert for its spread and introduction. This disease only attacks the fruits or pods of cocoa causing several types of symptoms that may occur alone or in combination with others.

12.4 Shade Management

Temporary shade: Cash crops are typically planted at least one year before establishment of young cocoa trees to provide over 50 percent shade. Useful species include banana, plantain, pigeon peas, cassava, papaya, etc. This allows the farmer to acquire working capital from the cultivation area in the first 1 to 4 years of establishment while providing much needed shade to the young plants. While the shade crops are normally removed by the fourth year after establishment, it is a common business practice to retain bananas on a permanent basis between the rows, ideally at 25% of the overall cocoa plant density, thereby contributing to the year-round income of the farmer.

In all the islands, shade management for adult trees was optimum except for a small percentage of farms in Saint Lucia and Dominica where it was excessive. From 128 responses, 77% reported shade at <50% and 23% of farmers had >50%.

12.5 Crop Productivity

Crop productivity can be benchmarked using the number of pods produced per tree. This is classified in three productivity categories:

- 1 to 15 pods/tree (Low),
- 16 to 20 pods/tree (Medium), and
- Over 21 pods/tree (High).

Section 13: Quality Assurance / Standards in the Cocoa Markets

13.1 Aspects of Quality in Cocoa

Quality is concerned with meeting the requirements or specifications that define high quality for a particular item or product. Cocoa quality includes *the all-important aspects of flavour and purity, and physical characteristics that have a direct bearing on manufacturing performance and aspects such as traceability, geographical indicators and certification to indicate the sustainability of the production methods* (CAOBISCO/ECA/FCC. 2015).

According to CAOBISCO/ECA/FCC (2015) aspects or specifications of quality that affect the value and price paid for a parcel of beans in cocoa therefore include:

- Flavour
- Food Safety and wholesomeness
- Physical characteristics
- Consistency
- Yield of edible material (nib)
- Cocoa butter characteristics
- Colour potential – ‘colourability’
- Traceability, geographical indications and certification

The ICCO (2016) provided a combination of criteria and protocols as a means to remove some of the ambiguity in assessing quality. These are:

- Identifying the genetic origin of planting material
- Morphological characteristics of the plant
- Assessing the flavour characteristics of the cocoa beans produced
- Analysing the chemical characteristics of the cocoa beans
- Colour of the cocoa beans and the nibs
- Degree of fermentation and drying
- Presence of acidity and off - flavours
- Percentage of internal mould and insect infestation
- Percentage of impurities

13.2 Standards (Benchmarks) for Best Quality in Cocoa Beans

The International Cocoa Standards specifies that Cocoa of Merchantable Quality meet the following requirements:

- It must be fermented, thoroughly dry, free from smoky beans, free from abnormal or foreign odours and free from any evidence of adulteration.

- It must be reasonably free from living insects.
 - It must be reasonably uniform in size, reasonably free from broken beans, fragments and pieces of shell and virtually free from foreign matter.
- i. **Flavour:** FFC demands detailed profiling of flavour characteristics as a lead item to ascertain best quality.
 - ii. **Consistency:** In terms of both flavour and physical quality particularly bean size, amount of defective beans and degree of fermentation.
 - iii. **Bean size and uniformity:** The weight of a cocoa bean should at least be 1.0 g and should be uniform in size. Bean counts are the quantity of beans required to make up 100 g. Therefore, less than 100 beans per 100 g is the best standard. Medium beans are 101 to 110 in 100 g. The shell content should range between 11 to 12%.
 - iv. **Moisture content of dry beans:** This must be 6.5 to 7% MC for best storage and manufacturing.
 - v. **Butterfat Content:** Ranging between 55 to 58 % and preferably of a hard nature resulting from a low free fatty acid (FFA) content of >1%.
 - vi. **Defective Beans:** Cocoa graded on the basis of the count of defective beans in the cut tests. Defective beans shall not exceed the following limits:
 - Mouldy beans: maximum 3% by count,
 - Unfermented/Slaty beans: maximum 3% by count,
 - Insect damaged, germinated or flat beans, total maximum 3% by count.
 - vii. **Sieving:** (anything sieved through a screen with 0.5 cm holes) – Max 1.5%.
 - viii. **Foreign matter:** (stones, husk, placenta, etc. with no commercial value) – Max 0.755%.
 - ix. **Cocoa Related Matter or CRM:** (clusters, broken beans and associated fragments and pieces of shell which do not pass through the sieve) – Max 3.5%.
 - x. **Off-taste in Liquor:** No off-taste (No mouldy, earthy, hammy or smoky off-taste).
 - xi. **Cadmium:** <0.2ppm (the EU sets limits in a final chocolate product of 0.8ppm in dark and 0.3ppm for milk chocolate).
 - xii. Other food safety aspects in cocoa are:
 - Ochratoxin A associated with mould infestation,
 - Polycyclic Aromatic Hydrocarbons PAHs related to fuels such as diesel in drying cocoa
 - Pesticide residues (use of recommended pesticides only for cocoa)
 - Bacterial counts e.g., Salmonella. Contamination can arise from unhygienic practices.

13.3 Cadmium in Cocoa and its Mitigation

Cadmium represents a very important and recently introduced food safety issue in cocoa with the advent of the European Union Regulation (EU) 488/2014 in Jan 2019 in which limits to cadmium was set in final chocolate products (mentioned below). Cadmium, like other heavy metals, may have adverse health effects if consumed in amounts above permitted levels.

Cadmium is a heavy metal that is found naturally in young volcanic and sedimentary based soils or through environmental contamination by the application of high cadmium fertilizers or from flood waters settling on cocoa fields. Cadmium bio accumulates in cocoa when predisposing soil conditions such as low pH, and low organic matter occur. Cocoa trees are natural bio accumulators of cadmium from the soil, especially older trees absorbing cadmium through their roots, then to leaves and ultimately into the cocoa beans.

EU maximum allowable limits of cadmium in cocoa and derived products are as follows:

- milk chocolate with <30 % total cocoa solids: 0.10 mg/kg
- chocolate with < 50 % total cocoa solids: 0.30 mg/kg
- chocolate with $\geq$ 50% total dry cocoa solids: 0.80 mg/kg
- cocoa powder sold to the final consumer: 0.60 mg/kg

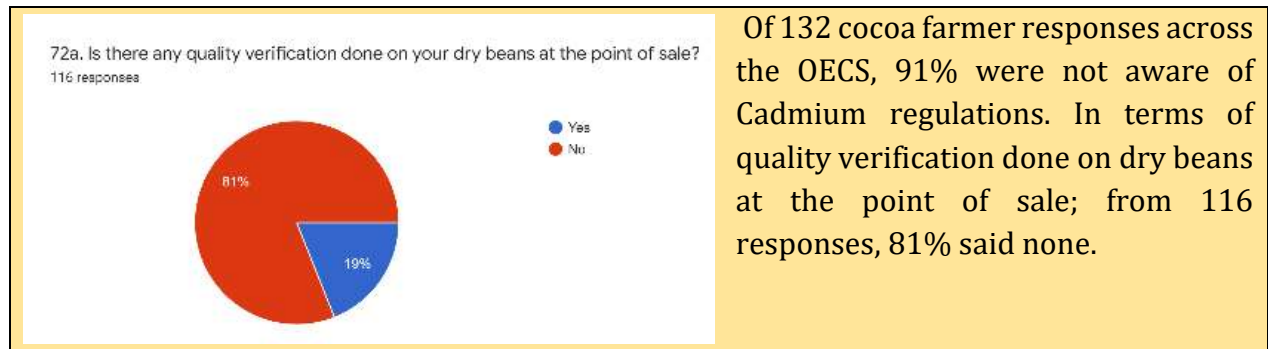
Despite the limit being set for chocolate and cocoa derived products, international cocoa bean buyers are also using these limits for cocoa beans being purchased. This has the direct implications for the exports of cocoa beans from the OECS, if they are affected by cadmium.

Initially all cocoa producing countries were required to determine the extent of cadmium by sampling soils and cocoa beans in a stratified segmentation of all the cocoa growing regions followed by laboratory analysis of the samples.

The following are recommendations for mitigating cadmium contamination in soils (CRC, 2020) affected by the problem:

- i. Application of limestone to soils with low pH, usually below a value of 5.
- ii. Application of biochar and large amounts of organic manure can help.
- iii. Application of High Zn micronutrient fertilizer to suppress the uptake of Cadmium in soils found to be low in cations including Ca, Mg, Fe, Zn and MN.
- iv. Replanting fields with grafted plants in which the root stock is a known low bio accumulator of cadmium. An example of such a cocoa variety for rootstocks is IMC 67.

- v. Ensure that where manures and fertilisers are used that these are tested and contain little or no cadmium.
- vi. Other solutions for mitigation currently being researched include breeding of new cocoa varieties with low cadmium uptake.



PART G: OPPORTUNITIES FOR GROWTH AND DEVELOPMENT OF THE OECS COCOA INDUSTRY

Section 14: Mapping the OECS Cocoa Industry

14.1 Conceptual Map of the Cocoa Industry Value Chain

The OECS cocoa industry value chain map provides a tool for identification of key industry actors and an evaluation of performance of the various operations in the industry chain. Activities in the chain range from the provision of inputs in farm production to product transport to the various processing operations and movement along alternative marketing channels. It includes service providers and support measures for the chain activities conducted by various actors. Mapping the value chain therefore assists in identifying strengths, gaps and weaknesses in the functioning of the chain. It could also reflect inefficiencies and capacity constraints.

The Map presented below provides a conceptual representation of the Cocoa Value Chain. It includes the major actors in the Cocoa Value Chain and their functions as well as logistic support for the various operations.

- 1. Providers of Cocoa Farming Inputs and Services including an Enabling Environment**
- 2. Cocoa Farming / Cocoa Bean Production**
- 3. Level 1: Processing & Marketing:**
 - 3.1 Wet Beans
 - 3.2 Dry Beans
- 4. Level 2: Marketing & Distribution of Finished Dry Beans**
 - 4.1 Exports to Extra-Regional Markets by Agents, Wholesalers and Aggregators
 - 4.2 Exports to Regional Markets by Agents, Wholesalers and Aggregators
- 5. Level 3: Domestic Processing & Marketing of Cocoa Based Value Added Products**
 - 5.1 Exports to Extra Regional Markets by Processors & Marketing Agents
 - 5.2 Exports to Regional Markets by Processors & Marketing Agents
 - 5.3 Domestic Retail by Processors, Wholesalers and Marketeers
- 6. Logistic Support: Levels 1 to Level 3:**
 - a. Transport
 - b. Storage
 - c. Customs Services
 - d. Port Services

14.2 Evaluation of OECS Cocoa Industry Value Chain

This study on the OECS Cocoa industry included baseline surveys of the main industry actors in each of the OECS Member States. Questionnaires were developed to capture the full range of information relating to their activities /operations, performance, challenges, access to key services and future in the industry.

The Processing and Marketing Segments of the Value Chain: Our field staff in each island conducting the interviews of the various actors / value chain operatives in each island. Generally, they reported an industry that is currently characterized by a number of growers but very few entities involved in the other value chain operations including:

- i. Wet bean processing
- ii. Dry bean processing
- iii. Cocoa-based valued-added operations
- iv. Exports of cocoa beans

Our conclusion from the paucity of actors involved in post-farm operations of the industry is that the industry, specifically its processing and marketing components, are still in its early development / infant stage. Additionally, where Field Staff attempted to interview processors and marketeers, they reported a general reluctance to be interviewed and where they agreed to be interviewed, the information shared was limited.

The available evidence suggests that the major activities in the OECS cocoa industry at this time primarily relate to farm production. The rest of the industry being in its early development stage there was limited scope for the conduct of a realistic and meaningful evaluation of performance.

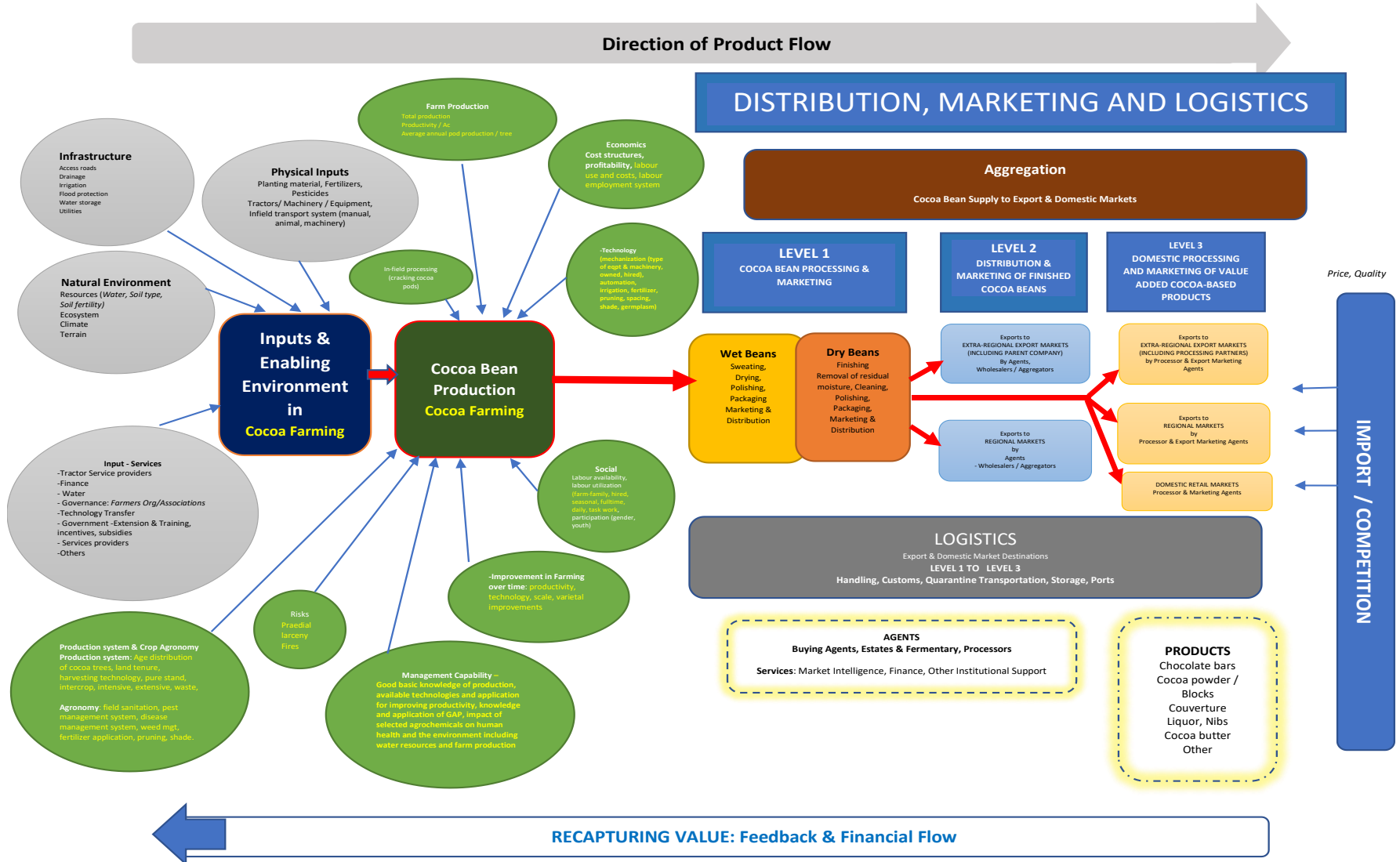
Evaluation of the Farming Operations of the OECS Cocoa Industry: Cocoa farming in the OECS is primarily the domain of small farmers, typically with less than 10 acres and usually intercrop with bananas, roots and tubers and fruit trees. This environmentally sustainable is one of the strengths of the industry and a source of economic and financial resilience. While production of cocoa per cultivated area is significantly below pure stand cultivations, intercropping is important in providing diversified income sources and risk management with respect to pest, diseases, hurricanes and market vagaries.

Data collected from growers on their cocoa farming operations indicate productivity levels below their potential. A number of factors were identified that impacted on crop performance in terms of productivity. These were discussed in Section 11 and included rainfall, soil fertility, access to quality planting material and management related factors

including planting density, pruning, control of pest and diseases, plant nutrition (fertilizer application) and age of trees.

Based on the above analysis, the scope for improving productivity in cocoa farming in the OECS is primarily related to management related factors and access to quality planting material. Development of the OECS cocoa industry at the level of cocoa farming thus relies on training and capacity building in cocoa agronomy and management as well the provision of key inputs such as improved genetic material and a programme for pest and disease control.

Figure 14.1: Value Chain Conceptual Model - Cocoa



PART H: RECOMMENDATIONS

Section 15: Developing the OECS Cocoa Industry

This Study on the conduct of a value chain analysis of the OECS cocoa industry examined all activities in the chain from production to marketing; domestic, regional and extra-regional. The analysis is based on the conduct of face-to-face interviews of value chain actors in each of the OECS Member States as well as well as marketeers in the overseas markets. The main cocoa producers in the OECS were Dominica, Grenada, Saint Lucia and Saint Vincent and the Grenadines with the latter having only a few growers characterized by a relatively young tree population. The valued-added operations of the industry are largely underdeveloped with the few processors being mainly cottage scale. Commercial processors of chocolates and cocoa-based products are few.

15.1 Rational for Development of an OECS Cocoa Industry

Sections 8, 9 and 10 presented the marketing report on the OECS Cocoa Industry – Section 8 focussing on wet and dry cocoa beans, Section 9 on marketing of processed products focusing on the characterization of the international market and Section 10 outlining a Marketing Strategy for the industry. Based on the strong and growing global demand for cocoa-based products, especially products based on fine and flavoured cocoa beans, we are of the view that cocoa production provides an attractive future. However, the opportunity is mainly in the chocolate and cocoa-based products market rather than the beans. While the global market for chocolates and cocoa-based products continue to grow, it is dominated by the larger established and branded manufacturers. Entry into this market entails significant promotional and marketing costs. On the other hand, the OECS tourism industry offers a potentially lucrative market for small scale manufacturers of these products of focus.

Based on the foregoing, we are of the view that there is a potentially attractive opportunity for a domestic cocoa industry in the OECS. It offers an opportunity to fill the void with respect to income, employment and economic contribution resulting from the decline in bananas. However, the industry is still relatively small and underdeveloped with a concentration on cocoa farming. Exploiting the potential opportunities offered by cocoa requires the development of an integrated cocoa growing – processing – marketing industry involving the development of all components of the value chain. Exploiting the industry potential requires a change in the value proposition with a focus on marketing of chocolates and cocoa-based products rather than beans.

15.2 Recommendation: Development of an Integrated Cocoa Industry

Above we have identified some of the main strengths of the OECS cocoa industry that could support sustainability and profitability. However, there are many issues that would need to be addressed to exploit these opportunities. Developing a viable and profitable cocoa industry is a long-term proposition requiring long-term commitment on the part of all actors – growers, processors, marketeers and governments. It calls for a holistic vision of the development needs of all aspects of the industry's value chain. In this regard, Member States would need to develop an attractive promotional programme and a package of support measures to attract investments in the cocoa value chain including Cocoa farming, Processing and Marketing of high-end cocoa-based products.

We now outline some of the critical development support needs in growing and establishing a viable industry.

a. FARM-LEVEL DEVELOPMENT SUPPORT

At the farming level critical industry support includes the following:

1. Provision / access to suitable lands for expansion of production.
2. Building the capacity of a cadre of Specialist Master Trainers who would build the capacity of growers in the following areas:
 - i. Modern field layout and architecture for optimization of sunlight, transportation corridors for access of machinery, equipment, transport vehicles and accommodating field tours.
 - ii. Establishment of a 1-acre experiential learning plot in Lead (Hub) Farmers holding to facilitate satellite producers teaching and learning of precision cocoa-farming practices in:
 - a) cocoa agronomy and management,
 - b) pest & disease management,
 - c) tree management / pruning,
 - d) plant nutrition and management,
 - e) irrigation
 - iii. Re-orientation of cocoa from *"bean production"* to *"production of intermediary product for human food"*. This means adoption of best practices in food safety, quality assurance and other contextual characteristics such as environmental ecosystem / crop growth habitat.
 - iv. harvesting and post-harvest (selection, fermentation and drying) of beans to accentuate and promote best quality.
3. The provision / access to critical inputs:

- i. Fiscal support for investments in production and agro-tourism facilities.
- ii. Technical support e.g., diagnostic testing, genetic compatibility, pollination strategies, soil sampling for nutrient, heavy metals as well as disease identification.
- iii. Adequate availability of Select Plant Genetic Material for different geographic agroecological zones.
- iv. Creation of a comprehensive GIS system for cocoa as a tool for environmental interaction, resource intervention, risk aversion, traceability and marketing.

b. DEVELOPMENT OF THE PROCESSING & MARKETING SEGMENTS OF THE INDUSTRY

In the case of the processing segment of the value chain, this is largely underdeveloped. Promoting the growth and expansion of this segment of the industry is key to capturing the potential benefits of the industry. Critical support measures in encouraging investment in this component of the value chain include:

1. Fiscal incentives for investing in value-added operations including processing beans – wet and dry, manufacture of cocoa-based products.
2. Providing training/capacity building in innovation and entrepreneurship, new product development, processing technology, quality assurance and marketing, to both cottage scale and SME investors, with a focus on producing high-end and novel products including products utilizing unique terroir - island flavours, attributes/distinctive features, origins and development of brands.
3. Technical support in packing, marketing including web-based marketing/ market certification, traceability and quality assurance.
4. Quality Lab testing and certification facility.
5. Development on business investment profiles, training and accommodating field tours.

c. ADDITIONAL POLICY SUPPORT

I. Establishment of a Centralized Cocoa/Chocolate Facility for the OECS Industry:

We recommend the establishment of a **COCOA RESOURCE TECHNICAL SUPPORT CENTRE (CRTSC)** staffed as follow:

- i. A Cocoa Agronomist and Master Trainer
- ii. A Chocolate Maker³ - differentiate the quality of the beans and origins (terroir and harvest), including Product Quality Assurance / Food Safety.

³ This is the professional responsible for the production of chocolate from cocoa. It is the person that accompanies the entire process, from the planting of cocoa to the manufacture of chocolate bars. The chocolate maker knows how to

- iii. Consultant - (when required) Chocolatier and Confectioner

The Centralized facility should also establish and maintain:

- i. a germplasm bank,
- ii. a product development and teaching lab.

II. Technical Programmes – Provision of Key Industry Support

1. Programme to Improve Soil Fertility

A programme of soil improvement is recommended given the declining soil fertility present in the volcanic soils where cocoa is grown. This has resulted from leaching of nutrients, soil loss and sustained crop uptake. Organic systems such as composting, vermiculture, and biofertilizers can be promoted to restore soil organic matter, Cation Exchange Capacity (CEC), health and fertility of cocoa soils.

2. Establish and Maintain Germplasm and Plant Propagation Support

Good germplasm is key to ensuring the high levels of productivity. The Identification and use of a group of commercial cocoa varieties (made up from ICS, GS, DOM, UF, TSH and other known desirable germplasm) for each island which must be clonally propagated as grafted plants and be made available to farmers. Farmers must be educated on the identification and characteristics of the individual varieties and the best agronomy in growing them to maximise their genetic potential for yield and fine flavour quality. These varieties must be established in clonal gardens for their conservation and utilization. Plant propagation capacity must also be properly developed and managed.

The plant pipeline thus developed will allow for the following:

- Replacement of aged cocoa tree stocks which have exceeded their 30-year economic life.
- Optimise current tree density plantings which are low in most islands (under 700 trees per Ha).
- Expansion of new acreages under cocoa to meet national production targets.

differentiate the quality of the grains and origins (terroir and harvest) and needs to be always updated about the innovations. <<https://www.cordonbleu.edu/news/professions-chocolate/en>>

3. Establishment of a Quality Management Systems (QMS)

The Development of QMS in the OECS cocoa industry is recommended with the main purpose to extract full value from *Bean to Bar*, quality assurance, product differentiation, traceability, flavour profiling. Infrastructure, functional field designs and layout, business management, agrotourism and marketing support with quality labs is key to developing a competitive industry.

4. Mitigating Risks Management Support

Farmers need to have access to support to cope with the increasing risks associated with cocoa production such as preventing high losses incurred from rodent, parrot and other pests as well as diseases as Black Pod and Witches' Broom, climate change, extreme weather events, cadmium etc.

5. Facilitating Farmer Economic Sustainability

Given competition within the cocoa value chain, industry growth and sustainability rely on a governance system that enables farmers to receive a commensurate share of the value in the trade and commercialization of cocoa via transparency, ultra-niche marketing, market intelligence, and value addition and retirement savings/investment plan.

6. Project Implementation

Re-engineering of the OECS Cocoa Industry will require substantial financial, technical and policy support. Thus, we recommend that such a project be driven by a senior government minister (with OECS oversight), given the span of the interventions from primary agriculture, agro-processing, industrial development, and cross-sector strategic alliances with other agencies such as Tourism and Bureau of Standards. This initiative will also require specially appointed **Project Management / Implementation Team** for project implementation, sourcing grant / investor financing. monitoring and control.

d. PROPOSED OECS COCOA INDUSTRY DEVELOPMENT MODEL

1. Context

The context for this proposal for an OECS Cocoa industry Development Model is the output from an analysis of the industry's value chain. The main findings of this analysis are as follows:

i. Strengths

- a. Cocoa beans produced in the OECS are fine flavoured which is a choice bean in the manufacturing of Chocolates and cocoa-based products and as such is highly sought after by Chocolatiers in the international market.
- b. The industry in the OECS, although, relatively small, has for a number of years an established cocoa farming segment.
- c. The OECS also has very good enabling agroecological conditions for high cocoa productivity.
- d. A few regional manufacturers who already have established business relationships with Chocolatiers in the foreign markets.

ii. Challenges

- a. The relatively low returns to growers and exporters of beans compared to Chocolate manufacturers.
- b. The high degree of competition from the well-established high-end Chocolatier in the international market.
- c. Developing chocolates and cocoa-based products that could compete in the global market against the recognized brands.
- d. Risks associated with climate change, increasing pest and disease incidence and decreasing soil fertility.

iii. Opportunities

- a. A tourism industry that could provide a good domestic market for chocolates, other manufactured products and tour services.
- b. Opportunities for exploiting the trends in chocolate manufacture by infusion local /indigenous products that offer complementary flavours.
- c. Potential for the industry to partially replace the decline in employment and income from banana industry.
- d. Potential to exploit combined sustainability labelling such as “Sustainability, Volcanic Island, Eco Friendly, and associations such as Organic Certified” to attract better prices in a segmented consumer market.

iv. Weaknesses

- a. Productivity of cocoa growers in terms of volume beans produced per unit area is below that required for a competitive industry. A number of management factors account for this and needs to be addressed.

- b. The postharvest / processing segments of the industry with respect to cocoa beans (both wet and dry) remains largely rudimentary and underdeveloped except in the case of a few operators.
- c. The manufacturing segment of the industry (chocolates and cocoa-based products) segment of the industry is also underdeveloped except for a few operators.

2. Purpose of the Proposed Model

The proposed Model for the development of an OECS Cocoa Industry is to provide critical development support to the industry within Member States of the OECS by centralizing the technical support necessary from a Centralized Facility so as to achieve economies of scale in the provision of technical support that is comprehensive, covering all development needs of various operations of an integrated cocoa production – processing – manufacturing industry. It also allows for the recruitment of well qualified and competent technical staff to provide the necessary support.

3. Project Proposal

Table 15.1 below provides details on the Proposed Project Development Strategy for the Industry. It is structured into four (4) Development Component comprising 6 Development Phases and a number of specific activities. The development of the industry is assumed to require six (6) years; thus, activities have been scheduled in logical development sequence over a 6- year period (refer to Gantt Chart 15.1 below).

4. The Proposed Development Model

We are proposing the implementation of development activities of the OECS cocoa industry over a duration of 6 years. The programme entails all business aspects of the industry's value chain. At the end, we expect a profitable and viable cocoa industry. Post-implementation, the role of the *Centralized Cocoa Technical Resource Facility* would be to continue providing technical support to the industry, ensuring its continued viability and profitability.

e. PROPOSED OECS COCOA INDUSTRY DEVELOPMENT PROJECT

Table 15.1: Proposed OECS Cocoa Industry Development Project

PROJECT COMPONENT	SCHEDULE/ Duration (mths)	Develop ment Phase	Schedule / Duration (mths)	Activity (Mths)
1. Preliminary Start-up Activities	0-6	1	0-6	PROJECT APPROVAL & START UPS 1.1 Policy Review /Project Approval 1.2 Establish OECS COCOA INDUSTRY PROJECT MANAGEMENT / IMPLEMENTATION TEAM (OECS CIPMI) Team 1.3 The OECS CIPMI to Elaborate on Project Design in Consultation with the Industry Stakeholders and the Member States 1.4 OECS to seek Support from Development Agencies for Project Implementation
2. Establish OECS COCOA RESOURCE TECHNICAL SUPPORT CENTRE (CRTSC)	7-36	2	7-12	Establish in house Cocoa Farming Technical Support Capacity in the COCOA RESOURCE TECHNICAL SUPPORT CENTRE (CRTSC) 2.1 Recruit Professional Staff to provide Technical Support to the Cocoa Farming Sector in the OECS a. Cocoa Agronomist b. Cocoa Entomologist 2.2 Establish a Field Lab to support the work of the Professional Staff 2.3 Staff to commence establishing a COCOA GERMPLASM PLOTS – to provide OECS Cocoa Farmers with quality planting material
		3	24 -36	Establish in house Cocoa Processing / Manufacturing Technical Capacity in the CRTSC 3.1 Recruit Professional Staff to provide Technical Support to the Cocoa Processing / Manufacturing Sector in the OECS viz; a. Cocoa Product Development Specialist b. Quality Assurance / Marketing Specialist 3.2 Establish Manufacturing / Product Development Lab (re: Product Development / testing)

Table 15.1: PROPOSED OECS COCOA INDUSTRY DEVELOPMENT PROJECT (cont'd)

PROJECT COMPONENT	SCHEDULE/ Duration (mths)	Develop ment Phase	Schedule / Duration (mths)	Activity (Mths)
4 Cocoa Farming Development Component	13-18	4	13-72	CONDUCT PERIODIC DIAGNOSTIC REVIEW OF COCOA FARMING IN THE OECS Purpose to identify: 4.1 Management Practices & issues impacting on Productivity & Efficiency of the Industry 4.2 Technical Support Needs including: a. Training in Management on Farm Practices b. Needs for Quality Planting material and Other Inputs c. Capacity building of Cocoa Extension Personnel in Member States 4.3 Financing Needs for the Development of Cocoa Farming and Industry Expansion 4.4 Identify Sources of Finance for Cocoa Farmers
		5	18-72	PROVIDE TECHNICAL SUPPORT TO THE COCOA FARMING COMPONENT OF THE INDUSTRY. Specifically: 5.1 Development & Deliver Outreach Training Programme for Extension and Other Technical Personnel in the Industry including: a. Cocoa Farming Husbandry b. Post-Harvest Technology

Table 15.1: PROPOSED OECS COCOA INDUSTRY DEVELOPMENT PROJECT (cont'd)

PROJECT COMPONENT	SCHEDULE/ Duration (mths)	Develop ment Phase	Schedule / Duration (mths)	Activity Mths
5 Cocoa Bean Processing & Manufacturing of Value-Added Cocoa Based Products		6	24 - 72	CAPACITY BUILDING IN PROCESSING & VALUE-ADDED MANUFACTURING 6.1 Conduct Needs Assessment of the OECS Industry with respect to: a. Training in Product Development b. Business & Marketing Support c. Financing 6.2 Conduct Training in Processing /Manufacturing of Value-Added Products 6.3 Conduct Training in Business Development re Manufacturing Cocoa Based Value Added Products 6.4 Identify financing Sources / Options for the Development of Valued Added Products, Business Investment Support and Marketing 6.5 Establish linkages to the Regional Tourism / Agro Tourism Sector to Exploit Market Opportunities for Cocoa Based Products 6.6 Conduct Training in Product Promotion / marketing Support

CHART 15.1: PROPOSED ROLLOUT OUT PLAN AND TIMELINE – OECS COCOA INDUSTRY DEVELOPMENT PROJECT

DEV. PHASE	Project Component / Activity	Schedule Duration (Mths)	Years					
			1	2	3	4	5	6
1	PRELIMINARY START-UP ACTIVITIES: Project Approval & Start Ups	0-6						
2	ESTABLISH OECS COCOA RESOURCE TECHNICAL SUPPORT CENTRE (CRTSC): Establish in-house Cocoa Farming Technical Support Capacity in the Cocoa Resource Technical Support Centre (CRTSC)	7-12						
3	Establish in-house Cocoa Processing / Manufacturing Technical Capacity in the CRTSC	24-36						
4	COCOA FARMING DEVELOPMENT COMPONENT Conduct periodic diagnostic review of cocoa farming in the OECS	13-72						
5	Provide Technical Support to the Cocoa Farming Component of the Industry.	18-72						
6	COCOA BEAN PROCESSING & MANUFACTURING OF VALUE-ADDED COCOA BASED PRODUCTS Capacity building in processing & value-added manufacturing, Product Promotion & Marketing	24-72						

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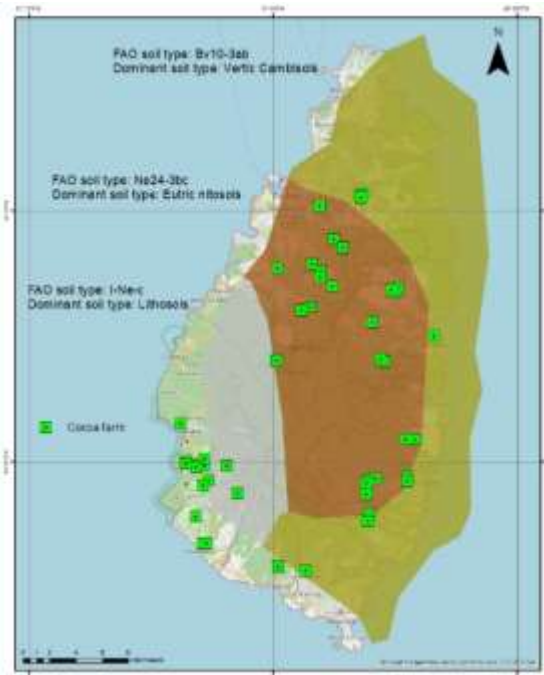
ANNEXES

Annex Table 2.1: Production Areas Surveyed, Estimated Number of Farmers and Holdings under Cocoa Cultivation by OECS Country

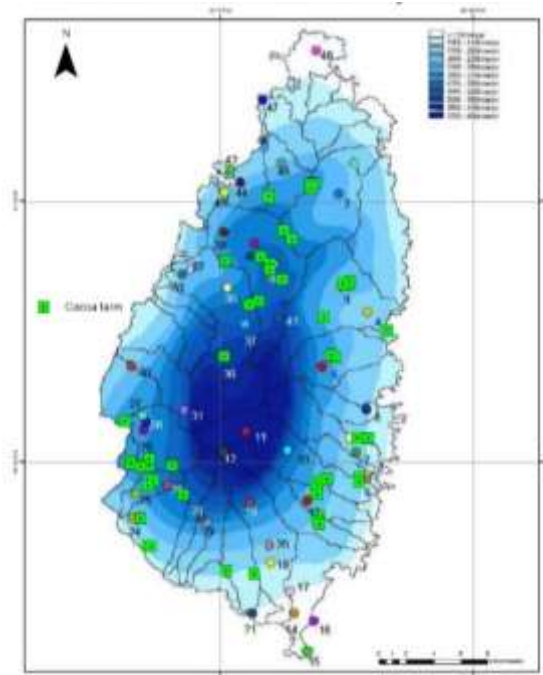
DOMINICA			GRENADA			SAINT LUCIA			SAINT VINCENT AND THE GRENADINES		
Production Areas	Estimated Acreage	Estimated # of Farmers	Production Areas	Estimated Acreage	Estimated # of Farmers	Production Areas	Estimated Acreage	Estimated # of Farmers	Production Areas	Estimated Acreage	Estimated # of Farmers
Central Region	20	25	Hermitage, Saint Patrick	10	10	Region 1 & 2	150	33	Congo Valley	65	15
East Region	60	100	Marlmount, Pomme Rose, Saint David	52	12	Region 3	60	35	Richmond	10	5
North Region	50	25	Mt. Horne, Mirabeau, Saint Andrew	60	20	Region 4	120	60	Lowmans Leeward	5	5
North-East Region	8	18	Mt. Parnassus, Belle Vue, La Mode, Saint George	18	6	Region 5	55	30	Mespo	15	10
West Region	25	70	Brothers, Florida, Saint John	20	50	Region 6	365	43	Orange Hill	30	20
			Carriere, Saint Andrew	25	5	Region 7	12.5	25	Diamonds	10	15
						Region 8	5	15			
TOTAL	163	238		185	103		767.5	241		135	70

Annex: Geographic Location of Cocoa Farms Surveyed

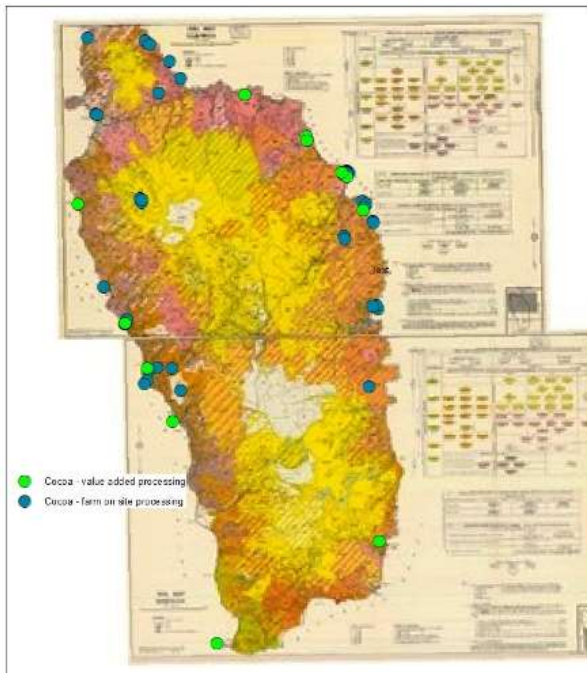
The illustrations presented below identifies the geographic locations of cocoa farms and farmers that participated in the survey for this Study. Their locations are shown against maps depicting the soil-type and rainfall levels where available.



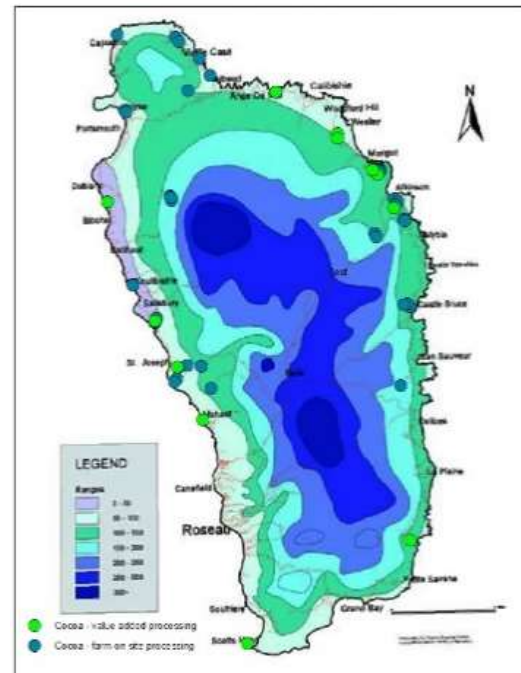
Distribution of cocoa farms across St. Lucia in relation to soil type
Source of the soil type map: <http://54.229.242.119/GloSIS/>



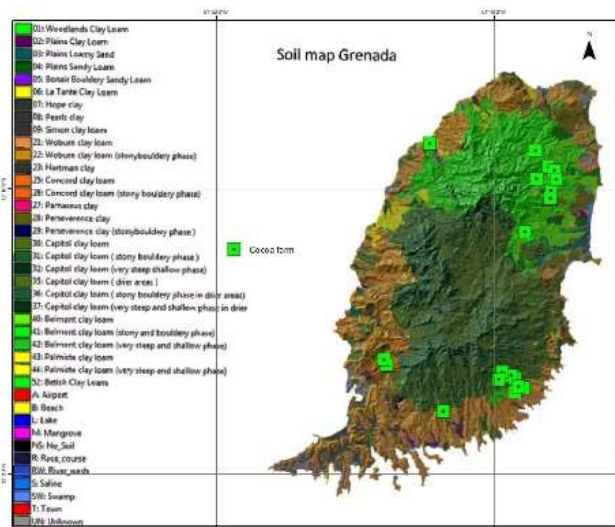
Distribution of cocoa farms across St. Lucia in relation to average annual rainfall
Source of the average annual rainfall map: <https://www.cdema.org/virtuallibrary/>



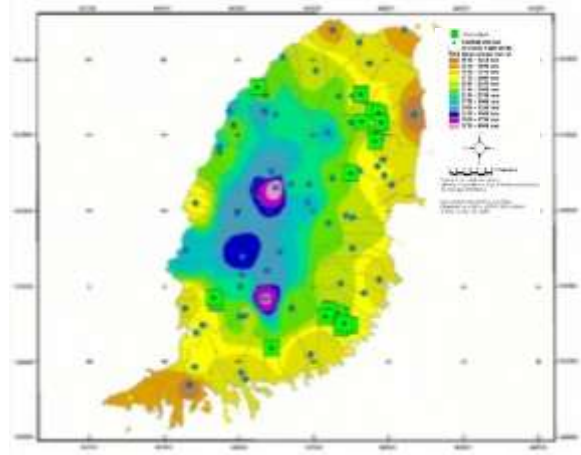
Distribution of cocoa farms in relation to the soil type across Dominica
Source of soil type map: <https://www.cdema.org/virtuallibrary/>



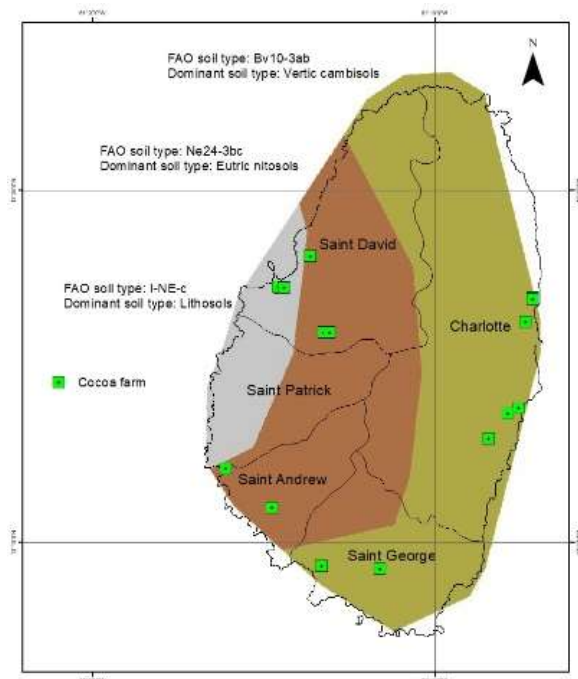
Distribution of cocoa farms in relation to the average annual rainfall across Dominica
Source of rainfall distribution map: <https://www.cdema.org/virtuallibrary/>



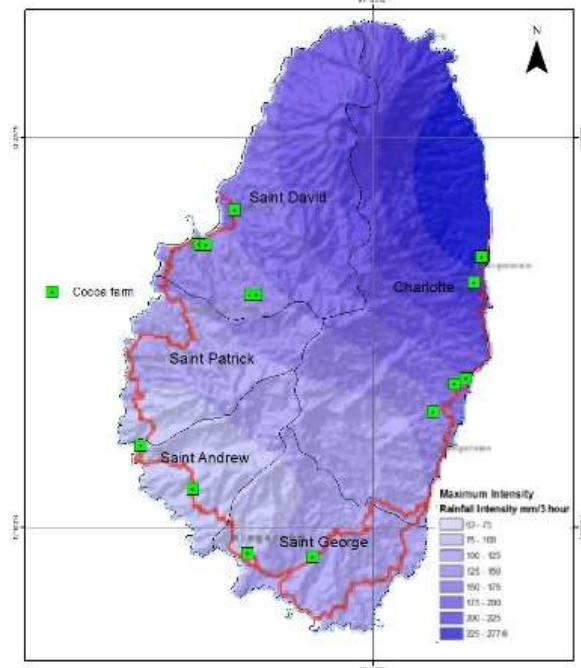
Distribution of cocoa farms in relation to the soil type across Grenada
Source of soil type map: CDB/CDERA, 2006



Distribution of cocoa farms in relation to the average annual rainfall across Grenada
Source of rainfall map: Land Use Division, Ministry of Agriculture, Lands, Forestry and Fisheries



Distribution of cocoa farms in relation to the soil type across St. Vincent
Source of soil data: <http://54.229.242.119/GloSIS/>



Distribution of cocoa farms in relation to the average annual precipitation in St. Vincent

