



**THE UNIVERSITY  
OF THE  
WEST INDIES**

ST. AUGUSTINE CAMPUS

# MANUFACTURING PROFILE 1: COCOA AND CHOCOLATE PRODUCTS

The Development of Project Profiles for the  
Manufacturing Sector of T&T

## ABSTRACT

Trinitario cocoa beans, native to Trinidad, is widely sought after in the world's cocoa and chocolate market because of its distinct flavours which can range from fruity to floral. Besides a few local cottage manufacturers, this product has not been intensely exploited and incorporated in the local manufacturing sector and most of the produce is currently exported. Hence, there is the opportunity to develop large scale chocolate manufacturing plants, which can utilise the majority of the locally produced cocoa in their processes.

**ENGINEERING INSTITUTE 2016**

## Table of Contents

List of Tables .....	iv
List of Figures .....	v
1 Description of the Opportunity .....	1
1.1 Summary .....	1
1.2 Product Mix .....	2
1.3 Description of Activities .....	4
2 Industry Overview .....	7
2.1 Industry Description .....	7
2.2 Incentives .....	8
3 Stakeholder Analysis .....	11
4 Environmental Scan .....	15
4.1 External Analysis .....	15
4.2 Internal Analysis .....	19
5 Sub-Sector Assessment .....	21
6 Identification of Value Added Services .....	23
6.1 Supply Chain Issues .....	24
7 Financial Analysis .....	25
7.1 Infrastructure .....	25
7.2 Annual Utilities Usage .....	25

# Manufacturing Profile 1: Cocoa and Chocolate Products

7.3 Salaries.....	26
7.4 Legal/ Statutory Fees .....	26
7.5 Operational Costs.....	27
7.6 Equipment Costs.....	27
7.7 Investment Summary.....	28
8 Human Resources .....	30
8.1 Organization Chart.....	30
8.2 Job Descriptions for Key Positions.....	32
8.3 Labour Availability.....	34
9 Location .....	36
10 List of Potential Investors and Partners .....	38
11 Concluding Remarks .....	41
12 References.....	42

## List of Tables

Table 1: Optimistic, Pessimistic and Moderate Scenarios.....	2
Table 2: Product Mix .....	3
Table 3: Stakeholder Categorisation for the Chocolate Production Industry .....	13
Table 4: PESTLE Analysis for Cocoa and Chocolate Production .....	15
Table 5: Competitive Analysis for Cocoa and Chocolate Production.....	18
Table 6: SWOT Analysis of Cocoa and Chocolate Production.....	19
Table 7: Sub-Sector Assessment Table .....	21
Table 8: Approximate Cost of Infrastructure.....	25
Table 9: Annual Utilities Cost .....	25
Table 10: Positions and Annual Salaries .....	26
Table 11: Operational Costs .....	27
Table 12: Equipment Costs.....	27
Table 13: Investment Summary.....	28
Table 14: Job Descriptions .....	32
Table 15: Potential labour pools for proposed positions .....	34
Table 16: A general assessment of locations in T&T .....	36
Table 17: Potential Investors and Partners .....	38

## List of Figures

Figure 1: Chocolate Industry Pyramid.....	3
Figure 2: Typical Chocolate Making Process.....	6
Figure 3: Trinidad and Tobago Exports by Commodity in US Dollars - Chocolate and other food preparations containing cocoa. – Yearly .....	8
Figure 4: Key Stakeholder groups in the T&T Cocoa and Chocolate Industry.....	12
Figure 5: Stakeholders in the Cocoa and Chocolate Production Industry .....	14
Figure 6: Value Stream Map of Cocoa .....	23
Figure 7: The organizational structure of the cocoa and chocolate products factory .....	31

# 1 Description of the Opportunity

## *1.1 Summary*

The world cocoa market distinguishes cocoa beans into two (2) broad categories; “bulk” or “ordinary” and “fine or flavour” cocoa beans. The fine or flavour beans which are found in the Trinitario variety of cocoa, fetch a higher price on the world market as it has a distinct flavour and is used to produce high-end, premium dark chocolates. Trinidad is known for its Trinitario fine flavoured cocoa beans which have gained international attention and won prestigious awards. Besides a few local cottage manufacturers, this product has not been intensely exploited and incorporated in the local manufacturing sector (Nero 2016).

According to the International Cocoa Organization (ICO), in the year of 2012, fine flavour cocoa accounted for five percent (5%) of the total cocoa production worldwide. This 5% was estimated at three hundred thousand (300,000) tonnes of cocoa. Trinidad and Tobago produced approximately one thousand (1000) tonnes of fine flavour cocoa; this is marginal on the world market but there is the opportunity in manufacturing high end products which utilize locally-produced cocoa in their processes. Hence, the profile looks at developing a medium or large scale chocolate manufacturing plant, which utilizes a majority of the cocoa beans produced locally.

## Manufacturing Profile 1: Cocoa and Chocolate Products

Investments in research and development, supported by the Trinidad and Tobago (T&T) Cocoa Research Centre, could lead to patents and licenses for high value added premium cocoa and chocolate products which would be a sustainable source of active or passive income. This opportunity resides in the creation and occupation of a lead position in the dark chocolate value stream which would be based on a comprehensive market entry approach as advised by local and international industry experts. Three scenarios; optimistic, moderate and pessimistic markets were assessed in the profile and the result may be seen in Table 1. The investment analysis are further discussed later in the report, under the financial analysis section.

Table 1: Optimistic, Pessimistic and Moderate Scenarios

SCENARIO	INVESTMENT (IN MILLION USD)	PAYBACK PERIOD	10 YEAR NPV (IN MILLION USD)	10 YEAR IRR
PESSIMISTIC	3.9	4 yrs	4.68	43%
MODERATE	4.2	3 yrs	7.5	56%
OPTIMISTIC	4.5	3 yrs	9.9	68%

### ***1.2 Product Mix***

The chocolate industry pyramid shows the progression of chocolate products to higher value-added, single origin bars at the apex (see Figure 1). Nonetheless, this investment opportunity involves the participation at all levels of chocolate production except mass

## Manufacturing Profile 1: Cocoa and Chocolate Products

produced chocolate flavoured confectionaries. Confectionaries of a high quality may also be produced. A representative product mix is shown in Table 2. These prices were estimated based on research of similar products currently sold on the world market.

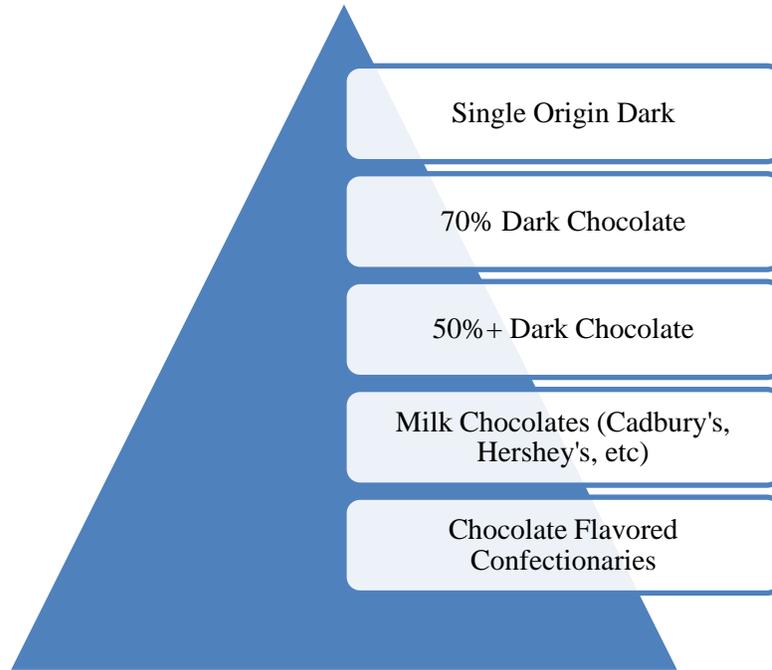


Figure 1: Chocolate Industry Pyramid

Table 2: Product Mix

PRODUCT	SIZE	WHOLESALE (USD)
<b>Extra Dark Chocolate 85% Cocoa</b>	3.2 Oz (Pack of 12)	\$35.00
<b>70% Dark Chocolate Baking Bars</b>	3.2 Oz (Pack of 12)	\$28.00
<b>60% Dark Chocolate Bars</b>	3.2 oz. (pack of 12)	\$21.00
<b>Mint chocolate bars 55% cocoa</b>	8 oz. bars (Boxes of 24)	\$ 96.00

## Manufacturing Profile 1: Cocoa and Chocolate Products

<b>Chocolate Candy Bars</b>	1.5 Oz Packets (Pack of 24)	\$30.00
<b>Truffles</b>	24 Pcs (Boxes)	\$50.00
<b>Coffee and Chocolate Mix bar</b>	3.2 oz. (pack of 12)	\$30.00
<b>Assorted Chocolates</b>	500 g Box of 36 chocolates	\$20.00
<b>Signature Dark chocolates</b>	400g box of 28 chocolates	\$18.00

### *1.3 Description of Activities*

The process begins when the cocoa is harvested and the beans are transported to the manufacturing facility, where they are fermented and dried. Fermenting removes the bitterness and brings out the “chocolate” flavour of the cocoa bean. The beans must then be dried to a specific temperature to further enhance the flavour and ensure that the beans do not get acidic and bitter. It is recommended that these processes be done at the factory in order to ensure a quality process from the beginning of production.

The cocoa beans are then roasted to develop the colour and flavour of fine chocolate. The shells are removed and the “meaty” insides of the cocoa bean is then broken up into “nibs”. The nibs are then sieved into varying sizes by a process called winnowing. After the nibs are sorted, it is ground into cocoa liquor; which is an unsweetened cocoa mass. The grinding generates heat which melts the fat contained in the nibs and the granular solid nibs are converted to a liquid.

The liquor is then pressed to separate the cocoa butter from the solids. The final stage involves milling and sieving the solids to desired levels of fineness. The solids are then

## Manufacturing Profile 1: Cocoa and Chocolate Products

mixed with varying quantities of cocoa liquor and cocoa butter to develop a variety of smoothness and flavour in the finished chocolate product. There can also be mixing in of other additives such as sugar, milk, vanilla flavourings, etc. Figure 2 shows the basic chocolate making process.

## Manufacturing Profile 1: Cocoa and Chocolate Products

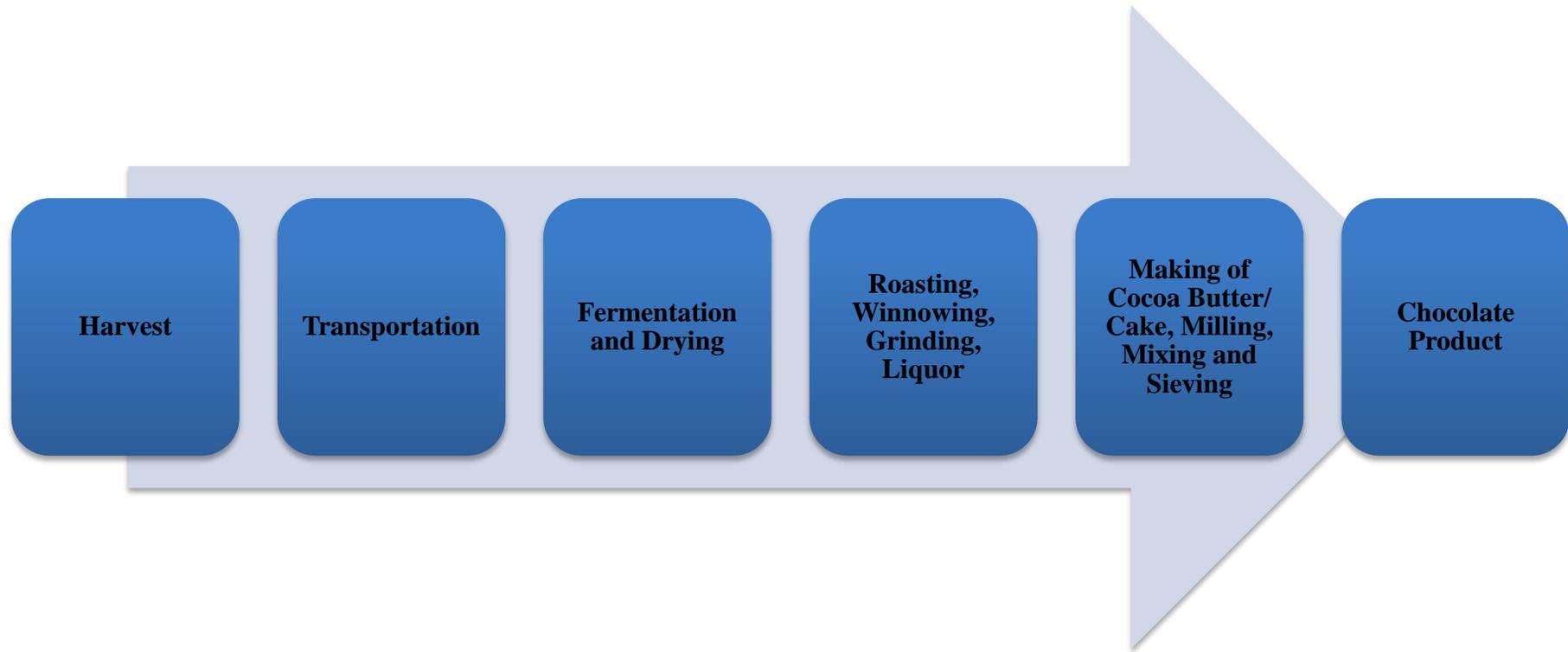


Figure 2: Typical Chocolate Making Process

## 2 Industry Overview

### *2.1 Industry Description*

Global cocoa demand is rapidly increasing and major chocolate giants such as Hershey, believe that the demand will be unsustainable by 2020 (Benzinga 2013). While demand is growing, there is declining farming of cocoa as farmers move to more lucrative business opportunities, thus making it more difficult to meet the cocoa demand. The current chocolate market is worth over US\$80 billion with over 3.5 million tons of cocoa being consumed. With emerging markets, this is expected to rise by 30% bringing the demand to over 4.5 million tons by 2020 (Ha 2013).

T&T's export of cocoa has increased by approximately \$4 million USD between 2005 and 2010 (see Figure 3). However, our local production stands at only 1000 tons annually (InvesTT 2014). The location, temperature, rainfall and sunshine hours favour a thriving cocoa industry. With the potential for rehabilitation of old cocoa estates as well as the creation of new ones and numerous incentives offered by the Government of the Republic of Trinidad and Tobago (GORTT), amongst our strengths, the opportunity to supply a significant percentage of high quality cocoa to international markets as well as develop our own value stream exists. There is great potential for T&T to fill the international demand as our cocoa is globally recognized for its fine flavour which is highly sought after.

## Manufacturing Profile 1: Cocoa and Chocolate Products

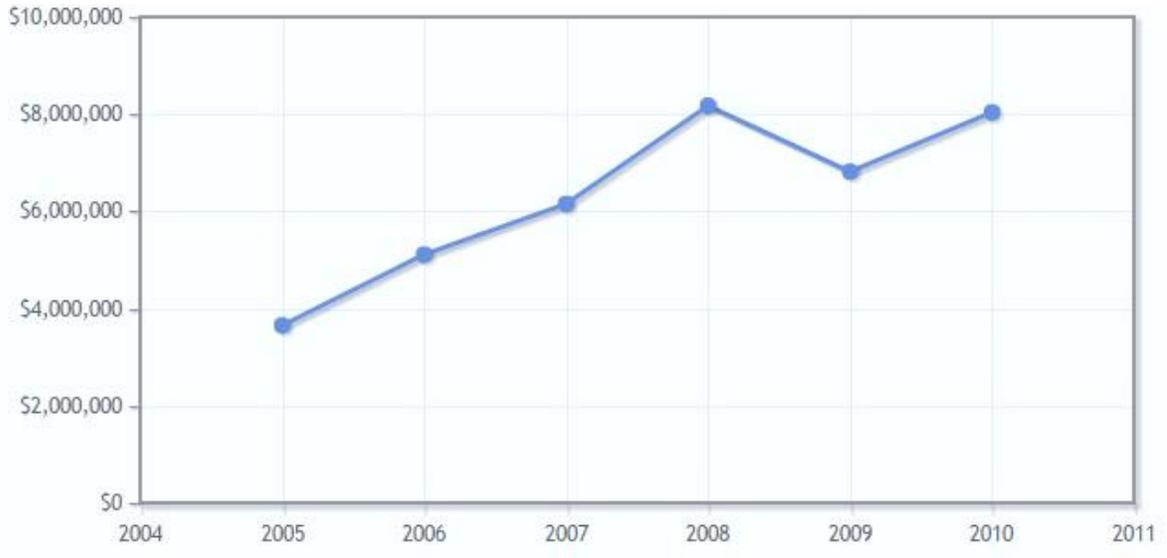


Figure 3: Trinidad and Tobago Exports by Commodity in US Dollars - Chocolate and other food preparations containing cocoa. – Yearly

**Source:** Adapted from

<http://www.indexmundi.com/trade/exports/?country=tt&subchapter=1806>

### ***2.2 Incentives***

A number of incentives are available for investors. In addition to general incentives, there are incentives related to manufacturing as well as agro-processing. (All values for incentives are in \$TT where US \$1. = TT \$6.74 on 17 August, 2016)

- ***The Fiscal Incentives Act***, offers a waiver of income tax on dividends or other distributions, other than interest, out of profits derived from manufacture of approved products.

## Manufacturing Profile 1: Cocoa and Chocolate Products

- ***Total Relief from Value Added Tax*** on imports for highly capital intensive enterprises.
- ***The Customs & Excise Act*** offers investors duty free importation of plant, machinery, equipment, components and raw materials, as specified in the Third Schedule of the Customs Tariff.
- ***The Foreign Investment Act*** allows a foreign investor to purchase land not exceeding one acre for residential purposes and five acres for commercial purposes without obtaining a license. In order to purchase land in excess of these amounts, a foreign investor must apply for a license from the Minister of Finance. Additionally, foreign investors are allowed to purchase up to 30 per cent of the cumulative shareholding in a public company.
- ***Agro-processing Incentives*** offered by the government including rebates of:
  - 50% of the cost of establishing approved facilities for Agro-Processing of approved commodities to a maximum of \$50,000
  - 50% of the cost of refurbishing of approved facilities for Agro-Processing of approved commodities to a maximum of \$20,000
  - 50% towards the cost of packaging material to a maximum of \$15,000 annually
  - 40% of the cost of Hazard Analysis and Critical Control Points (HACCP) upgrade to a maximum of \$40,000

Manufacturing Profile 1: Cocoa and Chocolate Products

### **3 Stakeholder Analysis**

The various stakeholders were analysed using Mitchell, Agle and Wood's Power Legitimacy Urgency model. The Power, Legitimacy, Urgency model results in eight different stakeholder groups. These groups are defined by which of the three (3) attributes each individual stakeholder group possesses. Each of the stakeholders in this study was scored from 1 to 5 to assess their respective degree of power, legitimacy or urgency. This analysis shows how salient a stakeholder can be. The first step, however was the identification of stakeholders (see Figure 4).

Seventeen (17) key stakeholders were assessed. Each was rated on a scale from 1 to 5 for degree of possession of each attribute where 1 was lowest and 5 was highest. The stakeholder was deemed to possess the attribute of power, legitimacy or urgency respectively, when given a ranking of 3 or higher. The result of this preliminary analysis is summarized in Table 3. For this opportunity, cocoa farmers, state agencies and processors, were deemed to be the definitive stakeholders, possessing all three (3) attributes. Figure 5 shows the distribution of the total attributes.

## Manufacturing Profile 1: Cocoa and Chocolate Products

HARVEST	TRANSPORTATION	FERMENTATION AND DRYING	ROASTING, WINNOWING	COCOA AND CHOCOLATE PRODUCTS
<ul style="list-style-type: none"> <li>•Cocoa Farmers</li> <li>•Cooperatives and Associations</li> <li>•Government Agency</li> <li>•CARIRI</li> <li>•CARDI</li> <li>•IICA</li> <li>•Equipment Suppliers</li> <li>•Cocoa Research Centre</li> <li>•Agro-Chemical Shops</li> <li>•Banks</li> </ul>	<ul style="list-style-type: none"> <li>•Cocoa Farmers</li> <li>•Cooperatives and Associations</li> <li>•Processors</li> <li>•Transport Contractors</li> </ul>	<ul style="list-style-type: none"> <li>•Cocoa Farmers</li> <li>•Cooperatives and Associations</li> <li>•CARIRI</li> <li>•CARDI</li> <li>•IICA</li> <li>•Equipment Suppliers</li> <li>•Carpenters</li> <li>•Cocoa Research Centre</li> </ul>	<ul style="list-style-type: none"> <li>•Cocoa Farmers</li> <li>•Cooperatives and Associations</li> <li>•CARIRI</li> <li>•CARDI</li> <li>•IICA</li> <li>•Equipment Suppliers</li> <li>•Cocoa Research Centre</li> <li>•Processors</li> <li>•Banks/Lending Agencies</li> <li>•Agricultural Development Bank (ADB)</li> </ul>	<ul style="list-style-type: none"> <li>•Food Processing/ Food Science Professionals</li> <li>•Cooperatives and Associations</li> <li>•CARIRI</li> <li>•CARDI</li> <li>•IICA</li> <li>•Equipment Suppliers</li> <li>•Cocoa Research Centre</li> <li>•Local, Regional and Extra-Regional Consumers</li> <li>•Local and Foreign Distributors</li> <li>•Import/Export Agents</li> <li>•Banks/Lending Agencies</li> <li>•Agricultural Development Bank (ADB)</li> </ul>

Figure 4: Key Stakeholder groups in the T&T Cocoa and Chocolate Industry

## Manufacturing Profile 1: Cocoa and Chocolate Products

Table 3: Stakeholder Categorisation for the Chocolate Production Industry

<b>STAKEHOLDER</b>	<b>POWER</b>	<b>LEGITIMACY</b>	<b>URGENCY</b>	<b>TOTAL</b>
Agro-Chemical Shops	1	3	3	<b>7</b>
Banks	5	2	4	<b>11</b>
CARDI	2	2	2	<b>6</b>
CARICOM Exports	2	3	2	<b>7</b>
CARIRI	2	2	2	<b>6</b>
Cocoa Farmer	4	5	3	<b>12</b>
Cocoa Research Centre	1	4	4	<b>9</b>
Co-Operatives	5	5	2	<b>12</b>
Equipment Suppliers	1	3	3	<b>7</b>
Food Processing/ Food Science Professionals	1	4	1	<b>6</b>
Government Agencies	3	3	3	<b>9</b>
IICA	1	2	1	<b>4</b>
Import/Export Houses	3	3	3	<b>9</b>
Processors	5	5	5	<b>15</b>
Retail Consumers	4	1	3	<b>8</b>
Transport	1	3	3	<b>7</b>
Wholesale Consumers	5	2	4	<b>11</b>

## Manufacturing Profile 1: Cocoa and Chocolate Products

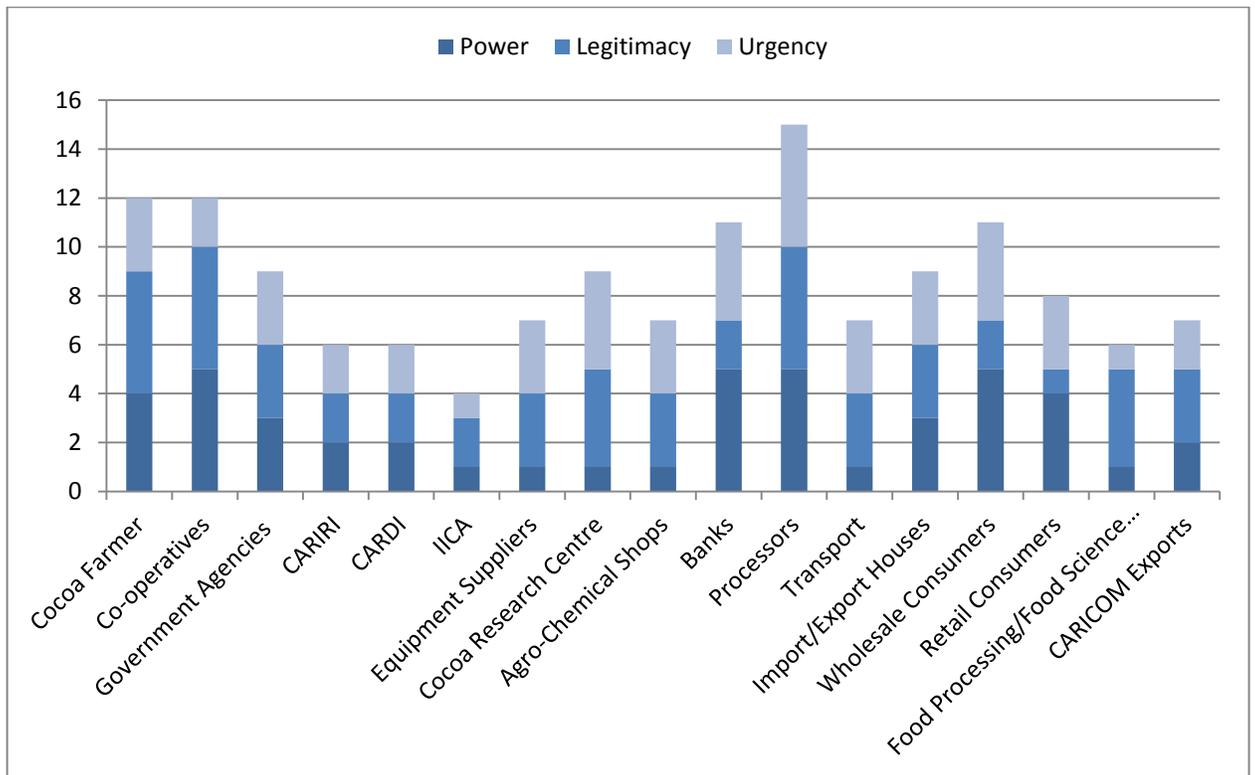


Figure 5: Stakeholders in the Cocoa and Chocolate Production Industry

## 4 Environmental Scan

### 4.1 External Analysis

#### PESTLE

The environmental scan started with an evaluation of the external environment for cocoa and chocolate production. This was done using the PESTLE tool where Political, Economic, Social, Technological, Legal and Environmental (physical) benefits or concerns regarding the venture were identified and their potential impact individually assessed. See Table 4.

Table 4: PESTLE Analysis for Cocoa and Chocolate Production

CATEGORY	SITUATION	POTENTIAL IMPACT
<b>Political</b>	The government has stated an interest in developing the sector.	Change in basic policies are anticipated which may improve the environment for cocoa based industry.
	Agro-Processing Incentives provided by the Ministry of Trade and Industry.	The cost of establishing and refurbishing processing facilities is much cheaper currently than before.
	Lack of a clear plan by the Ministry of Agriculture.	This can have a negative effect on the long term viability of the industry.
<b>Economic</b>	Increased market demand as the middle class in emerging economies grow.	Emerging markets such as those in Asia, are developing tastes for luxury goods.
	Economic uncertainty continues in many developed market territories such as the US.	This has surprisingly, not impacted on the market for dark chocolates. In fact, demand has increased, making researchers speculate that chocolate is being used for comfort in times of increased stress and in

## Manufacturing Profile 1: Cocoa and Chocolate Products

		times of economic downturn, individuals see chocolates as an affordable luxury.
	The premium quality and preferred nature of Trinidad and Tobago cocoa product.	This allows for the supply to old established markets where reputation and quality exist as well as exploitation of new niche market.
<b>Social</b>	Increased health consciousness.	Research shows that dark chocolate has wide-ranging health benefits. This may account for increased demand for organic dark chocolate, in markets dominated by ‘chocolate candy’ products such as the very lucrative US market.
<b>Technological</b>	All equipment is not readily available or available in the sizes and at the specifications required.	The Mechanical and Manufacturing Engineering Research Centre (MMERC) at the UWI, St. Augustine, is currently working on designing and fabricating its own equipment. This R&D along with research from the Cocoa Research Unit, can lend tremendous support to the industry.
<b>Legal</b>	There are strict laws and food safety regulations which dictate standards for food products in developed country markets such as the FDA Bioterrorism law in the US.	Companies that wish to produce chocolates would have to see about certifying themselves to be able to comply with these laws.
	The Cocoa and Coffee Industry Board (1998) Act of Trinidad and Tobago was repealed in February 2014. This act had constraints on the farmers as the State bought and	This creates an opportunity for more option with regards to the sourcing and pricing of cocoa as the farmers would quickly supply their produce locally instead of looking for international buyers and dealing with all the paperwork involved in exporting.

## Manufacturing Profile 1: Cocoa and Chocolate Products

	exported the cocoa.	
	Fair Trade Organic Products are increasingly being preferred.	Fair Trade and Organic Certification would grant a competitive edge in the US and EU markets where there are concerns about environmental degradation, pesticide use, and child labour, poor working conditions and other such issues.
<b>Environmental</b>	Large farms having ecological effects on the environment.	Large estates are carbon dioxide sinks and well as oxygen producers and thus improve local air quality. They can also prevent soil erosion, particularly at higher elevations.

### **PORTER'S 5 FORCES**

The second part of the external analysis examined the competitive environment. For this analysis Porter's 5 Forces (P5F) was used. P5F looks at the rivalry among existing competitors, the threat of new entrants, the threat of substitute products, the bargaining power of suppliers and the bargaining power of customers. Using the P5F tool is superior to simply identifying competitors in the marketplace and assessing their potential threat. Because it allows for the analysis of potential threats from other products or ventures that may not be identical or even operate in the same industry but which are threats nonetheless. This analysis can be seen in Table 5.

## Manufacturing Profile 1: Cocoa and Chocolate Products

Table 5: Competitive Analysis for Cocoa and Chocolate Production

<b>FORCE</b>	<b>SITUATION</b>	<b>THREAT LEVEL</b>
<b>Existing rivalry</b>	Direct rivalry exists from other luxury food producers, particularly European, American and South American chocolate producers. For newer, larger markets such as the US, competitors would also include the steadily growing community of producers of all other gourmet or luxury snack foods. However, the fine chocolate market recognizes that local cocoa is unique and superior and is valued based on location, specifically, the estates of origin. Therefore, the threat from existing rivals is deemed MEDIUM.	<b>MEDIUM</b>
<b>Threat of new entrants</b>	The threat of new entrants is moderate because Trinitario cocoa is rare and not widely available outside of the Caribbean. There is however, the ongoing threat of developed country producers forging partnerships with local farmers to gain access to the raw material and produce Single Origin Chocolates from locally grown cocoa. The threat of new entrants is also regarded as MEDIUM.	<b>MEDIUM</b>
<b>Threat of substitute products</b>	While there are no known imitation products, less discerning consumers may opt for cheaper mass produced items, while seekers of luxury items may replace chocolates with alternatives such as gourmet cakes, fruit preserves and other popular luxury foods. There is a worldwide taste for luxury foods including fine chocolates but the market is dominated by other categories of luxury food items. The threat of substitute products, whether those are cheaper chocolates or other luxury foods, is therefore considered HIGH.	<b>HIGH</b>
<b>Bargaining power of customers</b>	The bargaining power of customers in the niche Trinitario chocolate market is moderate to low since the product is relatively scarce.	<b>LOW</b>
<b>Bargaining power of suppliers</b>	Cocoa Farmers and their co-operatives have much control over the sale of their produce as the uniqueness of the Trinitario cocoa makes	<b>HIGH</b>

	for an in-demand product. Therefore, the threat of supplier bargaining power is deemed HIGH.	
--	--	--

## 4.2 Internal Analysis

### SWOT

The SWOT tool was used to conduct an Internal Analysis for the venture. The first phase of the SWOT tool identified the Strengths and Weaknesses inherent to the proposed project; and major Opportunities in and Threats to the industry (see Table 6). The second phase recommends how strengths and opportunities can be exploited and threats can be mitigated and weaknesses addressed respectively; this is addressed elsewhere in the report.

Table 6: SWOT Analysis of Cocoa and Chocolate Production

<b>STRENGTHS</b>	<b>WEAKNESSES</b>
<ul style="list-style-type: none"> <li>• Superior raw materials in the form of Trinitario cocoa.</li> <li>• The local cocoa has already been recognized internationally and Trinidad has long established customers and markets.</li> <li>• There already exists a large body of knowledge within Trinidad and Tobago with regards to the Cocoa Research Unit at UWI that had been doing active research over 80 years.</li> <li>• There has been a history of research and development in terms of the design and fabrication of technologies needed to process</li> </ul>	<ul style="list-style-type: none"> <li>• Trinidad’s cocoa estates have not been properly managed and are currently in disarray.</li> <li>• The harvesting of the cocoa is not mechanized.</li> <li>• Cocoa products have a high cost of production.</li> <li>• There is little investment in developing and streamlining of chocolate making processes.</li> </ul>

## Manufacturing Profile 1: Cocoa and Chocolate Products

<p>cocoa.</p> <ul style="list-style-type: none"> <li>• There are well-established networks and co-operatives.</li> </ul>	
<p><b>OPPORTUNITIES</b></p> <ul style="list-style-type: none"> <li>• The unique cocoa species in Trinidad allow for complete domination of a niche market.</li> <li>• High end chocolate markets are lucrative, promising large profits.</li> <li>• Further research of cocoa extracts would allow for the production and sale of food flavours and enhancers for cocoa.</li> <li>• As dark chocolate is recognized for its health benefits, there is an opportunity for research on pharmaceutical applications of cocoa.</li> </ul>	<p><b>THREATS</b></p> <ul style="list-style-type: none"> <li>• Diseases can wipe out an entire crop.</li> <li>• Larger economies can produce more chocolate in larger quantities and at lower costs.</li> </ul>

## 5 Sub-Sector Assessment

The Cocoa and Chocolate Product venture, was assessed using various criteria including market demand, raw material cost and availability, energy use, investment value, finished product value and availability of labour. This was based on a factor rating method developed by subject-matter experts. On each of the criterion, the venture was given a rating from 1 to 10. These were weighted according to the relative importance of the criteria and a final score calculated. The final score for the venture was 7.697 out of a possible 10, which was above average among the potential investment opportunities. See Table 7 for the weighted assessment.

Table 7: Sub-Sector Assessment Table

CRITERION	ASSESSMENT	WEIGHT	RATING 1-10	SCORE
Demand	High demand for Trinitario cocoa; steady market growth and opportunities for industry linkages along the value chain.	19.6%	9	1.764
Finished product value	High value finished product.	17.4%	9	1.566
Raw material (availability)	Demand outstrips raw material supply. Many estates are in disarray and farmers are not given true value for money.	13.0%	4	0.52
Raw material (cost)	The cost of raw material is relatively low compared to the finished product.	13.0%	9	1.17
Legislation/regulation/	High government interest; government has	10.9%	8	0.872

## Manufacturing Profile 1: Cocoa and Chocolate Products

government focus	investment in research and development, existing legislation with special focus on cocoa.			
Energy	The processing of the cocoa would require low power usage under normal conditions.	<b>8.7%</b>	<b>7</b>	<b>0.609</b>
Labour market	There are still few farmers around but they are aging. There are trained and skilled persons in cocoa processing.	<b>8.7%</b>	<b>5</b>	<b>0.435</b>
Investment value	A start-up company may require near \$5M USD	<b>6.5%</b>	<b>9</b>	<b>0.585</b>
Technology	Proven cocoa research capacity; Ongoing collaboration amongst Cocoa Research Centre at UWI with IICA and GORTT and Stakeholders allow for the dissemination of information and technology.	<b>2.2%</b>	<b>8</b>	<b>0.176</b>
Job creation	Large numbers of direct and indirect jobs created.	<b>0.0%</b>	<b>7</b>	<b>0</b>
		<b>100%</b>	<b>75</b>	<b>7.697</b>

## 6 Identification of Value Added Services

Value Stream Map (VSM) has its genesis in the Toyota Production System of Lean Manufacturing. It essentially shows, on a single page, how value is created along the extended value chain from suppliers to customers for a single product type. When the value stream is mapped and assessed, opportunities for improvement may only then be identified. The value stream indicates other services that will be necessary for the successful realization of the venture. This can be seen in Figure 6.

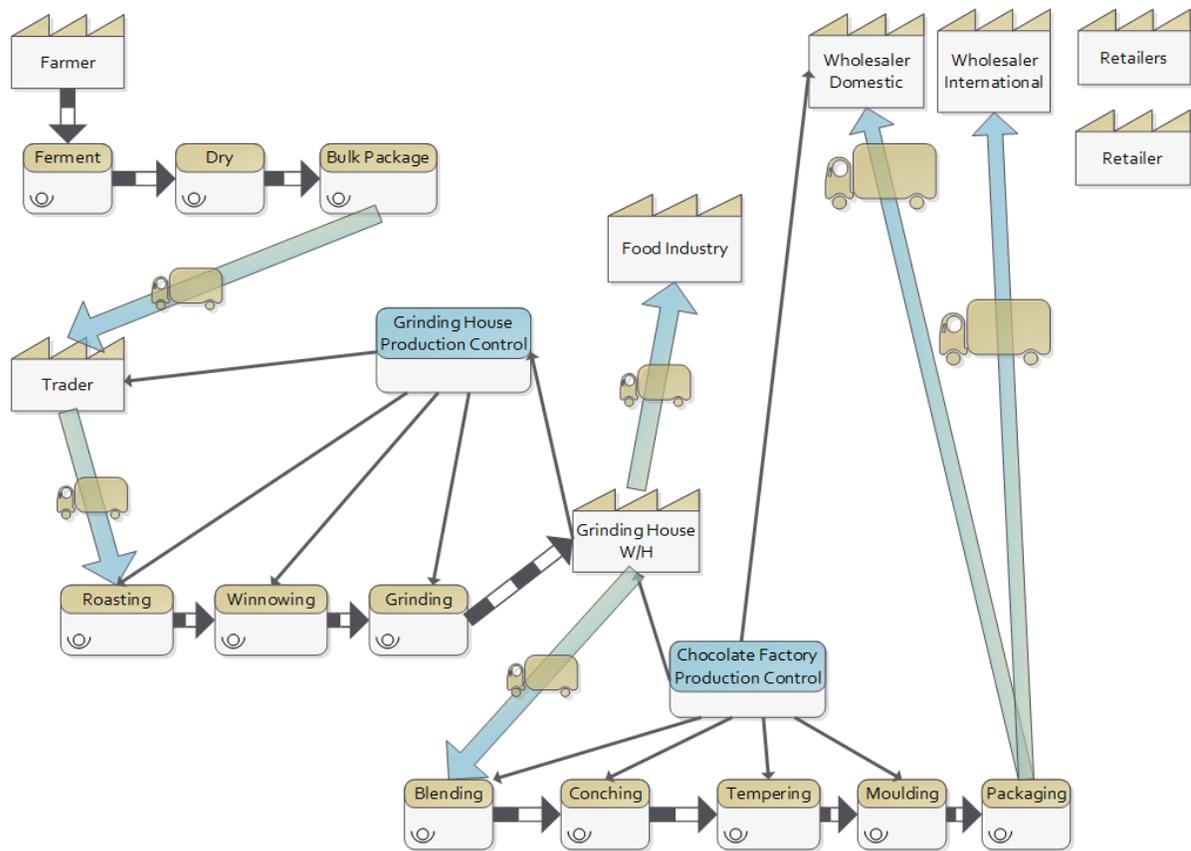


Figure 6: Value Stream Map of Cocoa

## ***6.1 Supply Chain Issues***

### **Pricing:**

The price of cocoa has been rising in recent years and farmers could conceivably ask for a higher price for the supply of their crops. This may result in a pricing war which could bring production at the factory to a halt. Negotiation and rapport with the farmers is needed to avoid this unfavourable outcome.

### **Pest and Diseases:**

This is a mono-crop industry. Any pest or disease can attack the crop, crippling of the entire industry. This can be prevented by keeping up-to-date with researchers and professionals in the cocoa industry (such as the Cocoa Research Unit), so as to decide how best these threats can be fought. Another possible, though more expensive option, is the investment in research to develop more disease and pest resistant strains of the crop.

## 7 Financial Analysis

### 7.1 Infrastructure

The estimated size of the plant is 1021 m<sup>2</sup> and this includes cold storage facilities, parking, a 24kV electrical kiosk, special loading bay area and special raw material storage facility. The approximate cost is shown in Table 8.

Table 8: Approximate Cost of Infrastructure

DESCRIPTION	COST (USD)
Renting/Leasing of a 1021 m <sup>2</sup> warehouse/factory	61,000.00
Installation of fire and security systems, air conditioning, plumbing, electrical works etc. to make the building ready of occupation	126,000.00
Cost of installing a 24kV electrical kiosk	8,000
<b>TOTAL</b>	<b>195,000.00</b>

### 7.2 Annual Utilities Usage

Table 9: Annual Utilities Cost

DESCRIPTION	COST (USD)
Electricity – 1,141,200 kWh per year at 0.025USD per kWh	29,778.19
Water – 276m <sup>3</sup> of water per day, at \$1.80 USD per m <sup>3</sup> for a year	188,887.50
<b>TOTAL</b>	<b>218,700.00</b>

### 7.3 Salaries

Table 10: Positions and Annual Salaries

<b>POSITION</b>	<b>NUMBER OF EMPLOYEES</b>	<b>UNIT ANNUAL SALARY (USD)</b>	<b>TOTAL ANNUAL SALARY (USD)</b>
General Manager	1	28,000	28,000
Administration and Financial Manager	1	22,500	22,500
Accounting Assistant	1	11,700	11,700
Business Development and Marketing Officer	1	14,500	14,500
Quality Manager	1	22,500	22,500
Product Development Specialist	1	20,600	20,600
Production Manager	1	22,500	22,500
Production/ Line Supervisors	4	17,100	68,400
Production Operators	6	10,800	64,800
Mechanic	1	9,000	9,000
Sales Officers	2	12,600	25,200
Delivery Drivers	2	8,280	16,560
<b>TOTAL</b>	<b>22</b>		<b>326,620</b>

### 7.4 Legal/ Statutory Fees

Legal costs are projected to be **10,100.00** USD

## Manufacturing Profile 1: Cocoa and Chocolate Products

### 7.5 Operational Costs

Table 11: Operational Costs

<b>COST CENTRE</b>	<b>COST (USD)</b>	<b>DESCRIPTION</b>
Marketing/Promotion	560,000.00	10% of expected annual Income
Research/Product Development	112,000.00	2% of expected annual income
Maintenance	45,000.00	(On Call Service Company/ OEM Representative)
Security	30,000.00	
Telecommunication	47,000.00	(Phone and Internet Services)
Miscellaneous	56,000.00	1% of expected annual income
Vehicle Rentals/Leases	144,000.00	(Cold Storage and Delivery Trucks, Material Handling Vehicles e.g. Forklifts )
Insurance/ Export	560,000	10% of expected annual income
Raw Material	705,000	
<b>TOTAL</b>	<b>2,259,000.00</b>	

### 7.6 Equipment Costs

Table 12: Equipment Costs

<b>EQUIPMENT</b>	<b>QUANTITY</b>	<b>COST (USD)</b>
Cocoa Roasting Machine (Specialized Equipment)	1	105,000
Grain Cocoa Bean Winnowing (Specialized Machine)	1	150,000
Cocoa Grinder/Pulveriser	1	100,000
Industrial Presses (for butter extraction)	1	100,000
Chocolate Conche Mixer (Specialized Equipment)	2	300,000
Chocolate Five Roll Refiner	1	220,000

## Manufacturing Profile 1: Cocoa and Chocolate Products

Chocolate Moulds	5	60,000
Cold Storage Facility	1	250,000
Specialized Material Handling Equipment	1	200,000
Miscellaneous	1	100,000
Chocolate Melangeur	1	100,000
<b>TOTAL</b>		<b>1,685,000</b>

### 7.7 Investment Summary

Table 13: Investment Summary

COST CENTER	COST (USD)	FREQUENCY OF COST
Utilities	218,700.00	Recurring
Salaries	326,620.00	Recurring
Rental/Leasing	61,000.00	Recurring
Legal/Statutory Fees	10,100.00	Recurring
Operational Costs	2,259,000.00	Recurring
<b>Subtotal</b>	<b>2,875,420.00</b>	
Plant/Equipment Cost	1,685,000.00	Initial
Infrastructure	134,000.00	Initial
<b>Subtotal</b>	<b>1,819,000.00</b>	
<b>TOTAL</b>	<b>4,694,420.00</b>	

The product range discussed in the product mix section of the report were manipulated to give optimistic, moderate and pessimistic scenarios to give an indication of the feasibility of the project. The plant was assumed to start operating at 60% capacity and to increase to 100% within 5 years. The total investment was split over years 0-3. All estimates are still

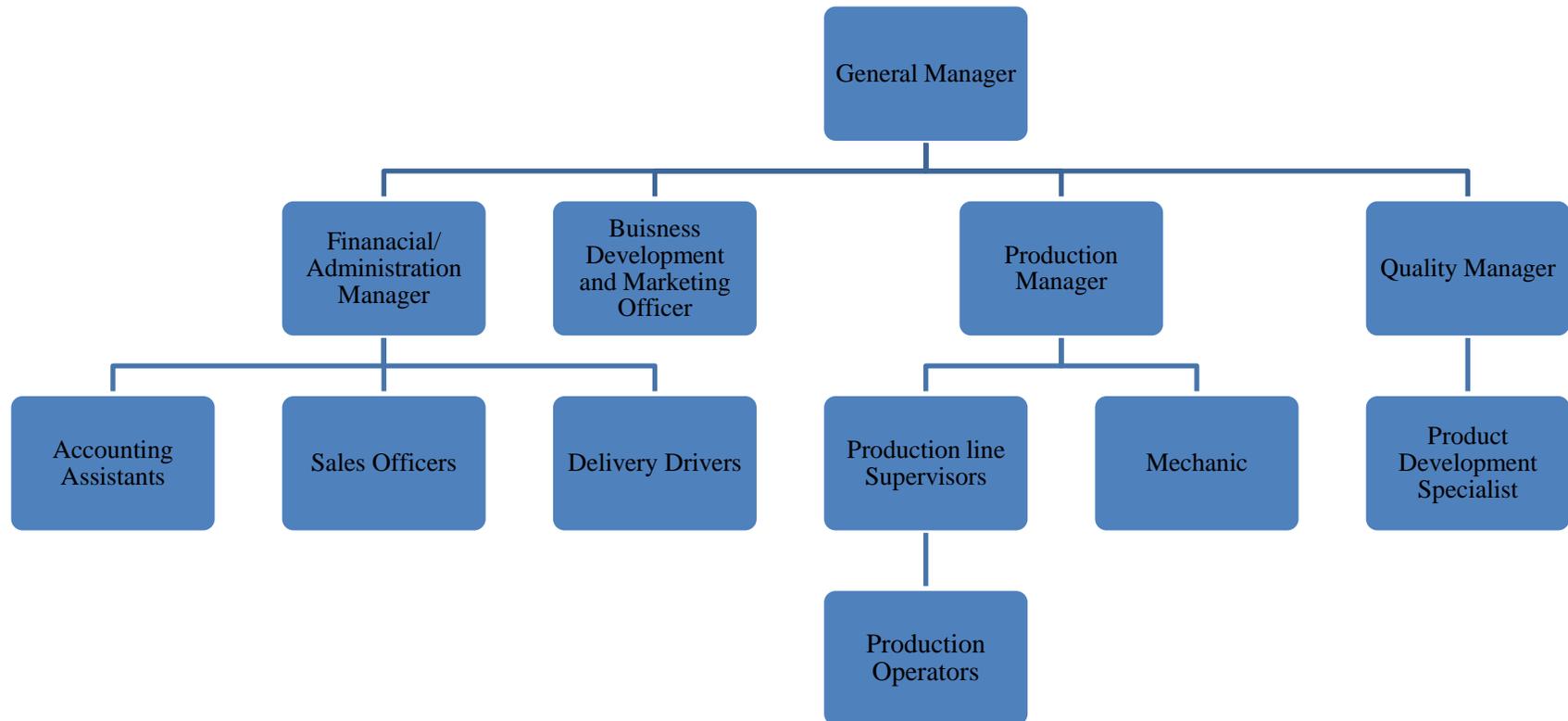
## Manufacturing Profile 1: Cocoa and Chocolate Products

considered conservative and achievable because the fact that the technology is fairly new for T&T was considered, and a moderate start was assumed.

Drawing on the pessimistic estimate, this project would pay back in 4 years with a positive net present value of US\$4.68 million in 10 years. The moderate estimate of the market will yield a project that pays back in 3 years. The ten year return on this project is 56% and the net present value is US\$7.5 million. With innovative and creative product development and targeting moderate but lucrative markets, the optimistic forecast is possible. This scenario pays back in year 3 with a 10 year net present value of US\$9.9 million and an IRR of 68%. These values are shown in Table 1 of the report.

## 8 Human Resources

### 8.1 Organization Chart



## Manufacturing Profile 1: Cocoa and Chocolate Products

Figure 7: The organizational structure of the cocoa and chocolate products factory

## 8.2 Job Descriptions for Key Positions

Table 14: Job Descriptions

POSITION	RESPONSIBILITY
Board of Directors (BOD)	The Board of Directors will comprise of the Chairperson who is knowledgeable in business and food industry sector, Secretary/Financial Controller, Food Safety Consultant, Food Engineer, Legal Advisor, a Business Development/Marketing Professional and a Major Investor
General Manager	The General Manager will report to the BOD and will assume overall responsibility for the management and operations of the organization. Included would be product development, business development, operations, production, financial control, quality control and training of employees in all aspects of the operation.
Quality Manager	The Quality Manager will have direct responsibility for the quality of the product produced. His responsibilities will include quality control, quality assurance and the championing of policies that will institutionalize quality standards within the organization. He also has full responsibility with implementing, monitoring and control of all aspects of food safety.
Finance/ Administration Manager	The Finance/ Administration Manager will be responsible for controlling the company's finances and for reporting to the board any variances from the targets established. The Finance/ Admin. Manager will produce regular Management and Financial Reports and will perform internal audits on the company's operations on a regular basis. The Finance/ Admin Manager will ensure that any/all statutory requirements are met. This finance/ admin manager will also have the portfolio of marketing and sales.
Accounting Assistants	The Accounting Assistants are responsible for processing of bills, invoices, accounts payable and receivable, etc.
Production Manager	The Production Manager runs the plant ensuring there is sufficient raw material, the finished product is of good quality and production quantity is met. He is involved in new product development. The production manager is champion of

## Manufacturing Profile 1: Cocoa and Chocolate Products

	safety and quality. He is involved in selection, installation and maintenance of all equipment.
Business Development and Marketing Officer	The Business Development and Marketing Officer will be responsible for promoting the product and for the actual online and physical sales of the product into new and existing markets. The officer is a senior person who will also contribute to new product development based on feedback from the market and for using all forms of media to assist in the promotion and sales of the product. He/she is responsible for planning, advertising, public relations, product development and distribution.
Mechanic	The Mechanic is responsible for preventative measures as well as troubleshooting processes and diagnosing mechanical, hydraulic and pneumatic problems associated with process equipment.
Production Line Supervisors	These persons are actively involved in the processing of cocoa from the raw material through fermentation, roasting, winnowing, grinding, tempering to the final product that is packaged. They ensure that raw materials are of desired quality and that all processes/unit operation are done in a timely manner. They supervise the work of the equipment operators and guide the processing of the cocoa. They ensure that quality and food safety are carefully followed on the production line. They are trained in the making of cocoa and HACCP.
Production Operators	The operators are directed by line supervisors and ensure the correct amount of material and ingredients are added in each unit operation. They monitor the equipment's operating parameters such as intake amount, temperature and speed of operation etc.
Product Development Specialist	The Product Development Specialist investigates, designs, and assesses products. They also coordinate all stages of product development, from initial concept art, to finalization and distribution.
Sales Officers	The sales officer is the point of contact between the company and the customer and is required to establish and maintain strong relationships between both parties.
Delivery Driver	A Delivery Driver transports the finished goods to customers. Orders are made

through the Sales officers.

### 8.3 Labour Availability

Table 15: Potential labour pools for proposed positions

CATEGORY	UNEMPLOYED	EMPLOYED	POTENTIAL EMPLOYMENT POOL
Professionals <ul style="list-style-type: none"> <li>• Accounting Assistant</li> <li>• Production Line Supervisor</li> <li>• Product Development Specialist</li> </ul>	900	36700	Graduates from any of the sixteen (16) Universities of the West Indies Open Campus locations in the Caribbean, and/or any of UTT campuses in Trinidad.
Legislators, senior officials, managers <ul style="list-style-type: none"> <li>• Board of Directors</li> <li>• General Manager</li> <li>• Production Manager</li> <li>• Finance/ Admin Manager</li> <li>• Business Development &amp; Marketing</li> </ul>	400	61300	Sourced from the existing pool of unemployed and employed persons through interviews and the subsequent process of filtering.

## Manufacturing Profile 1: Cocoa and Chocolate Products

Manager <ul style="list-style-type: none"> <li>• Quality Manager</li> </ul>			
Clerks <ul style="list-style-type: none"> <li>• Sales Officer</li> </ul>	5100	67100	Can be sourced from several training centres in Trinidad registered under the Accreditation Council of Trinidad and Tobago (ACTT)  E.g. Crane Safe Technical Institute, Advanced Solutions Technical Institute and Technical Institute for Learning, just to list a few.
Technicians <ul style="list-style-type: none"> <li>• Mechanic</li> <li>• Computer</li> </ul>	1500	69300	
Floor Operators	600	57700	

## 9 Location

The assessment of the most suitable locations for the establishment of the proposed facility, was determined using a factor rating method. Fourteen (14) rating criteria were used in this particular instance. These criteria can be found in the first column of the Table 16.

Table 16: A general assessment of locations in T&T

	Weight	Trinity	Aranguez	Central	Diego Martin	South	Arima	Tobago		
Availability of services and supplies	0.048	80	80	80	80	80	80	60		540
Environmental considerations	0.010	75	75	75	75	75	75	90		540
Infrastructure - land availability	0.095	65	70	90	60	60	75	60		480
Infrastructure - land/construction costs	0.105	60	60	80	50	60	60	40		410
Infrastructure - roadways/access	0.124	80	80	60	70	70	80	50		490
Labor availability experience/skills	0.067	90	70	75	75	80	80	60		530
Labour cost	0.048	75	75	75	75	75	75	65		515
Proximity to emergency services	0.000									0
Proximity to port	0.086	80	80	80	80	70	75	60		525
Proximity to raw materials	0.057	80	80	80	60	60	60	50		470
Utilities - electricity	0.105	90	90	90	90	90	90	90		630
Utilities - gas	0.086	90	90	90	90	90	90	80		620
Utilities - telecom	0.086	90	90	90	90	90	90	90		630
Utilities - water	0.086	75	75	70	60	75	70	50		475
<b>Total</b>	<b>1.000</b>	<b>1030</b>	<b>1015</b>	<b>1035</b>	<b>955</b>	<b>975</b>	<b>1000</b>	<b>845</b>		<b>6856</b>

The locations considered were those that have previously been identified for national economic development, i.e., key economic zones. These locations were considered as they are well positioned for the establishment of new businesses. Accordingly, access to the

## Manufacturing Profile 1: Cocoa and Chocolate Products

necessary infrastructure, services and other critical resources would be more readily available, as compared to most other locations across the country.

As in other similar assessments, the results of the assessment indicate that the seven locations in Trinidad are all relatively well positioned to setup the proposed manufacturing facilities. Of these seven, Central and Trincity areas have emerged as the locations with the greatest comparative advantage. This is primarily a result of their relative proximity to Port of Spain and/or Piarco, where the key ports and many of the critical supporting services are located. As in previous assessments, Tobago has emerged as a location that is least suitable. The primary reason for this is the lack of a container port in Tobago. Port access is a critical requirement, if the exportation of the products is required. Accordingly, the construction of a container port would be critical to improving the suitability of Tobago as a location for the proposed industry.

Best Locations based on rankings are:

1. Central Trinidad: 1035
2. Trincity: 1030
3. Aranguez: 1015
4. Arima: 1000
5. South: 975
6. Diego Martin: 955
7. Tobago: 845

## 10 List of Potential Investors and Partners

Table 17 gives a list of potential investors and partners, together with contact information.

The list is not exhaustive.

Table 17: Potential Investors and Partners

POTENTIAL INVESTOR/ PARTNERS	CONTACT INFORMATION
Cocoa Research Centre	Sir Frank Stockdale Building Ground Floor, North Wing The University of the West Indies St. Augustine Tel: (868) 662 8788, (868) 662 2002 Ext 82115; 82178; 83330; 83331; 83332; 83333 Fax: (868) 662 8788 Email: info@cocoacentre.com; info@cacaocentre.com
Sham Rampersad Tableland Cocoa Farmers Association	Email: shamrampersad1@gmail.com Tel: (868) 678-4576
Juliet Mohammed Cocoa and Coffee Marketing Cooperation	Email: <a href="mailto:ccmcs1@gmail.com">ccmcs1@gmail.com</a> Tel: (868) 667-6353
Greville Nicholson Tobago Cocoa Farmers Association	Tel: (868) 777-8746
Tourism Development Company Ltd	Level 1, Maritime Centre # 29 Tenth Avenue

## Manufacturing Profile 1: Cocoa and Chocolate Products

	<p>Barataria          Republic of Trinidad and Tobago          Maritime Centre: (868) 675 7034-7Piarco          International Airport Office: (868) 669 5196/6044,          (868) 800-4TNT          TDC Information: info@tdc.co.tt</p>
<p>Ministry of Agriculture, Land and Fisheries          Head Office          Ministry Food Production</p>	<p>St. Clair Circle, St Clair          Tel: (868) 622 1221          Fax: (868) 622 8202</p>
<p>Caribbean Agricultural Research and          Development Institute (CARDI)          University of the West Indies</p>	<p>University Campus,          St. Augustine.          Trinidad and Tobago.          Phone: 1 (868) 645 1205/6/7 Fax: 1 (868) 645 1208</p>
<p>Caribbean Industrial Research Institute          (CARIRI)</p>	<p>University of the West Indies Campus,          St. Augustine.          Trinidad and Tobago.          Tel: (868) 299 0210 Email: acams@cariri.com</p>
<p>Inter-American Institute for Cooperation on          Agriculture (IICA)</p>	<p>#10 Austin Street,          St. Augustine.          Trinidad and Tobago.          P.O. Box 1318, Port of Spain, Trinidad, West          Indies          Tel: (868) 645 4555, (868) 645-5020, (868) 645          8886          Fax: (868) 662-8253 Direct Line: (868) 645-4555</p>

## Manufacturing Profile 1: Cocoa and Chocolate Products

Agricultural Development Bank (ADB)	#87 Henry Street, Port of Spain. Tel: (868) 623 6261-5 Fax: (868) 627 7493, (868) 624 3087 E-mail: northoffice@adbtt.com
The National Export Facilitation Organization of Trinidad and Tobago (EXPORTT)	151B Charlotte Street, Port of Spain Tel: (868) 623-5507 Fax: (868) 625-8126 Email: info@exportt.co.tt
Trinidad and Tobago Agri-Business Association (TTABA)	Unit 13, Freeport Warehouse Complex, Eagles Crescent, Mission Road Tel: 673-6429

## 11 Concluding Remarks

The Cocoa and Chocolate Products industry promises to be a very lucrative industry for any investors. The high demand for dark chocolate coupled with our highly flavoured and sought after Trinitario cocoa open doors to an enterprising niche market. If we were to follow the Swiss model, there is potential for Trinidad and Tobago to break new grounds. Switzerland currently produces 1.9 million USD worth of raw cocoa product, yet sells nearly 743 million USD worth of chocolate product (Indexmundi 2016). Trinidad and Tobago produces a similar 2 million USD worth of raw cocoa product, but we sell 8 million USD of chocolate product. The present profile considers using only 14% of the total local raw material. (Indexmundi 2016)

There also are many downstream linkages, such as cottage industries where chocolatiers can sell fine chocolate or customized chocolate products which makes this subsector very attractive. The key elements for success would be to invest heavily in branding, research and development. Also, supplier quality needs to be maintained and farmers should be well-rewarded for their produce.

## 12 References

CRU (Cocoa Research Unit). 2016. "General Information." Accessed January 03, 2016.

<https://sta.uwi.edu/cru/index.asp>

Ha, James. 2013. "Chocolate Crisis: Cocoa Demand will be unsustainable by 2020."

Accessed February 6, 2016.

<https://www.benzinga.com/markets/futures/13/10/3980552/chocolate-crisis-cocoa-demand-will-be-unsustainable-by-2020>

Indexmundi. 2015. "Trinidad and Tobago Exports by Product Sub-chapter in US Dollars – Cocoa and Cocoa Preparations – Yearly." Accessed December 12, 2015.

<http://www.indexmundi.com/trade/exports/?chapter=18&country=tt>

International Cocoa Organization. 2012. "Drying of Cocoa Beans." Accessed December 15, 2015.

<https://www.icco.org/faq/59-fermentation-a-drying/110-drying-cocoa-beans.html>

InvesTT. 2014. "Instantly transform your chocolate business: Why Trinidad is your best source of fine or flavour beans." Accessed March 1, 2017.

<http://www.investt.co.tt/blog/investt-blog/2014/june/instantly-transform-your-chocolate-business-why-trinidad-is-your-best-source-of-fine-flavour-beans>

## Manufacturing Profile 1: Cocoa and Chocolate Products

Ministry of Trade, Industry, Investment and Communications. 2015. "Compendium of Investment Incentives in Trinidad and Tobago for the Non-Energy Sector." Accessed December 15, 2015. <http://tradeind.gov.tt/wp-content/uploads/2016/02/2015-Compendium-of-Incentives.pdf>

Nero, Sean. 2016. "T&T's cocoa sector left behind." *Trinidad and Tobago Guardian*, January 29.

The World Atlas of Chocolate. 1997. "The Production of Chocolate." Accessed December 15, 2015. <https://www.sfu.ca/geog351fall03/groups-webpages/gp8/prod/prod.html>

Trinidad and Tobago Guardian. 2011. "T&T Cocoa wins top spot at international awards in France." Accessed November 21, 2015. <http://www.guardian.co.tt/news/2011/10/24/tt-cocoa-wins-top-spot-international-awards-france>