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## Factors Influencing Sustainable Cocoa Production in Northern Haiti

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# FACTORS INFLUENCING SUSTAINABLE COCOA PRODUCTION IN NORTHERN HAITI

A Thesis

Submitted to the Graduate Faculty of the  
Louisiana State University and  
Agricultural & Mechanical College  
in partial fulfillment of the  
requirements for the degree of  
Masters of Sciences

in

The Department of Agricultural Economics & Agribusiness

by

Wegbert Chery

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## **List of Acronyms**

BAC: Bureau Agricole Communale

BMP: Best Management Practice

COFIP: Collectif du Financement Populaire

CNUCED: Conférence des Nations Unies sur le Commerce

DDA: Direction Départementale Agricole

EU: European Union

FAO: Food and Agriculture Organization

FAOSTAT: Food and Agriculture Organization of the United Nations Statistical Division

FECCANO: Fédération des Copératives Cacaoyère du Nord

IADB : Inter-American Development Bank

IHSI: Institut Haïtien de Statistiques et d'Informatique

IPM: Integrated Pest Management

ITC: International Trading Centre

MARNDR: Ministère de l'Agriculture des Ressources Naturelles et du Développement Rural  
d'Haïti (Ministry of Agriculture of Haiti)

MEDA: Mennonite Economic Development Associates

MIF: Multilateral Investment Fund of the Inter-American Development Bank

NGO: Non-Governmental Organization

NRP: Nitrate Reduction Program

OMC: Organisation Mondiale du Commerce

PISA: Produits des Iles S.A.

PNUD: Programme des Nations Unis pour le Développement

SIDI: Solidarité Internationale pour le Développement et l'Investissement.

SWOT: Strength Weaknesses Opportunities and Threats

USA: United States of America

USAID: United States Agency for International Development

USDA: United States Department of Agriculture.

## **Abstract**

Given the environmental concerns on the one hand, especially soil erosion and deforestation, and the hope that the global cocoa market offers on the other hand, cocoa production is a potential candidate to simultaneously guarantee a competitive return to investment for farmers in northern Haiti and mitigate the negative environmental impact of farming practices. It becomes crucial for policy makers and investors to know and understand the key elements of the decision to produce cocoa. Though there has been substantial effort to improve the cocoa sector in Haiti, cocoa production systems in Haiti lag behind in the area of sustainability. To address the lack of information on key criteria farmers rely upon to produce cocoa sustainably, this study identifies factors influencing the sustainable cocoa production adoption decision. The act of adopting sustainable cocoa production in this study is defined by the rehabilitation of old cocoa farms and the establishment of new cocoa plantings that fit into agroforestry management systems. This study also is a first attempt at describing the current state of sustainable cocoa production in Haiti.

A qualitative method was used to conduct this research. The approach used was focus groups. Fourteen focus groups and seven individual interviews provided data used to answer the research question. Additionally, a SWOT analysis was conducted on the cocoa sector.

Results of the investigation indicate that farm gate price, farm size, property ownership, land configuration and rural infrastructures, networking, and animal feeding practices were key determinants of sustainable cocoa production in northern Haiti. In addition to these factors influencing sustainable cocoa production in northern Haiti, the SWOT analysis identified key elements that constrained or might help with expansion and growth of the cocoa sector. Weaknesses include lack of maintenance and rehabilitation of farms. One of the best

opportunities lies in physical proximity to the U.S. market and special trade agreements with favorable buyers from the European Union who are looking for the fine cocoa flavor of the *Criollo* variety. Black pods, drought and climate change, low producer price and corruption within farmer cooperatives pose the greatest threats.

## **Chapter 1: Introduction**

### **1.1 Background**

The agricultural sector contributes 25% of the total Global Domestic Product (GDP) in Haiti (MARNDR, 2012). More than 60% of the working population is in agriculture (HNP, 2014). Despite a gradual reduction of the importance of agriculture to the Haitian economy, 35% of the GDP in 1994 to 25% in 2012 (MARNDR, 2012), agriculture continues to be a dominant sector of the economy. Population growth, migration to the city, and increased economic pressures are leading to widespread deforestation throughout Haiti, including the use of low quality fruit trees for fuel or wood products. At the beginning of the 20<sup>th</sup> century, the country's forest coverage was estimated at 60% of the total land area (Roger, 2005). Scientists estimate forest coverage today at about 2% (Vario, 2007; Bellande, 2009; MARNDR, 2012), whereas the vegetation coverage is estimated at 15% (World Bank, FAO, and USAID quoted in Bellande, 2009).

Haitian land configuration is naturally not very friendly to some agricultural infrastructures; indeed, 60% of the Haitian territory is mountainous (Vario, 2007). Seventy percent of national land is exposed to a significant level of soil erosion in the words of Vario (2007). Loss of agricultural production due to mountainous soil erosion is estimated to be between \$4 to \$5 million a year (Bellande, 2009). Cultivation on soils with slopes of more than 50% explains 80% of this erosion and loss (Bellande, 2009). According to Smucker (2005), the denuded situation of the sloped land in Haiti is a reflection of the market opportunities for agriculture products. In fact, given the low price farmers used to receive for the fruit from their trees, growing annual crops was more advantageous financially for them. Smucker et al. (2005) addressed “incentives for natural resource management in Haiti,” and suggested a change from annual crops to “tree crops” such as cocoa, particularly on steeply soils. They argued this change

would significantly diminish the negative impacts of agriculture on the environment by reducing erosion.

Efforts to increase the value of fruit trees, especially mangoes, coffee, and cocoa, have been plentiful; for instance, cocoa from Haiti has penetrated new markets in France and Canada among others. (COFIP, 2012; Smucker 2005). Moreover, producer organizations have been strengthened and an increase of cocoa prices in Haiti has caused farmers to increase their capital investment in tree crops (Smucker, 2005). Since 1999, the European Union (EU) has implemented programs to support cocoa producers in Haiti under an agreement between the African, Caribbean and Pacific Group of States (ACP) and the EU. In 2000, within a U.S. Agency for International Development's (USAID) project, in cooperation with Auburn University, Christopher Stevenson produced an improved cocoa production training manual. In tandem with the EU efforts, the USAID implemented another project which emphasized sustainable cocoa production in northern Haiti from 2008 to 2012. That agricultural and environmental project, Développement Economique pour un Environnement Durable (DEED), promoted cocoa production practices that are simultaneously environmentally friendly, provided competitive returns on investment, and promoted good working conditions. In November 2013, the Haitian government, in partnership with Multilateral Investment Fund of the Inter-American Development Bank (IADB), launched a \$4.8 million cocoa project in Haiti. That project aimed at reaching and making a significant positive impact, specifically in terms of increasing yield, on 3,000 farmers in northern Haiti among the 7,000 targeted farmers nationwide (HPN, 2013).

In Haiti, cocoa production integrates an agroforestry system, where cocoa is associated with many annual crops and other trees. The Cocoa Foundation (2013), a world cocoa organization, estimated twenty one percent of agroforestry coverage in Haiti is cocoa farms.

Haiti's annual cocoa production averaged 4,362 metric tons over the period 1980-2000 according to estimates based on the Food and Agriculture Organization of the United Nations Statistical Division (FAOSTAT) database. For the last decade, the production has stabilized around 9,000 metric tons. The acreage planted to cocoa has increased 2.44 times during the same time period. Cocoa exports have been steady, at around 3,500 metric tons, for the last decade according to data from the International Trade Commerce (ITC). However, since 2010, exports have increased to around 4,000 metric tons. In 2012, the value of cocoa exports was \$9.028 million. According to a study conducted by Collectif du Financement Populaire (COFIP) in 2012, cocoa producers in northern Haiti have gained increasing benefits from cocoa production via penetration into some markets by Fédération des Coopératives Cacaoyère Nord (FECCANO). Consequently, many farmers have demonstrated an interest in investing in cocoa production.

#### 1.1.1 Overview of World Cocoa Production

Cocoa is mainly produced by small subsistence farmers around the world. Indeed, cocoa farm size is less than one hectare (1 Hectare, ha  $\approx$  2.5 Acres) for many farmers in West Africa and Southeast Asia. For instance, subsistence farmers produce more than 90% of cocoa production in Ivory Coast, one of the major cocoa producing nations. Most of the large farms are located in Brazil, Ecuador, and Malaysia (CNUCED/OMC, 2001). Keith indicated that large cocoa farms in Brazil are about 500 hectares, and the size of small farms is less than 25 hectares. Traditional cocoa production with minimal maintenance produces between 300 and 500 kg/ha yearly. Improved varieties under optimal conditions can produce around 2,500 kg/ha annually (CNUCED, 2001).

Most of the cocoa diseases are fungal. Greco et al. (2007) indicated that black pod caused by *Phytophthora fungus* causes “the largest loss of [cocoa] pods.” In addition to black pod, there

exist three major cocoa diseases: vascular streak dieback, Broom (*Crinipellis permiciosa*), and frosty pod rot disease (*Moniliophthora sp*).

FAO estimated global cocoa production was 5,003,211 metric tons in 2012. Africa represents the largest cocoa production region with a total output of 3,289,190 metric tons, which is 65.7% of world production. Ivory Coast, the largest cocoa producer, produced about 33% of the world production (1,650,000 metric tons). The world production is concentrated in a few countries. Indeed, the production of the seven largest cocoa producing nations, Ivory Coast, Indonesia, Ghana, Columbia, Nigeria, Brazil and Cameroon, account for more than 97% of the global production. Figure 1 below depicts the distribution of world cocoa production.

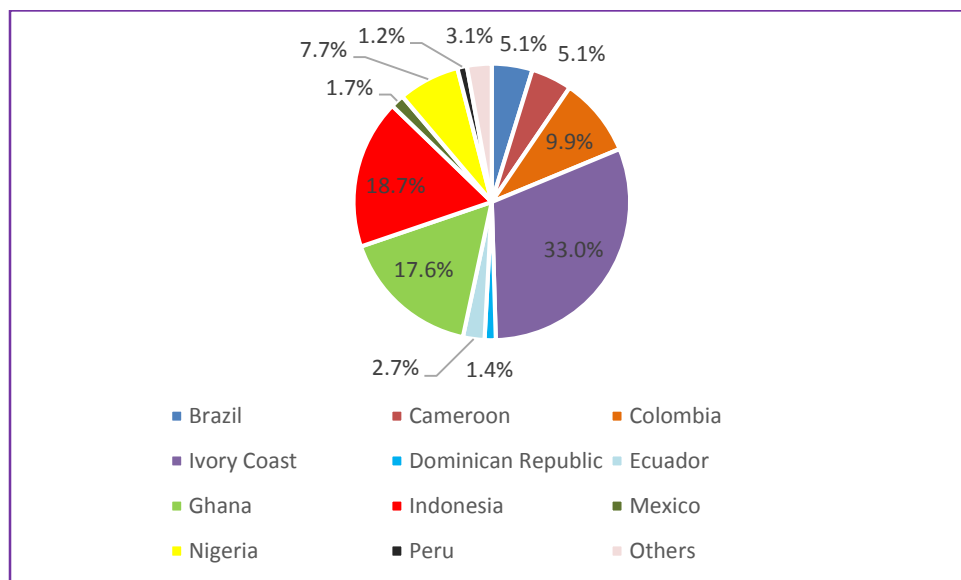


Figure 1: Distribution of World Cocoa Production (2012)

Cultivation of cocoa worldwide is limited to three major production systems: monoculture or “full-sun” production, shaded cocoa, and agroforestry systems. Monoculture of cocoa is the complete sunlight exposure of cocoa cultivation. Waldron et al. (2012) and Ruf (2011) argued that cocoa monoculture is practiced to obtain higher yield. Indeed, sunlight cocoa production consists of hybrid cultivars. Since cocoa trees naturally grow better under the shade

of other trees, shaded cocoa plantings are the most widespread farming system encountered worldwide. Most scholars (Greco Aixa Del et al., 2012, Waldron et al. 2012, Neptune et al., 2007, Avelino et al. 2012, Jean Chesnel, 2014) who write about cocoa farming systems whether in the Americas, Asia or Africa mention shaded cocoa culture. The term shaded cocoa sometimes overlaps with agroforestry cocoa systems because an agroforestry cocoa system is a shaded one. However, the inverse is not necessarily true. A shaded cocoa system may consist of remnant natural forest associated with planted cocoa trees. Most cocoa plantings in West Africa and in Latin America were started by clearing forests; farmers clear some parts of the forest, leave some trees, and cultivate cocoa under the remaining trees. In other instances, a shaded cocoa farm starts with temporary shade providers such as plantain and banana plants until the permanent trees mature enough; that is the case where the location was not covered with trees before. Agroforestry cocoa systems are cocoa culture practiced under trees in association with annual crops and other fruit trees. Animal production and utilization of animal waste in soil fertilization play a significant role in agroforestry systems. There exist many cocoa agroforestry systems, depending on the composition of the annual crops and trees grown in association with the cocoa plantings.

#### 1.1.2 Cocoa Production in Haiti

Haitian cocoa is mainly exchanged on two markets: the United States (U.S.) and the European Union (E.U). From 2009 to 2013 more than 50% of Haitian cocoa was sold in the U.S. In addition, Algeria and Canada historically bought a noticeable quantity of cocoa bean from Haiti. In 2009, 49 metric tons of cocoa bean were traded in Canada. In 2013 Algeria bought 248 metric tons of cocoa bean from Haiti. The following Figure 2 depicts the distribution of Haitian cocoa on the international market from 2009 to 2013 (data from ITC). According to the

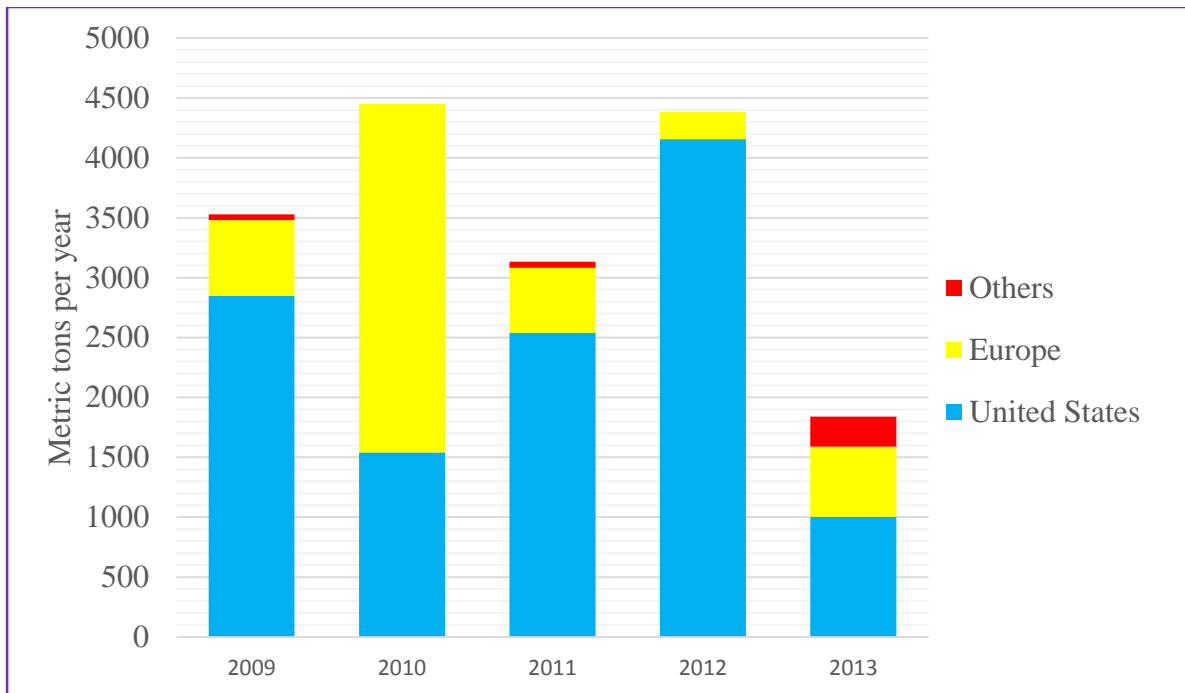


Figure 2: Cocoa Exports to Major International Markets of Haitian Cocoa

International Trading Center, the principal European trade partners for Haitian cocoa bean are Germany, Spain, Italy, and Netherlands. Figure 3 represents the percentage of total cocoa sales each partner bought from Haiti from 2009 to 2013.

Introduced in Haiti probably during Christopher Columbus colonization trips, *Criollo* and *Trinitario* are the dominant varieties of cocoa found in Haiti. Many scholars (Wood, 1961; Gianfagna, 2012; Knapp, 1920) argued that it was between 1525 and 1528 that cocoa was first introduced to the Caribbean. Historical accounts point to Hernando Cortes as the Spaniard conquistador who first introduced cocoa to Haiti as well as other Caribbean Islands such as Trinidad and Cuba. There is a lack of detailed literature about the introduction of cocoa and early cocoa production system in Haiti.

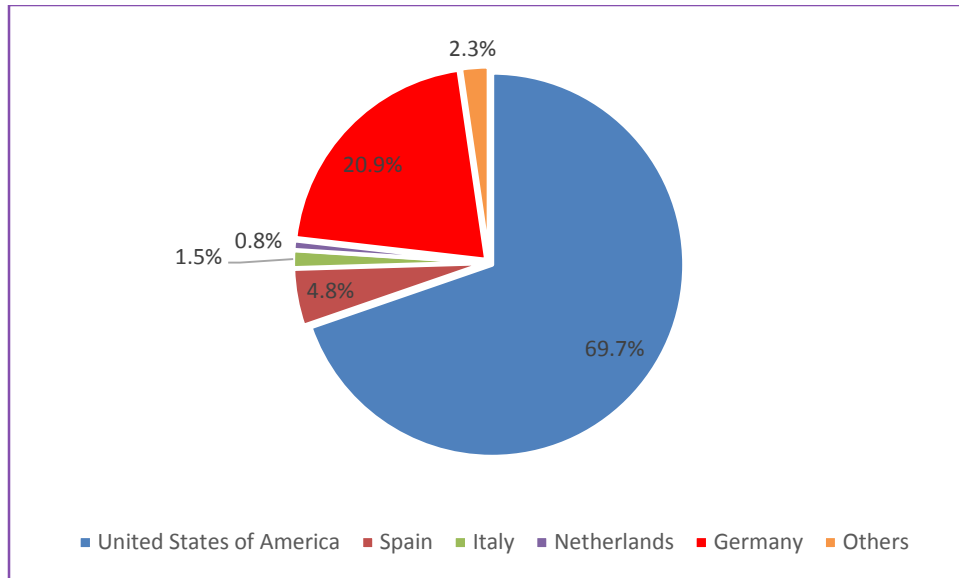


Figure 3: Distribution of Haitian Cocoa Trading Partners (2009-2013)

However, many studies (Boudet & Lundahl, LEGER, J. N., 1903; Jean Baptiste, 2011) related to Haiti during the French colonization period (1697 to 1803) mention cocoa as one of the trade commodities of the colony. For instance, Moreno (2011) stated that average annual cocoa exported from Haiti accounted for 200,000 pounds during the 1790-1801 period. Knowing that exported crops were produced on large-scale monoculture type system during the colonization period in Haiti, one can argue that cocoa production integrated a system of large farms which may be very different from the dominant associated cropping systems of cocoa production today in Haiti. In fact, since the forest coverage of the country was very high, it is unlikely that cocoa would be produced without shaded trees at that time. The most likely manner used to produce cocoa in those colonial times would be similar to how most farmers start establishing their cocoa farms in West Africa. Indeed, farmers would clear forest, leave some trees and plant cocoa under the shade of the remaining trees (Ofori-Bah et al. 2011, CNUCED/OMC, 2001, Greco et al., 2012).

Despite a lack of historical accounts on the exact time the prevailing cocoa systems started, one can debate that it must be a byproduct of the distribution of land that followed the Haitian Independence. In 1806 after the death of Jean Jacques Dessalines, the founder of the country and the first president of Haiti, the next Haitian president of the south and west parts of the country, Alexandre Petion, initiated a vast land distribution to all families (Jean Baptist, 2011; Leconte, 1931; Boisrond-Tonnerre and Saint-Rémy, 1851). Since the subsistence farming systems in Haiti trace back to that era, it is very probable that the associated cocoa systems also originated at that point. After independence of Haiti in 1804, cocoa is among the agricultural commodities that have long been part of the Haitian international exchange. Bourdet mentioned cocoa as a prominent exchange commodity of the Haitian economy in the early 20<sup>th</sup> century. For instance, Moreno (2011) argued that cocoa production spread throughout Haiti in the early 1900s and Haiti exported 4.6 million pounds of cocoa during the time between 1910 and 1914.

Formerly, farmers produced cocoa on almost all humid mountains around the country. With accelerating deforestation, significant cocoa plantings have been converted to more profitable annual crops such as corn, beans, peanut, etc. In some places, such as the south department (Haiti's original provinces were divided into 10 departments, which are broken down further into provinces), cocoa farms disappeared in the 1970s (Junior, 2014). In a study on the potential of cocoa production in 2005, Pierre indicated that in the 1970s, most of the cocoa farms were replaced by more profitable annual crops. According to many farmers in Haiti, the major reason people cut down cocoa trees to grow other crops lies in the history of the low price they had received for cocoa. They explained that in the 1970s, people stopped having interest in planting cocoa. Some people illustrated that they would need to sell about 5 pounds of cocoa in order to buy a pound of rice up to 1990. Even though cocoa had a low price, most people in the

north did not cut their cocoa plantings due to strict governmental control and restriction in terms of cutting trees during the Duvaliers dictatorship. After the fall of the Duvaliers in 1986, people kept most of their cocoa farms because of technical and financial support received from a Mennonite Economic Development Associate (MEDA) project at that time. Shortly after the end of that project, many farmers cut their cocoa trees and started investing in more profitable crops. This process stopped in the 2000s due to increased cocoa price on the national market.

Cocoa production in Haiti consists of a large number of farmers with small farm size. Indeed, the average farm size in the country is 1.8 hectares and 25% of farmers in northern Haiti growing cocoa (MARNDR, 2010). In Haiti, most cocoa producers are farmers who try to maintain their livelihood with a small farm size, which consists of many pieces of land sometimes. For most, farming and agricultural work are their main activities. To take care of their family, they need crop systems which provide food for the family or that can be harvested in a short period of time. As a result, cocoa does not work well in that situation. Firstly, the first harvest of a cocoa tree occurs at least four years after planting. Secondly, though cocoa trees may produce fruit more than once a year, the fruit cannot be used for direct consumption. And lastly, although cocoa prices have increased during the last ten years, farmers believe other crops are still more profitable. In fact, in the mountains, farmers are more interested in yam production, black beans, coffee, corn and other food staples. In the plains, banana, plantains, cassava, and other crops have priority over cocoa. These crops are the most profitable ones for most farmers. Nonetheless, as cocoa trees need little or no maintenance work, many keep some in their land parcels. Thus, they are able to harvest some cocoa pods twice or three times a year depending on the area.

Only a limited number of farmers can afford devoting much of their land to cocoa production. Some of these farmers have between four and seven acres of land and a small group of them have even more than ten acres of land. When their land is located in places that are suitable to cocoa, but not very suitable to coffee, they would have a significant part of the farm under cocoa. The other group that has at least 0.25 hectare in cocoa have either some significant off-farm source of revenue, such as money transferred from abroad or are educated professionals who work off-farm.

Most of the farms are very old and production is relatively low. Farmers and technicians alike indicate the majority of existing cocoa plants are more than fifty years old. Mature plants, in conjunction with the lack of maintenance, result in low yields. In fact, annual cocoa yield in Haiti averages around 250 kg/ha (Jean, 2014). There exists two cocoa seasons in northern Haiti. The main season goes from April to August. Then, there is a smaller season which starts in September and ends in December.

Use of non-mechanical farming tools such as pickaxe, machete, and hoe is predominant in Haitian agriculture. The FAO provides an estimated annual production of cocoa bean in Haiti. Figure 4 depicts cocoa production from 2009 to 2012, the most recent data available. During that period, cocoa bean production oscillated around ten thousands metric tons annually. In fact, FAO estimation shows an annual average production of 9,885 metric tons during the period from 2009 to 2012, the most recent data available.

In general, cocoa producers do not have information about how much it costs to grow a fixed quantity of cocoa. Agents for institutions such as the Ministry of Agriculture and Cocoa Federation Board do not believe this type of information is available. Making that estimation seems difficult to farmers for many reasons. First, most of the plantings are very old and they did

not keep record of expenses when establishing the plantings. Second, many obtained their cocoa farms from their parents. Third, they do not really spend money to maintain cocoa plants and they do not keep farm records regularly so that they cannot estimate the amount of labor allocated to cocoa production.

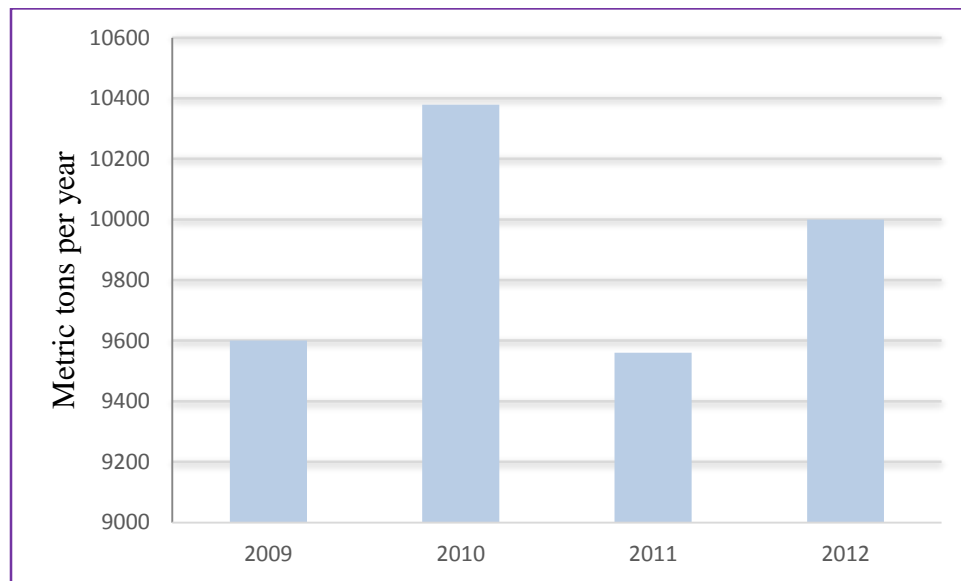


Figure 4: Cocoa Bean Production in Metric Tons, by Year

Furthermore, some farmers in Haiti grow tree crops such as coffee and cocoa because they perceive these plants require little or no maintenance. As a result, most farmers do almost no work on their cocoa field after the first five years except harvesting the pods.

## 1.2 Justification

Shedding light on significant factors that influence the probability of an agricultural practice, such as sustainable cocoa production, that simultaneously meets the farmers' goals and mitigates undesirable environmental effects has tremendous positive implications. Due to recent natural and social damage related to hurricanes, which was exacerbated by forest coverage degradation, the Haitian government and other institutions constantly seek methods to facilitate farmers' activities that protect of the environment and increase profits.

Although sometimes they focus more on maintaining a livelihood, farmers lie at the center of any serious debate or action that seeks to address environmental issues. They are the principal guardians of the environment and no one else has more direct contact with the environment than they do. During the last decade, the estimated forest coverage in Haiti is reported to be around 2% despite increasing environmental programs (Vario, 2007). Some perennial fruit farms, such as coffee and cocoa plantings, contribute to a large percentage of that coverage. There exists, therefore, a crucial need to find integrated approaches that can mitigate negative environmental impact and increase the forest coverage.

Denuded land and lack of tree coverage have exacerbated the devastation from hurricanes during the last few decades. Indeed, deforestation of the area surrounding a watershed was one of the major contributing factors associated with the destruction of Fonds Verettes, a village in southeast Haiti, in May 2004 during the passage of Hurricane Jeanne (PNUD, 2005). The Earth Observatory estimated the number of people killed by this hurricane was more than 2,000 (Gubbels and Brakengidge, 2005). The successive floodings of the city of Gonaives, that left thousands of dead people in 2004 (Hurricane Jeanne) and 2008 (Hurricane Hannah), was another case.

This study is a first in terms of revelation of the current state of sustainable cocoa produced in Haiti. Given the actual environmental situation and the potential economic and environmental impact of increased sustainable cocoa production in Haiti, the study aimed to identify ways that farmers can increase their agricultural revenue via sustainable crops. It provides guidance to the cocoa project managers and researchers to enhance effectiveness of cocoa production. Moreover, the investigation provides examples of possible policy changes and

their implications on farmers. Finally, the findings of this scientific inquiry may be used in the Grand-Anse Department, which is the other main cocoa production region in Haiti.

### **1.3 Problem Statement**

Apart from domestic cocoa consumption in Haiti, and prior to the creation of the Fédération des Coopératives Cacaoyères du Nord (FECCANO), the cocoa bean market was characterized by a single exporter who bought from the farmers in the northern Haiti market (COFIP, 2012). That exporter had substantial pricing power. The existence of monopolistic pricing power had created a market condition that puts cocoa producers at a disadvantage when negotiating prices. Thus, prices received by producers in this environment did not necessarily reflect globally competitive market prices. The intervention of FECCANO as a cocoa buyer and exporter not only increased competition in the cocoa market in Haiti, but also has increased Haitian market penetration. Particularly, some specialty markets (organic and fair-trade) offer a premium, which has led to increased returns to the industry and to producers.

With increased investment in community development and the weakening of the cocoa monopolistic power in northern Haiti, the international market has become a more attractive alternative and may remain so in the foreseeable future. The estimation of global chocolate demand for 2050 is believed to be more than twice today's demand (Bisseleua, 2009). Moreover, the FairTrade Foundation argued that cocoa demand worldwide is expected to be 4.5 million tons in 2020, a quantity that would surpass current production. Despite the substantial efforts that have been made to increase cocoa production in Haiti, acreage harvested in the past five years remains stable at around 21,965 hectares annually (FAOSTAT) with very low cocoa yield. This has resulted in stable, but low production.

Cocoa production is a potential candidate to simultaneously provide a competitive return on investment to the farmers in northern Haiti and to mitigate the negative impact of the environment deforestation and soil loss resulting from agriculture. It becomes crucial for policy makers and investors to know and understand the key elements upon which the decision to produce cocoa profitably rely. This study proposed to identify key elements upon which farmers make decisions to grow cocoa sustainably and profitably in Haiti. The results of this research should help to make appropriate policy and extension service changes. Moreover, investors (mostly farmers) who would like to grow cocoa in Haiti should have a better understanding of the steps they will need to take to be successful, profitable and sustainable.

## **1.4 Objectives**

### **1.4.1 General Objective**

This study investigates sustainable cocoa production practices in northern Haiti and identifies key factors upon which farmers base their choice of producing cocoa for specialized markets. Sustainable cocoa production in this study is defined by the renovation of old cocoa farms or the establishment of new ones that fit into agroforestry management systems. In addition to the previous criteria which relate to production phase, membership in a cocoa cooperative and fermentation of cocoa beans are other factors that are used in this study to evaluate sustainability of cocoa production in northern Haiti.

### **1.4.2 Specific Objectives**

Specific objectives of this research are:

- 1) Determine cocoa producers' awareness of modern cocoa production and rehabilitation techniques;
- 2) Evaluate factors influencing sustainable cocoa production adoption in northern Haiti;
- 3) Assess opportunities for and constraints to expanding sustainable cocoa production;

- 4) Determine the effects of cocoa incentive activities (extension services) on sustainable cocoa production.

#### **1.4 Hypotheses**

Based on the proposed study of sustainable cocoa production in northern Haiti and the defined objectives above, the study tested the following hypotheses.

- 1) The adoption of sustainable cocoa production is affected by the socio-economics factors such as family's income and formal education.
- 2) Physical properties (soil, slope) have no impact on the adoption and practice of sustainable cocoa production in northern Haiti.

## **Chapter 2: Literature Review**

Etymologically, sustainability refers to the lasting property of something. Sustainability started becoming an increasingly important issue in the 1970s. It was the focus of many global meetings, and careful emphasis has been put upon the interconnection and interaction between nature, economic development, and poverty (Elliott, 2012).

### **2.1 Sustainable Development**

Alongside the growing importance of the term sustainability, the concept of “Sustainable Development” was born in the 1970s. The World Commission on Environment and Development, in its 1987 report, defined sustainable development as socio-economic activities that aim at satisfying “the needs and aspirations” of the current generation as well as those of generations to come (Brundtland, 1987). Sustainable development embodies a modern approach requiring the creation of wealth in societies to tackle conjointly the issues of equitable distributions, the conservation of biodiversity, and gender equity (Elliot, 2012).

### **2.2 Sustainable Agriculture**

Agriculture is a very important economic activity worldwide. The link between farming activities and the environment is undeniable. As a result, any issue that deals with economic activities and agriculture, environment concerns must also be included. Hence, the growing concern over “sustainability” and sustainable development requires the characterization of an agriculture that fits into this framework. Thus, the term sustainable agriculture fits within the framework of sustainable development.

Harwood (1990) identified two temporal points in the evolution of the term sustainable agriculture. Firstly, in the early 1980s, emphasis was put on the regeneration aspect of farming activities by Rodale and the connection of a durable farming according to Jackson (Harwood,

1990). Furthermore, this concept evolved into a set of environmental friendly activities that relies on the “interaction” norms of ecology. Secondly, the repetitive and growing usage of sustainability concept since 1987 encompasses the full societal interaction of the farming activities. However, a lack of consensus on the definition of sustainable agriculture remains. As Harwood mentions, an acceptable definition he proposes is as follows: “Sustainable agriculture is a system that can evolve indefinitely toward greater human utility, greater efficiency of resource use and a balance with the environment which is favorable to humans and most other species.” Sustainable agriculture involves the use of available local resources and natural processes while restricting the use of chemicals and non-renewable energy (Roling, 2000). Others differ in their definition among institutions. For instance, Kim (2013) considers sustainable agriculture a novel farming system that internalizes environmental costs of farming activities. Kershner (2013) indicates that the US Congress in 1990 defined sustainable agriculture as:

An integrated system of plant and animal production practices having a site-specific application that will, over the long term: (1) satisfy human food and fiber needs; (2) enhance environmental quality and the natural resource base upon which the agricultural economy depends; (3) make the most efficient use of non-renewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls; (4) sustain the economic viability of farm operations; and (5) enhance the quality of life for farmers and society as a whole.

### **2.3 Cocoa: Origin, History, and Dissemination.**

The cocoa tree, known scientifically as *Theobroma cocoa*, L., originated from the Amazon region of Brazil (Livingstone, et al., 2012; Wood, and Lass, 2008; Knapp, 1920; Gianfagna and Cooper, 2012; CNUCED/OMC, 2001). According to historical accounts, there is no evidence on the exact time when people started eating the fruit of the cocoa tree. In fact, the first account of cocoa in history dated to the Spanish colonization of the Americas. Thus, the 16<sup>th</sup> century is considered the epoch during which the European first discovered cocoa, which had

been eaten by Aztecs and Mayan prior to contact with Europeans (Wood, 1985). However, cocoa was produced generally by the Mayan. Many other ingredients, such as chili and vanilla (Wood, 2008; Gianfagna, 2012) and maize (Knapp, 1920; Wood 2008), have been used together with cocoa. Despite the fact that the cocoa bean is the most interesting part of cocoa today, the first cocoa tasters used to eat only the cocoa pulp. In effect, the bean was eaten for the first time by unknown Aztecs, who took that risk after roasting the tropical fruit (Knapp, 1920).

In addition to the energetic properties of cocoa, earlier cocoa tasters used cocoa for such purposes as medicine, divinity and as currency (Wood, 2008). Indeed, it was known as the “food of the gods” in the Aztec civilization (Gianfagna, 2012). Moreover, chocolate was the main drink of Montezuma, the Aztecs emperor in Mexico in the earlier 1500s according to Knapp (1920). Cocoa beans were one of the Aztecs currencies too (Knapp, 1920; Boudet & Lundahl). Christopher Columbus is the one who first introduced the cocoa beverage to Europe (Knapp, 1920; Gianfagna and Cooper, 2012).

Domesticated in the Amazon forest, the cocoa tree has been propagated in South and Central America, and in almost all tropical countries in Africa and Asia. Wood (Wood, 1961) revealed that cocoa was disseminated in South America and the Caribbean in the 17<sup>th</sup> century, which is when it was likely brought to Haiti. He continued to explain that during that same period cocoa reached Asia and was grown there too. The Philippines was the first country in Asia where cocoa was grown.

Until the 18<sup>th</sup> century, people were interested only in the *Criollo* variety of cocoa bean. The domestication of *Forastero*, an improved variety of cocoa, occurred in 18<sup>th</sup> century in Ecuador and Brazil. After that, cocoa production spread to West Africa in the second half of the

19<sup>th</sup> century. Ghana and Nigeria were the first places in Africa where cocoa was introduced (Knapp, 1920).

## **2.4 Effect of Increased Cocoa Production on Forest Coverage**

Increasing cocoa production may have positive or negative impacts on forest coverage depending upon whether that increase occurs in the forest zone or elsewhere. In fact, in regions where cocoa production concentrates in the vicinity of a forest, which is the case in West Africa (Läderach et al., 2013), expansion of production area often takes place at the expense of forest coverage. For instance, Asase et al. (2010), in a study that estimated the impact of cocoa farming on forest in Ghana, found that a severe forest and biodiversity conservation loss followed increased cocoa production. Furthermore, Donald (2004) stated that production of cocoa may substantially contribute to the deforestation process in West Africa. The results from many other studies support the same conclusion. In a 2011 study, which analyzed the diffusion of new techniques of cocoa production on forestry, Kuwornu et al. (2011) found that new production practices and real producer price had significant and positive impact on the level of cocoa production. As a result, an increase in cocoa production led to an increase in deforestation. Kuwornu et al. (2011) also found that technological innovations that facilitate increasing production failed the sustainability test because they led to increased deforestation. In that case, intensification technologies that require subsidies should prevail so that the level of current forest coverage can at least be maintained under new technologies in the cocoa sector of Ghana (Kuwornu et al., 2011).

In contrast to forest regions, cocoa production in non-forested areas is reported to positively impact the environment. Indeed, Waldron et al. (2011) found that cocoa production and biodiversity conservation can simultaneously increase under a coca “shade-grown” system

with average farm size of 0.45 ha. Smucker et al. (2005) argued that changing annual crops to cocoa production can help alleviate negative environmental impacts in Haiti where many of the crops found in mountainous areas are annuals.

## **2.5 Sustainable Agriculture and Adoption of Innovations**

Sustainable agriculture can be defined as a new technology adoption due to the fact that it tends to be distinct from common agricultural practices. Technology is defined in different ways. According to Rogers (1995), innovation or technology is a simple act which aims at reaching specific goals through reduction of uncertainty in the face of causal relations. Enos and Park (1988) in a study related to introducing technology defined technology as, “the general knowledge or information that permits some tasks to be accomplished, some service rendered, or some products manufactured.”

Feder et al. (1985) argued that adoption is an ongoing process, in which the mind plays an essential role, which considers stages from the initial contact to the actual integration of that new innovation into one's decision making. Similarly, to rationalize a decision in life there must be at least some expected competitive advantage in a farmer's point of view to embark on a new way of producing. Indeed, Rogers (1995) reasons that there always exists a greater level of advantage associated with an adopted technology compared to the traditional ones.

### **2.5.1 Factors of Technology Adoption**

The literature on technology adoption reveals that market factors, government policies, technological change, distribution of population, environmental concerns, and the socio-economic situation of farmers' households are the major elements that impact technology adoption. Nonetheless, there have been many different ways that technology adoption factors have been classified. For instance, Norwak (1987) divided them into three groups: informational,

economic, and ecological. Wu and Babcock (1998) considered a typology that combines factors into human capital, production capital, natural and political factors. On the other hand, Kebede, Gunjal and Coffin (1990) used the labels social, economic and physical to classify the innovation factors. Despite the fact that the knowledge of factors influencing technological innovation matters when one wants to capture the logic of a particular innovation's diffusion and acceptance, Bonabana (2002) asserted that factors classification does not matter. Following the work of Feder, Just and Zilberman (1985), the literature on technology adaptation in the Third World Countries has been explored by many scholars. A review of the crucial agricultural innovation adoption literature is given in the next section.

## 2.5.2 Market Factors

### 2.5.2.1 Cost of Innovation

As Bonabana (2002) stated, adoption of new methods or technologies can be costly. Consequently, the rate of adoption of new agricultural practices heavily relies on the financial situation of farmers regardless of the potential positive nature of perceived advantages. The rate of adoption often depends on whether or not the technology is subsidized (Katz and Shapiro, 1986). Otherwise, the level of financial resources of the adopters will determine if one adopts or not (Khanna, 2001; Chambers et al., 1985).

### 2.5.2.2 Returns from Adoption of New Technology

Economic gains that farmers expect to obtain from a new production practice or an innovation is one of the important factors that drive farmers to choose it over traditional ones. Knowledge about the agricultural innovation becomes crucial for farmers as they integrate the information they have into their decision making process (D'Souza et al., 1993; Namara et al, 2007). The expected benefit may not be obvious enough to have people try a new technology. In fact, scholars debate whether or not farmer perceptions about technology characteristics and

benefits (Wubeneh et al., 2006) and economic concerns (Mzoughi, 2011) have a strong positive effect on agricultural technology adoption. Moreover, Saltiel (1994) argued that the necessary “economic net returns” required for technology adoption may be psychological. However, this kind of belief tends to have a positive impact more on wealthy and large farms. Small farms, on the other hand, are more likely to adopt in the face of demonstrated benefits (Abara and Singh, 1993).

Higher yield is often a direct gain that farmers received when they adopt new agricultural technology. Tiwari et al. (2008) indicated that in Nepal, farmers obtained between 21 and 52% more output by adopting a new maize variety that was developed conjointly with the farmers. Feder et al. (1985) also indicated that hybrid corn had been adopted in many countries because of their higher yield capacity.

Price of the crop produced is a tangible benefit that farmers heavily consider when making decisions about what to grow. Piya (2009) investigated variation of crop production due to their prices in Nepal and found that short-term and long-term prices have a significant positive impact on production of sugarcane and wheat. Subervi (2008) arrived at the same conclusion in a study which analyzed agricultural supply response to fluctuations of prices in developing countries.

### 2.5.3 Socioeconomics Factors

#### 2.5.3.1 Farm Size

Literature on agricultural technology adoption, especially technology related to conservation agriculture, points out that total farm size is often a significant determinant of adoption. However, as Knowler et al. (2007) argued, no causation or preconceived conclusions can determine how agricultural innovation adoption would move as the farm size becomes

larger. In effect, studies have found a positive relationship between farm size and probability of adopting new technologies in developed and undeveloped countries alike (Zhou et al., 2008; Ewuola et al., 2010; Namara et al., 2007; Wossen et al., 2013; Bonabana, 2002, Feder, Just and Zilberman, 1985). This positive relationship between farm size and technology may be obscured to many. Given the fact that some people believe that technology could be a compensation factor that can give small farms an edge over their competitors, who on the other hand, may capitalize on the scale of production, one can get some insights on this issue by trying to delve deeper. The latter logic would fail in the cases where farmers produced for subsistence. Analyzing the decision making of many farmers, some scholars argue that farmers who do not own a lot of land are risk averse (Sodiya et al., 2010) regarding new production practices and allocate more of their farm to subsistence crops (Namara et al., 2007). Moreover, studies have revealed that small farms bear characteristics that somehow limit adoption of innovations. For instance, the land they farm is the most fundamental asset that some farmers have to secure a loan. A small piece of land may imply low access to credit. Thus, production costs (Sodiya et al., 2008; Ogunsumi, 2010) and fixed costs of new practices (Abara and Singh, 1993) may prevent small farms from innovating.

Contrary to the majority of findings that claim a positive connection between the attitudes of a farmer to adopt new practices in his or her land area, Yaron et al. (1992) found that the rate of technology adoption decreases for larger farms. It is noteworthy to mention, that Yaron et al. (1992) indicated that a negative effect of farm size on agricultural innovation adoption is more likely to occur with labor-intensive innovation or practices that aim at minimizing land use.

Distribution of costs of new technology with regard to farm size is another factor that can drive some agricultural innovations. For instance, technologies that involve large fixed costs are

more likely to be adopted by large farms because the larger the farm, the more the fixed costs can be spread out and consequently decrease average cost of production. Chavas (2001) indicated that farm mechanization is often embraced by farmers to deal with the increase of farm size.

#### 2.5.3.2 Gender

Many scholars have pointed to gender as a significant factor in technology adoption studies. The consideration of gender as a potential significant factor is rooted in the division of labor in traditional societies in general and on farms specifically. Gender differences may direct technology adoption in a certain direction depending upon the kind of work that technology requires. Various results have been obtained. Zhou et al. (2008) in their study on determinants of water-saving technology in China found that being male had a positive impact on adoption. One possible explanation for the gender effect may be found in the fact that male farmers in the Zhou study had larger farms than females because farm size was also a positive factor in that study. However, other studies pointed out no differences between genders regarding internalization of new agricultural practices. That is the case of Overfield and Fleming (2001) and Doss and Morris (2001) on their research related to improved varieties of maize in Ghana and coffee in Guinea, respectively.

#### 2.5.3.3 Education Level of Farmers

Education is universally believed to be a human capital asset, capable of providing competitive advantages for those who increase their level of formal schooling, *ceteris paribus* (all else remaining the same). As learning and knowledge are not only formal, scholars have delved into experience and formal education level to shed light on their impact on adoption of new agricultural practices. Many studies have found a positive association between formal education

and adoption of new agricultural technologies. Indeed, Doss and Morris (2001), in a study that investigated factors influencing Integrated Pest Management (IPM) technology, find that the more educated a farmer, the higher his or her tendency to adopt IPM, holding other factors constant. Others studies that deal with adoption of other agricultural innovations (such as micro-irrigation technologies, agri-environmental Nitrate Reduction Program (NRP), and cassava) have come to the same conclusion (Namara et al., 2007; Ogunsumi et al., 2010; Zhou et al., 2008, Giovanopoulou et al., 2011).

#### 2.5.3.4 Farmers' Age

Similar to other suspected significant factors, age of farmers has been found to have both positive and negative effects on the probability of technology adoption. Ewuola et al. (2010) have observed a higher rate of adoption among younger farmers in research on extension diffusion service. Giovanopoulou et al. (2011) found a positive association between age and adoption in their study on agricultural practices aimed at reducing nitrate pollution. The positive association may reflect the adoption experience of the farmers. On the other hand, a negative association between age and adoption rate would indicate that older farmers are less likely to try a new practice, such as a Nitrate Reduction Program. The learning requirement associated with new technologies and farmers' attachment to existing technology could explain their reluctance to use new technology. No specific trend exists with regard to age effect and agricultural technology adoption.

## **Chapter 3: Methodology**

A great deal of the literature review focused on various aspects related to the research problem, the theoretical framework, as well as cocoa production in Haiti. Emphasis has been made particularly on the Haitian cocoa industry and its contributions to the national economy. Based on the limitations of the previous studies, the topic was selected. Limitations of previous studies related to the general term have been clearly identified. This study is focused to the following steps.

### **3.1 Conceptual Considerations**

The literature review revealed many potential parameters that may explain the decision process of a farmer considering adoption of an agricultural practice. Indeed, farm size (Zhou et al., 2008; Ogunsumi et al. 2010, Ogunsumi, 2010; Namara et al., 2007; Wossen et al., 2013; Bonabana, 2002, Feder, Just and Zilberman, 1985; Sodiya et al., 2010, Namara et al., 2007, Yaron, Dinar and Voet, 1992), education level of farmers (Zhou et al., 2008; Namara, 2007; Giovanopoulou et al., 2011), property ownership (Giovanopoulou et al., 2011), intrinsic characteristics of soils (Wubeneh, 2006), networking (Wossen et al., 2013) and other variables have been identified as explaining some observed decision patterns in the adoption of new agricultural practices. In most agricultural adoption studies, the use of dichotomous probabilistic models has been used. Hill and Griffiths (2011) explain that the logit and probit models are the most widespread econometrics choice models used in the scientific community due to the needs of obtaining probability values within the  $[0, 1]$  interval. Developed in the 1930s in experimental toxicology, the probit model was the main econometric model used by scholars until the mid-1970s. Scientists started using logistic models intensively, and even more than the probit models since the 1970s, even though it was developed in the 1940s (Agresti, 2007). Montgomery et al.

(2001), as cited by Bonabana (2002), illustrated that the low adaptability level of the probit model in the presence of multiple independent variables constituted its weakness and the reason the logistic model has been more often employed.

Nonetheless, due to difficulties in conducting a traditional survey and gathering needed data for analysis, I focused on a qualitative approach. To gather qualitative data, I settled on conducting a focus group approach to provide relevant answers to questions I was investigating. Given the fact that qualitative research addresses issues relating to the manner that people make sense of their realities and formulate their goals (Merriam, 2009), I used a qualitative approach to investigate the decision making process of farmers. Through qualitative research, one can understand people's interpretation and attribution of life experience.

Qualitative research originates from the work of anthropologists and sociologists in the mid twentieth century. In 1967, Glaser and Strauss established the theoretical foundation of qualitative research and analysis. During the 1970s and 1980s, publications on methodology for qualitative research proliferated and many disciplines began embracing qualitative inquiries as a scientifically reliable approach. Qualitative research is a broad term which encompasses critical analytic methods that "describe, decode, and translate phenomenon in the social realm." Contrary to quantitatively investigated research questions, qualitative inquiry has more to do with description than with numbers and statistical probabilities (Merriam, 2009).

Farming, one of the oldest human activities, can be either an economic or subsistence activity. In some cases, it may even be recreational. For those to whom farming constitutes the essential economic activity from which to make a living, profitability is the main goal. However, success in business requires entrepreneurship. Entrepreneurial skill development does not require a high level of education. Indeed, some farmers with low formal education rationalize economic

choices in terms of resource allocations: what crops to produce and where, input purchase and use, how to negotiate, and where to sell.

In the case of Haitian farmers, formal education is low and subsistence farming is typical. Many farmers may be aware of the negative environmental impacts of producing some annual crops and the potential of obtaining higher long-run profitability on some perennial crops such as cocoa and coffee. Nonetheless, the decision of a farmer to produce a particular crop or use a cropping system in a specific manner is the outcome of a set of factors that conform to the farmer's objectives and financial constraints. These factors are plentiful and include: societal, economic, environmental, or soil characteristics. For instance, property ownership is a potential significant parameter. Farmers are unlikely to invest in cocoa production unless a legal framework guarantees full enjoyment of such investment over a reasonable period of time. Moreover, economic responsibilities of some farmers may prevent them from embarking in such investments due to the fact that the first harvest will be many years in the future. Daily expenses require farmers with small land holdings to undertake activities that provide returns in a short period of time.

The adage of habits becoming second nature also represents a significant input to the decision making of farmers' production choices. Indeed, some farmers may only have seen themselves as people who need to repeat a set of activities to maintain their livelihood, instead of entrepreneurs who need to gather different information and carefully integrate them into their decision making. Moreover, valuation of environmental improvement from the land owners' perspective may have a remarkable impact on the area in which sustainable cocoa production occurs. Conceptually, the involvement of farmers in sustainable cocoa production depends on their level of entrepreneurial skills. Furthermore, the extent to which farmers and land owners are

sensitive to the environment and sustainability of farming activity affect adoption of sustainable cocoa production. The amount of incentives from any government programs that exists for cocoa production also may significantly affect the prevalence of sustainable cocoa production in northern Haiti. Nevertheless, without sound confidence that one will harvest the full fruit of his or her efforts, market opportunities value, and concern about possible positive environmental impact alone would not convince many farmers to invest in cocoa.

This research fits into applied “basic qualitative study” in the words of Merriam (2009) because it strives to understand farming decision making of a specific group; identifying and understanding the core of this decision constitutes the heart of this investigation. Specifically, one starts with a case study since the inquiry can be limited to a specific group or area. Indeed, the research concerns farmers in humid regions in northern Haiti. Moreover, this research does not seek to tackle the problem of farm decision making in general, only the decision about sustainable cocoa production. However, one must recognize the interconnection of cocoa production systems to other cropping systems in this area. It’s very important to consider other crops the subject farmers produce and use a systemic approach in the analysis since cocoa production decisions are not taken in a vacuum. Merriam (2009) expounded that qualitative case study fits within scientific investigation that seeks to uncover meaningful realities, allow sound interpretations, and provide insights for delimited cases. Farmers in humid zones and cocoa producers in northern Haiti are the subjects of this study. Case studies can and often use numerous information sources to produce the end product. Interviews and observations are the primary data source of case study.

Though qualitative case studies do not lay down foundations for extrapolation and generalization because of its particularity, one can produce reliable and relevant knowledge

using this method. Being aware of critiques and limitations of the case study approach, Erickson (1986) remarked that transferability of information generated by case study in comparable settings is scientifically acceptable. Merriam (2009) went further in her analysis on usefulness of case study by stating: “Case study offers a means of investigating complex social units consisting of multiple variables of potential importance in understanding [a] phenomenon. Anchored in real life situation, the case study results in a rich and holistic account of a phenomenon. It offers insights and illuminates meanings that expand its readers’ experiences.” It’s undeniable that farming units are complex social units regardless of farm size. In the case of Haiti, where most farmers undertake almost only farming activities, having urgent social responsibilities with little off-farm revenue sources, and having a small farm size, decision making about production choice might appear even more complex than many would imagine.

### **3.2 Data Collection**

Data for this study were collected mainly through focus groups. The population under investigation consisted of farmers who cultivate land in humid regions in northern Haiti. Participants were limited to farmers that were located in humid areas as that is where cocoa is generally cultivated in Haiti. Other key information providers who work on the Haitian cocoa sector are located there too. In addition to primary data that were obtained from focus groups, some international databases provided input for some estimates. For instance, annual cocoa production and acreage planted were based on FAOSTAT estimations. The International Trade Commerce furnished yearly cocoa exports, quantity and value data.

### **3.3 Focus Groups**

After consulting with the Ministry of Agriculture in Haiti and institutions undertaking agriculture work in northern Haiti, a number of focus groups (fourteen) and interviews (seven)

were conducted. In general, one hundred seventy five people participated in this study. Among the participants, there were one hundred forty seven farmers. The study region (les départements du Nord et du Nord-est) includes two geographical districts, the north and the northeast departments. The farmers in the north produced 98% of the total production of the two geographical areas; and the north east accounted for the remaining 2% (Gary PAUL, 2011). In the process of conducting the focus groups, geographic representation was not considered in the composition of the groups, as it could be in a stratified sampling technique. For example, though ninety eight percent of cocoa production is from the north district, the number of focus group participants and interviewees from the north is not ninety eight percent of the total number of focus groups and interviews. Nevertheless, more group discussions were likely to occur in areas with higher rural population within the study area. The questioning route or questionnaire guide that was used in the focus groups is in Appendix. The focus group technique that was used consists of a “double-layer design” method (Krueger & Casey, 2009). The geographic provinces represent one layer. Various groups of homogeneous participants that were interviewed constituted another layer.

The information source which provided input for this study included as many people from different segments of the Haitian cocoa value chain as possible. For instance, targeted categories in which the focus groups and interviews were conducted were the following:

- Public sector, international agencies, and extension agents. This group encompasses representatives of the Ministry of Agriculture and other institutions, especially Non-Governmental Organizations (NGOs) and international agencies, which provide services to the agricultural sector.
- Cocoa Federation and Cooperatives Boards.

- Processors.
- Buyers and Exporters.
- Farmers.

The number of focus group conducted in each geographical unit was independent of the rural population. However, the higher the rural population of a municipality, the more likely it was that a focus group discussion occurred.

### **3.4 Selection of Interviewees and Focus Group Attendees**

A divergent group of farmers was selected for each of the focus groups conducted with farmers. An emphasis of the farmer groups was socio-economic diversity so that attendees were selected from different socio-economic segments of the farming class. However, the groups conformed to Krueger & Casey (2009) idea of identical group as they were all farmers. To find those groups of farmers, I contacted the head of the municipal agriculture office or BAC (Bureau Agricole Communale) to help reach the targeted farmers. In effect, the director of the BAC or his assistant(s) contacted some farmers and invited them to attend the focus group. The investigator gave BAC personnel the following guideline:

- Contact and invite ten farmers to participate in a focus group for a study. The aims of the study were described.
- Do not get all the people from the same neighborhood.
- Do your best so that most neighborhoods can be represented, especially those where people produce cocoa.
- Do not invite only local leaders or farmers who are educated or who can speak with ease in a group meeting; in fact, the group must not include more than two leaders, and it must include also at least one of the poorest farmers in the area.

- The group must have at least two women.
- Do your best to have a representative number of women that equates to their representativeness in the agricultural sector of the province.
- Do not invite cooperative leaders to the focus group because there will be a focus group especially created for them.
- Do not invite cocoa speculators to the meeting; they will be contacted separately.
- Do not invite only large producers; there must be no more than two large producers. There can be three average-sized producers and the remaining must be small producers.
- Of ten people you invite, try to have two who do not produce cocoa, but who live in a cocoa production area.
- Do your best so that there can be representation of almost all age groups of farmers.
- All guests must be farmers.
- Find a neutral place to conduct the focus group, such as a school, someone's house, etc. That means the place must not be located at the Ministry of Agriculture or other institutions, which are working on agriculture and specifically on cocoa in the area. In this way, everyone can feel comfortable enough to speak during the focus group and say everything they would like.
- Finally, BAC personnel were informed that they would not be allowed to assist with the focus groups, so as to not influence responses of participants.

The facilitators had at least two weeks to invite focus group participants. Before the focus groups met, the researcher contacted the facilitator and obtained phone information of participants who had a cell phone. Thus, the investigator called potential participants at least two days before the focus group met to confirm their participation.

For the cooperatives, we contacted the president of the cocoa federation (FECCANO) to invite five of the seven cooperatives affiliated with the federation. In addition, the investigator contacted by phone three other cooperatives and two cocoa processors to invite them to attend the groups. Emails, cell phone calls, and face-to-face focus invitations were for professionals in the institutional focus group. Similar to the pre-focus group steps in the farmer focus groups, the researcher called the guests at least a week before the focus group met. They were called again two days before and the day prior to the focus group meeting to assess their willingness and availability to participate. Some participants were called in the morning before the focus group to remind them and confirm their participation.

A total of fourteen focus groups and seven interviews were conducted to gather information for the study. Twelve of these focus groups were with farmers. One of the focus groups was with institutions: public, international and NGOs. The other focus group was engaged with a group of cooperative members and small cocoa processors. Additionally, seven interviews were conducted with key information providers within the cocoa value chain in the region. Three of the individual interviews were conducted with people who export cocoa. Another interview was with an agronomist who has been working with farmer organizations and cooperatives for about ten years in the region. The remaining three focus groups were conducted with local cocoa speculators who buy cocoa from farmers and sell it to export firms.

Table 1 includes detailed information on rural population distribution and places where focus groups were held for cocoa production in the north provinces within the study area.

Table 1: Cocoa Production Zones of North District and Investigated Provinces

Nord Department			
Province	Rural population	Focus group	Group Categories
Borgne	52,274	Yes	Farmers
Port-Margot	29,672	Yes	Farmers
Gande Riviere du Nord	24,647	Yes	Farmers
Plaine du Nord	26,647	Yes	Farmers
Milot	21,219	Yes	Farmers
Acul du Nord	41,009	Yes	Farmers
Pilate	43,356	Yes	Farmers
Limbe	34,827	Yes	Farmers
Plaisance	48,601	Yes	Farmers
Bahon	19,060	Yes	Farmers
Limonade	34,146	No	Farmers
Saint Raphael	36,005	No	Farmers
Dondon	22,912	Yes	Farmers
		Yes	Institutions (MARNDR, International institutions, NGOs)
		Yes	Cooperatives and Processors
	434,375	13	

Table 2 provides information on the rural population of two cocoa production provinces situated in north east Haiti.

Table 2: Cocoa Production Zones of North-East District and Investigated Provinces

Northeast Department			
Provinces	Rural Population	Focus Group	Group Categories
Trou du Nord (Roche Platte)	22,993	No	Farmers
Sainte Suzanne	23,497	Yes	Farmers
	46,490		

As the study concerns cocoa, I conducted focus groups only in the cocoa production provinces within the study area. These provinces were identified by Gary (2011). The rural populations provided in Tables 1 and 2 are the 2009 estimates of the Institut Haïtien de

Statistiques et d'Informatique (IHSI). Figure 5 below depicts areas where focus groups were conducted.

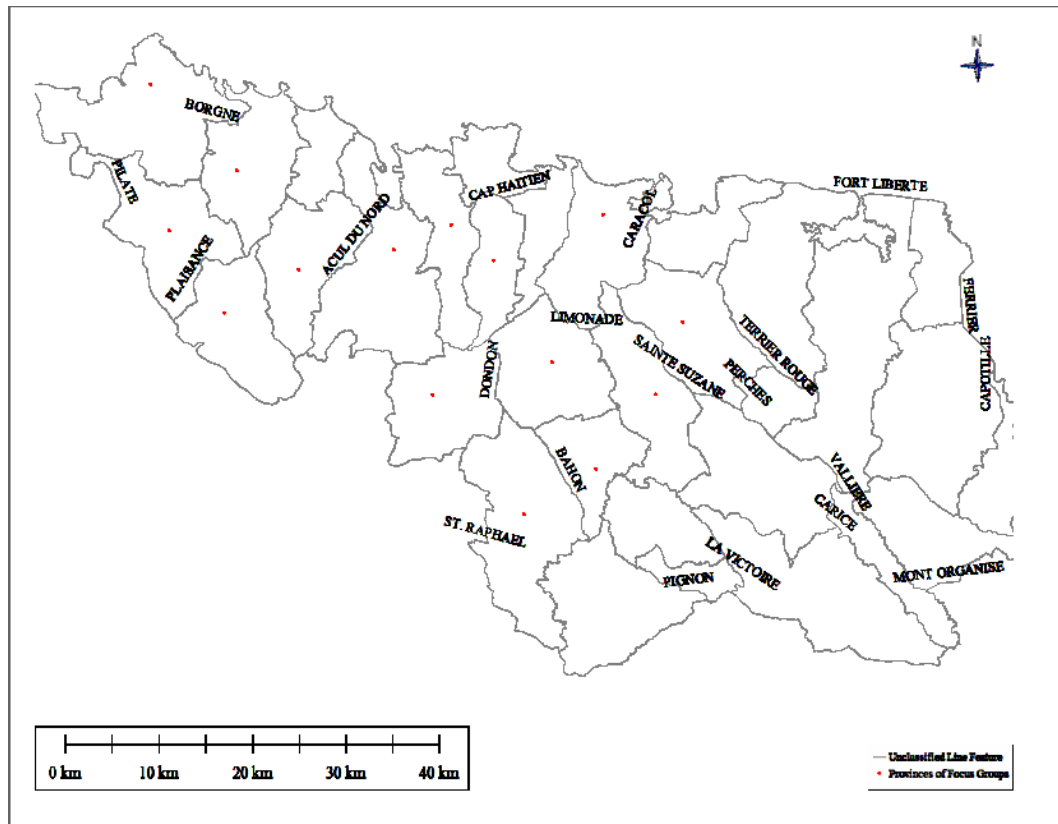


Figure 5: Map of the Study Area in Northern Haiti

The map includes provinces of two departmental regions, north and north east, which form the study area. The dots are centers of the provinces where the focus groups took place.

### 3.5 Question Guide

The Questioning Route (focus group questions) through which the study data were collected follows the structure that Krueger and Casey (2009) propose in terms of organization for an efficient focus group. For instance, they advise that a well-structured questioning route has five types of questions: opening question, introductory questions, transition questions, key questions, and ending questions, respectively. The opening question is provided to the group

after a brief presentation by the researcher and the description of the main objective of the study. Focus group attendees were told their participation in the study was voluntary and that they could leave at any time. All interviewees received contact information, cell phone number and email address of the researcher in case they had any question about the results. Additionally, during focus group sessions, everyone was advised to be respectfully and to kindly listen to what another participant has to say even though he or she may partially or totally disagree with what is being said. I explained why it was important to be respectful because their situation and their view may be somehow different from others. Thus, everybody had a chance to voice their thoughts and opinions in a respectful environment. In response to the first question, everyone introduced himself or herself. The goal of this question was to engage everyone very early in the discussion and to make them feel comfortable for subsequent questions and discussions (Krueger and Casey, 2009).

Contrary to the opening question, the introductory questions must start revealing participants' insights about the issue at hand. In this section, the participants engaged into a general discussion about the ways farmers in the area make up their minds regarding the types of crops they decide to grow. Sustainable production practices in general and sustainable cocoa production in particular made up another component of that series of questions.

The transition and key questions aim to produce information that constitutes the core of the data to be analyzed. As a result, the set of questions discussed in this section during the focus groups tackled participants' views and understanding of the reasons some farmers produce sustainable cocoa while others do not. At that stage, participants were asked to name, describe and categorize factors that they believed were important in sustainable cocoa production. Furthermore, participants outlined farming characteristics of sustainable cocoa producers in

comparison to traditional cocoa producers. Specifically, participants shed light on significant differences between farmers who produced high quantity cocoa and those who produced low quantities. During this phase, some clarifications were provided for the participants. For instance, the moderator described the components or techniques of a cocoa management system that could be considered sustainable cocoa production. Awareness and application of these following techniques were discussed: cocoa renovation technique, selective tree replanting, coppicing and grafting, phased farm replanting, use of chemical fertilizers and pesticides, and international certification.

Finally, the focus groups ended with an ending question that gave attendees the opportunity to say things they may have not been able to say during the discussion session. Before asking that question, the person who led the discussion rephrased the objective of the study and the group discussion. Thus, participants were able to present their points of view about the specific objectives of the study. During this phase, participants were able to make suggestions to the moderator for improving group discussion.

During the focus groups and most of the individual interviews, a tape recorder was used to help gather the data. The recordings were made with participants' consent. At the beginning of each focus group, the moderator showed the device to all attendees, mentioned why it was being used, and explained its usefulness in recording all information the participants have to share. Then, the moderator asked if everyone felt comfortable to be recorded and if they had any objections about being recorded. For all fourteen focus groups, the attendees unanimously accepted being recorded. In all, about five people who participated in the focus groups raised some questions before they agreed to be recorded. They asked about whether the recordings were to be kept private and not shared with third parties especially for purposes of discriminating

against them in upcoming rural and agricultural development projects. The moderator assured them that no one else would have access to the raw information they provided.

### **3.6 Data Analysis**

Analyzing data for qualitative research requires dynamicity, rigor and discipline. This phase needs to be undertaken simultaneously with data collection. Merriam (2009) asserted that someone may compromise his or her research by waiting until the end of the data gathering process to conduct and complete the analysis. Krueger and Casey (2009) in a similar fashion argued that “focus group analysis is systematic, verifiable, sequential and continuous.” Simultaneous data collection and analysis does not imply completion of the analysis when gathering the data has finished. Only when one engages in analyzing collected data as the collection process is ongoing can one realize how to rephrase questions to obtain the type of information sought.

Moreover, without any analysis during the data collection process, one may not discover missing key information that requires a deeper investigation in subsequent interviews and focus groups. This method ensures collection of relevant, satisfactory and sufficient data to answer the research question. Nonetheless, beyond the continuing analysis during the process of information gathering a thorough analysis followed the data collection process too. The advocated “abridged transcript and note based analysis” of Krueger and Casey (2009) was used in the analysis. Accordingly, after each focus group, the investigator listened to the record and transcribed relevant data to paper before conducting another focus group interview. Only comments and information which were most likely to be used in the subsequent analysis were transcribed. In fact, one did not write irrelevant discussions and information that was outside the scope of the

targeted topic. In parallel with the audio transcripts, one had reviewed the field notes that were taken during interviews and focus groups as one progressed in the data collection process.

Post data collection analysis consisted of reviewing field notes and transcripts, coding transcripts of records and notes as well as categorizing similarly to the process that Merriam (2009) describes in her qualitative research guide book. With the objective of the study in mind, category names were assigned to different patterns observed in the data. After reviewing all transcripts and field notes, one reduced the number of categories by merging and combining them into larger groups. This second phase of merging categories considered different factors. Persistency and frequency constituted an outstanding point in forming final categories. Indeed, the number of times focus groups' attendees and interviewees mentioned a factor, as well as the emotion and energy they showed in motioning that particular factor combined with how other participants reacted when someone brought out some information, played a substantial role in its retention as a category. "Extensiveness" as Krueger and Casey (2009) named it, is another important factor the researcher considered in formulating the report of his findings. With regard to extensiveness, the importance of a factor arose from the variety of people who affirmed and defended it during the focus groups. For instance, age as a determinant of cocoa production was raised less often than price; however, all types of participants mentioned how age of farmers mattered when it came to choosing whether to grow cocoa or something else. In addition to frequency and extensiveness, persistent information and analysis which were raised by few people also constituted significant parts of the overall analysis.

To arrive at the factors influencing sustainable cocoa production in northern Haiti, analysis of responses participants gave to questions 4, 5, and 6 (see Appendix for these questions) were crucial. In response to question 4, participants provided farm characteristics of

farmers who produced cocoa sustainably and those who did not. With regard to those responses, persistency, frequency, and extensiveness of the answers was used to sort out important factors. As question 5 and 6 required participants to list and summarize factors of sustainable cocoa production, answers that participants gave to these questions were combined with farm characteristics of cocoa producers from question 4 to obtain the final retaining factors influencing sustainable cocoa production.

The SWOT analysis results were provided directly by participants. Indeed, participants provided answers to each component of the SWOT analysis in response to questions 10, 11, 12, and 13 which dealt with that analysis during the focus groups and individual interviews. During the data gathering, the investigator explained each component of the SWOT analysis for the participants. For instance, participants were given at least one example for each component of the SWOT analysis. Indeed, the investigator mentioned "good production practices" as a strength example. Thus, participants were able to list information for each component of the SWOT analysis. Similar to the process used to obtain factors influencing sustainable cocoa production, frequency, persistency, and extensiveness was used to retain the important elements of the SWOT analysis that participants provided. During the post data collection analysis, the participants' responses to the SWOT analysis were sorted out and divided into production SWOT analysis and post-harvest SWOT analysis.

Given the fact that two currencies were involved in the analysis of the study, an exchange rate to convert the Haitian currency (Gourde) to the U.S. dollar was used. To make that conversion, the following website was used: <http://www.exchangerates.org.uk/USD-HTG-exchange-rate-history.html>.

## Chapter 4: Results

### 4.1 Description of the Focus Group Participants and those Interviewed

Most of the attendees of the focus groups were men; however, women represented 26.2% of all focus groups participants including the institutional and the cooperative focus groups. In addition to the focus groups, five out of the seven additional individual interviews were conducted with men. Figure 6 depicts the gender representation of the focus groups. The blue bar represents the number of men and the yellow stands for the number of women. The yellow bar is absent for the institutional focus group because no woman attended the institutional focus group.

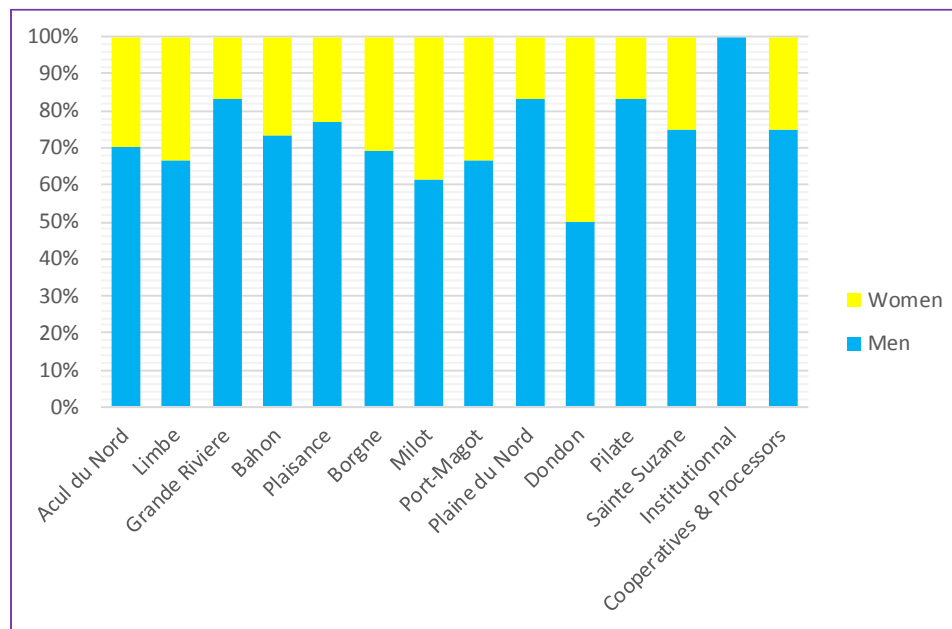


Figure 6: Gender Representation of the Focus Groups by Region

More than 70% of the focus group attendees were small farmers who possessed a farm of about two hectares in size. Eighty percent of them produced cocoa; however, only about 30% had a cocoa farm. The remaining had some cocoa trees but did not have at least a parcel in which cocoa was the main agricultural product. Most of the attendees were over 40 years of age. Only about 20% were in their mid-20s. More than 60% of the participants did not have off-farm work.

The women are those who generally had off-farm activities, primarily small businesses. Most participants lived in rural areas; only about 20% lived in proximity to towns and cities.

#### **4.2 Participants Awareness and Knowledge of Sustainable Cocoa Production**

The knowledge level of participants about sustainable cocoa production can be analyzed on two levels. On one level, one considers farmers and speculators versus other participants, mainly agricultural technicians and exporters. On another level, one might separate production phase from post-harvest phase.

Technicians and exporters who engage in the cocoa supply chain in Haiti understood the concept of sustainability very well. Regarding agriculture, sustainability is the farmers' ability to satisfy their present needs without compromising the ability of the future generations of farmers to satisfy their own needs. Farmers and speculators did not understand that concept very well. For farmers and speculators, who also are mostly farmers, sustainability had to do with the lifespan of a crop. That is, only perennial crops can be sustainable according to their view. They also had difficulty understanding the concept of organic food and organic agriculture. Only a few of the interviewees, about 5%, stated that organic agriculture refers to an agriculture in which no chemicals are used - either fertilizers or pesticides. For many, the term of "organic" refers to a post-harvest treatment, specifically fermentation in the case of cocoa. This misunderstanding, especially assigning the fermentation process to the organic concept, happens because of their habit of only selling fermented cocoa under the label of organic cocoa.

With regard to production practices, there exists no real difference for the producers in terms of types of cocoa and targeted markets. Being asked to estimate the percent of farmers who are aware of good production practices in each farmer focus group, attendees altogether agreed it was less than 20%. Producers who knew that information were either those considered big

producers in the area or agricultural agents, farmers or agricultural workers who have once received some formal agricultural training, or leaders of farmer organization. When considering a set of sustainable cocoa production practices such as pruning, cocoa regeneration techniques, selective tree replanting, coppicing and grafting, phased farm replanting, only about 10% of the farmers were aware of them. Even fewer farmers mastered and applied those techniques. Not surprisingly, most cocoa production was potentially sustainable because the prevailing cocoa production system is an agroforestry system. This system was widely known in Haiti as *Jardin Créole* (Creole Garden). Indeed, farmers had their cocoa trees planted in association with annual crops and fruit trees such as coffee, avocado, mangoes, and so on. Except for some yam varieties such as *Discorea alata*, dense cocoa plantings do not accommodate annual crops. Most farmers who participated in the focus groups believed this was true.

Additionally, farmers feed their animals in the garden, so, the animal waste helps soil fertility. However, farmers were not likely to raise animals on their cocoa farm except for pigs. As a result, the renovation of the fertility of those farms was more critical.

The real difference farmers and most cooperative leaders had with cocoa production started with harvesting. The treatment provided differed by where a cocoa was going to be sold: specialized markets or traditional markets. Commercial agents considered and bought two kinds of cocoa. Traditional or ordinary cocoa was sold in the less regulated market while conventional fermented cocoa was sold in a more regulated market for a higher price. For traditional cocoa, farmers harvested the pods, cut them and extracted the fruits, then dried the cocoa bean. The fermented cocoa, on the other hand, required a specific treatment name fermentation, which aims to facilitate the development of an aroma which gives the cocoa added value. This cocoa was sold under different labels named FLO, organic, and Fair-Trade. The cocoa federation

(FECCANO) and its affiliated cooperatives had fermentation boxes to implement that process. Likewise, other exporters installed their own fermentation boxes. Therefore, they collected cocoa the same day farmers cut the pods. For the FECCANO network and other cooperatives, farmers brought their cocoa to the fermentation and buying center.

#### **4.3 Producers of Fermented Cocoa**

All cocoa producers could potentially sell fermented cocoa. Nonetheless, farmers who are more likely to conserve their cocoa to sell to institutions that collect conventional fermented cocoa are those who are not subsistence farmers. Indeed, these farmers have between 0.25 and 2 acres of cocoa. Some of these farmers possess about 6 acres of cocoa planted in a region where farmers have an average of 1.8 acres of total land. These farmers not only have enough land to grow other staples they need for their family, but they also have many other crops such as banana, plantain, avocados and citrus, etc. that they can harvest year round.

Generally, about 70% of cocoa producers who sold fermented cocoa were the producers of sustainable cocoa. This group represented farmers who have been able to obtain an organic certificate and sell part of their product under an organic label through FECCANO. The federation has been able to create a traceability system, which is one of the requirements of the organic market worldwide. Given the long process of certification and the requirements of this specific market, these farmers have learned and mastered sustainable cocoa production techniques that give them a competitive advantage over the majority of farmers in Haiti.

Fermented cocoa production is concentrated in seven provinces in northern Haiti: Borgne, Port-Magot, Grande Rivière du Nord, Baho, Milot and Plaine du Nord. Six of these provinces had a cocoa cooperative which is affiliated with the north cocoa federation, FECCANO. Borgne had two cooperatives; both of which were affiliated with the federation.

Based on the estimation of the production capacity of the members of the federation, the cocoa sector can produce 450 metric tons of fermented cocoa. Meanwhile the existing fermented capacity accounted for 400 metric tons. However, so far the sector hasn't been able to exploit even half of its installed fermented capacity due to financial constraints specifically related to working capital.

#### **4.4 Producers' Main Reasons to Invest in Cocoa Plantings**

The investigation revealed the four main reasons farmers in northern Haiti had for investing in cocoa production in the last two decades. The first one has to do with retirement savings plan. Indeed, most farmers who participated in the study asserted that relying on tree crops, especially coffee and cocoa production, for cash when they were unable to work anymore was one of the most important reasons for them and their colleagues to plant cocoa. Although they believed that coffee was more profitable, some farmers emphasized the importance of cocoa trees because cocoa matured and produced fruit at least twice a year compared to coffee which produced only once a year. The shorter production period of cocoa gave it an edge over coffee for some farmers. Moreover, some land was not appropriate for coffee production due to their low altitude and other soil factors. This explained to some extent why some farmers invested in cocoa instead of coffee as a retirement plan. A "quick back up cash crop" was how many cocoa producers defined cocoa trees. In addition to retirement savings, many farmers produced cocoa as a quick cash exchange commodity. According to all participants in the cocoa supply chain, cocoa trees had become a loan guarantee for many. As a result, farmers obtained some subsistence credit from cocoa speculators on the basis of some cocoa trees planted or at least a cocoa farm they possessed.

Participants of the study explained that the cash exchangeability of cocoa bean could be expressed in terms of a farmer's proximity to cocoa cooperatives or speculator's home. They argue, "it is almost 100% guaranteed that you would obtain some money if you possessed some cocoa bean, regardless of how satisfactory the price. You would not starve or have to keep your children at home because they were sent back from school for lack of money."

Gain from actual cocoa projects in the study area was another reason some people demonstrated interest in investing in cocoa production. Some farmers stated, "We do not understand why so many international institutions are interested in cocoa production. Nonetheless, one fact is certain, if you do not show interest in cocoa nowadays, you will not benefit from some projects." Consequently, though some farmers do not believe that cocoa production would help them meet their household economic goals, they showed interest in investing in cocoa to obtain some financial benefit and agricultural tools from these institutions.

The last, but not the least important reason farmers showed interest in cocoa production, was the increase of cocoa bean prices in local markets during the last ten years. Most cocoa producers were not satisfied with the actual price they received. However, they indicated that the situation was better now than it was ten years ago, and they expect it to improve into the future. Regarding the price situation, many farmers argued that it's the prevailing attitude of a "pitiless system at the national level" that did not allow them to enjoy a reasonable share of the value of their production. In about 40% of the focus groups, participants stated: "Farmers are less than guardians of cocoa bean because the price they receive from those who control the sector imposes a destructive burden. With only cooperatives, we believed that it would be better; unfortunately, our situation was almost the same. Only that of the leaders had changed significantly."

## **4.5 Factors of Sustainable Cocoa Production**

In question five of the question guide, focus group participants and interviewees were asked to list the important factors of sustainable cocoa production. The question specifically was: “Can everyone, please, take a minute and list all the important factors (whether positive or negative) that farmers consider when deciding to have sustainable cocoa production?” The responses led to the following factors: price, farm size, ownership characteristics, age, land location, infrastructure, social organization, and predominant production system.

### **4.5.1 Price**

Farmers, extension agents, exporters, and other people who participate in the cocoa supply chain in northern Haiti indicated that price was the number one factor that drove sustainable cocoa in a particular direction. They explained that cocoa trees were cut down in the 1980s as a result of low price. This caused farmers to seek other more profitable crops to grow in place of cocoa. They continued to mention that this had stopped due to an increase in the price farmers had received during the last 15 years. More than 50% of the research participants doubt they would see any significant augmentation in the area under cocoa production in the near future since the price is unstable and fluctuates too widely. Consequently, regardless of how attractive the prices appear, they indicated they would not expect long-term profitability of that cocoa. Some cooperative members argued that the fate of the cocoa supply chain is in the hands of a few buyers. They mentioned that whenever FECCANO could not buy because of insufficient funds, the price dropped more than 25%.

In 2014, farmers sold their cocoa at 23.063 gourdes (\$0.51) a pound on average. The difference amongst the provinces investigated is presented in Figure 7. Acul du Nord, Plaine du Nord, Milot, and Plasaince were the provinces in which farmers received the highest prices for

their ordinary cocoa bean. Cocoa price fluctuated more in Borgne, Port-Magot, and Milot than the other cocoa production provinces. The existence of cooperatives in these areas, which adhere to FECCANO, was one of the factors which explained this fluctuation.

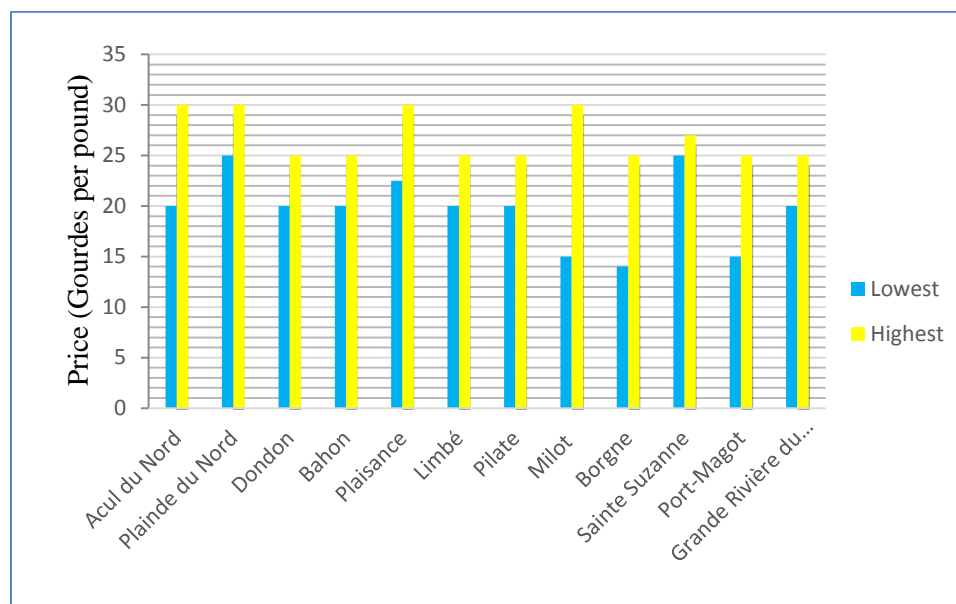


Figure 7: Price per Pound of Cocoa Bean in Northern Haiti (2014)

This price presentation did not consider the price of fermented cocoa. In fact, average farm gate price of fermented cocoa was \$0.80 (36.25 gourdes) in 2014. Similar to the ordinary cocoa bean, the price of fermented cocoa varied amongst provinces. The highest reported price, \$0.88 a pound, was in Borgne. FECCANO has been the only exporter of fermented cocoa from northern Haiti up to 2014. Another competitor, PISA, started collecting and fermenting cocoa in the region in 2014. Its first export will start in 2015. The farm gate price was not the final price for members of the federation. After sale, the cooperatives distributed the patronage dividend to members ('ristourne'), which is the value of additional payment per pound of product sold previously to a cooperative. The ristourne varies amongst cooperatives since administrative costs are not the same across cooperatives. Moreover, organic cocoa producers were more likely to obtain higher ristourne than conventional fermented cocoa sellers. For instance, the federation

asserted that, in 2014 the ristourne was between \$0.22 and \$0.33 (10 and 15 gourdes) for conventional fermented cocoa and between \$0.33 and \$0.45 (15 and 20 gourdes) for organic cocoa. The average of ristourne paid to cocoa members of FECCANO since 2008 is \$0.21.

Bad rural infrastructure, particularly roads, was another cause of low prices according to focus group participants. Indeed, Borgne, in which two big cocoa cooperatives were located and also the highest cocoa production zone in northern Haiti, is recognized as a very difficult place to access. Focus groups participants argued that besides the cooperatives, speculators in the region offered lower prices compared to other zone. The situation of Port-Magot was similar to that of Borgne.

In terms of financing, farmers cannot afford the prevailing high interest rates of the banks and micro finance institutions which oscillated around 36%. However, some members of cooperatives that belong to FECCANO benefited from a loan from Solidarité Internationale pour le Développement et l'Investissement (SIDI) that had an annual interest rate of 10%. COFIP is a local micro credit institution that managed the SIDI loan. It provided it to FECCANO at 8% interest and FECCANO made loans to its members at 10%, claiming the 2% as an administrative fee.

#### 4.5.2 Farm Size

All participants of the study made it clear that producing sustainable cocoa relies on the amount of land a farmer possesses. Many participants stated: “I would like to have a cocoa farm, even a small one so that I could expect some cash during cocoa seasons and especially at the opening of school year, but I don’t have enough land to do that.” In fact, many farmers argued that although cocoa played an important role in providing cash at critical moments, it was not profitable enough to replace other crops. Sustainable cocoa producers, mostly those who were

affiliated with FECCANO, received part of their selling price as ristourne in September, which coincided with school opening in Haiti. Most producers were very thankful for that last payment. This ristourne was not a guaranteed payment and no one knew in advance how much it would be. Farmers counted the ristourne as a surplus because they received at least the same amount of money for a pound of cocoa that someone else obtained on the traditional market upon giving their cocoa to the cooperative. The larger the farm size, the higher the probability that a farmer devoted a part of it to sustainable cocoa production.

Only farmers who had sufficient land to grow other crops to take care of their family can devote significant area of their farm to cocoa production. Farm size was a significant determinant of farmers producing cocoa or not. The participants of the study, specifically farmers, described the cocoa tree as a plant which does not fit well into a cropping system with other crops. In essence, during the first year, other crops grew with cocoa. However, after about three years, usually only the cocoa trees survived. The other crops died out. Most farmers, given their small farm size and the fact that they rely heavily on agricultural activities to take care of their family, have preference for crops they can grow with others so that they can harvest crops almost year-round.

#### 4.5.3 Land Tenancy

In addition to price and farm size, the legal relationship that a farmer had with the lands he or she farmed played a significant role in their decision about choice of crops. Only farmers who were landowners plant cocoa on the land they farmed and owned. Most farmers indicated that planting cocoa on someone else's land would not be a very wise and sustainable decision. They argued that the landowner could terminate any rental agreement before the first harvest. The one who seeded the cocoa would have no legal recourse.

#### 4.5.4 Age

Most farmers who declared having at least 0.25 hectare of cocoa farm during the focus groups were over 45 years old. Moreover, the results of the interviews with farmers showed a tendency among farmers to grow cocoa as a retirement plan. Many argued that their colleagues and they invested in cocoa production so that they would have a source of revenue when they could not work anymore. This fact made it more likely for people who were over 50 years to grow cocoa than those younger than 50. Although some people saw cocoa plantings as a retirement plan for farms, others directed that retirement capital to coffee farms, which were more profitable according to some farmers. That was the case of Dondon, one of the provinces of the study, for example.

#### 4.5.5 Land Position and Agricultural Infrastructure

Based on the answers provided by farmers who attended the focus groups it would be very unlikely for them or their peers to have cocoa on high value (very fertile or irrigated) soils which are on plains. For example, a farmer qualified as “a waste of resource” the act of growing cocoa on irrigated soils. Other crops deemed more profitable were grown on these kinds of land. As a result, the more steeply sloped and the less fertile the soil was, the more likely it was to be farmed with cocoa.

#### 4.5.6 Organizational Affiliation

Organizations such as cooperatives and farmer associations had a positive impact on sustainable cocoa production. Members of rural organizations showed a greater interest on taking better care of their cocoa plants. Moreover, farmers who were affiliated with the FECCANO network must conform to requirements of agricultural practices so that they could be certified or maintain their organic certification to sell their cocoa in specialized markets. These farmers

received much training on either fermentation techniques or good production practices.

Cooperative members were more optimistic about a better future for the cocoa industry and they were less affected by price volatility because the cooperatives shared the profits with them in September in the form of *ristourne*.

#### 4.5.7 Animal System

Whether or not people kept their animals confined throughout the year impacted the decision of farmers of growing cocoa. Indeed, some provinces (Limbé for instance) and neighborhoods characterized by free ranging animals during some seasons were less likely to grow cocoa. Establishing new cocoa farms was very difficult because animals might eat their leaves or the whole seedling. As a result, many farmers complained that this particular issue was profound and prevented them from even thinking about investing in new cocoa planting.

#### 4.6 SWOT Analysis

A SWOT analysis is a method used to evaluate the Strengths, Weaknesses, Opportunities, and Threats involved in projects, business ventures or sectors of activity. The technique is credited to Albert Humphrey, who led some business conventions at Stanford University in the 1960s and 1970s using data from 500 companies (Friesner, 2011). Strengths and weaknesses are internal characteristics. Strengths underline advantages, while weaknesses summarize disadvantages. On the other hand, opportunities and threats are external characteristics. Opportunities are defined as existing possibilities that the surrounding environment provides. Taking advantage of these external elements, upon which a firm has no control, for example can help increase efficiency and profitability. Threats also are factors of the surrounding environment to which an institution has no control over. Contrary to opportunities, threats are susceptible to cause loss to a business or an institution.

#### 4.6.1 Production SWOT Analysis

During the focus groups and interviews, participants were asked to enumerate and argue the components of a SWOT analysis for the cocoa sector in Haiti. Given the answers they provided, I arranged them into two sections. The first one related to pre-harvest and harvesting phases; the other focused on post-harvest. Questions 10, 11, 12, and 13 in the question guide (Appendix) specifically dealt with the SWOT analysis.

##### 4.6.1.1 Production Strengths

In the SWOT analysis, Strengths were considered intrinsic or internal characteristics of the cocoa sector which could be beneficial to the profitability and growth of the sector. Most of the strengths are presented in Table 3. In fact, non-saturation of the production area refers to

Table 3: Production Strengths

Biophysical Strengths
<ol style="list-style-type: none"><li>1. Good variety of cocoa grown. This was quite appreciated worldwide. Example: Dominance of variety <i>Criollo</i>, which is appreciated a lot on the international market.</li><li>2. Organic cocoa produced, that does not use chemical fertilizers and pesticides.</li><li>3. Non-saturation of production area.</li><li>4. Existence of some micro-climate allowed three cocoa production seasons a year in some places.</li></ol>
Managerial Strengths
<ol style="list-style-type: none"><li>1. Improvement of producers' attitude toward cocoa production.</li><li>2. Viable production systems where cocoa was associated with other crops and trees; an agroforestry system.</li></ol>

the availability of land in the study region that could be used to expand cocoa production area in case cocoa ranked higher in farmer's choice of crops. Improvement of producer attitude toward cocoa production emphasized the tendency of more farmers to not be as pessimistic about the

possibility of gaining a higher agricultural revenue from cocoa. The dominant agricultural systems, agroforestry, in which farmers in northern Haiti produced cocoa, are viable since they do not facilitate soils degradation, especially soil erosion.

#### 4.6.1.2 Production Weaknesses

Weaknesses also were internal factors to the cocoa sector. Table 4 contains the weaknesses that were identified in the study. Picking immature fruit and using inappropriate tools and methods, such as climbing the tree to harvest, were some characteristics of bad agricultural practices. When someone climbs a cocoa tree, the probability that he or she eliminated future floral buds was high. Consequently, that practice diminished the next production. Bad pruning was another unproductive agricultural practice. Some agricultural technicians mentioned that bad pruning practices of some farmers led to retention of water in the pruned section and resulted in lowered cocoa production.

Concerning renovation of old cocoa farms, many cocoa trees were planted more than 50 years ago. As a result, their production was very low. An agronomist who worked in the cocoa sector in northern Haiti identified the aging population of cocoa trees as a severe threat because old trees have lower yields, which tended to increase (even lower yields) every year.

Less than 20% of farmers, according to focus group participants, do some conservation work on the land planted with cocoa to prevent soil erosion. In general, farmers lacked financial means to purchase appropriate tools that can effectively help with plant maintenance. For instance, almost only secateurs (pruning clippers) were available in the study area for farmers to prune unneeded branches.

Table 4: Production Weaknesses

Biophysical Weaknesses
<ol style="list-style-type: none"> <li>1. Inappropriate agricultural practices. Example: Bad pruning practices and inappropriate picking practices.</li> <li>2. Lack of agricultural tools to do maintenance work.</li> <li>3. Aging of most cocoa farms.</li> <li>4. Lack of cocoa processing plants.</li> </ol>
Managerial Weaknesses
<ol style="list-style-type: none"> <li>1. Lack of maintenance and rehabilitation of cocoa farms.</li> <li>2. Non-existence of concentration within the cocoa channel to defend that channel.</li> <li>3. Insufficient connection to external world regarding recent technological developments on cocoa production and processing.</li> <li>4. Low productivity.</li> <li>5. Absence of production record keeping.</li> <li>6. Problem of traceability.</li> <li>7. Lack of information on the process of price formation.</li> <li>8. Producer ignorance about the types of cocoa varieties they possess.</li> </ol>
Socio-economic Weaknesses
<ol style="list-style-type: none"> <li>1. Continued fragmentation of parcels, dispersal of cocoa trees and dominance of small cocoa farming plots.</li> <li>2. Poverty and bad socio-economic conditions of producers. Example: Land insecurity.</li> <li>3. Reluctance of some farmers to accept training regarding maintenance of farms.</li> </ol>
Socio-economic Weaknesses
<ol style="list-style-type: none"> <li>4. Lack of investment capacity of farmers. Example: poor access to credit.</li> <li>5. Absence of innovative cocoa farms in the farmers' immediate environment</li> </ol>

In fact, some branches had become so big that they could not be cut with secateurs; electrical saws were required to cut such branches. Additionally, fertilization was absent from almost all farms. The traceability problem was another factor making it difficult for many to take advantage of organic markets.

One of the best ways to teach people to do something is by providing an example. There was a lack of innovative cocoa farms in the area that farmers could refer to improve their cocoa plantings. Low financial capability of farmers that partly explained their land insecurity combined with low access to agricultural credit and lack of innovative cocoa farms explained to some extent their reluctance to accept cocoa production training. Many farmers did not use the training they received from institutions that try to improve the cocoa sector in the area. This situation led to low productivity of cocoa plantings.

Value-added products are generally an alternative that allows farmers to gain increased profit of their agricultural products. This was not the case of cocoa sector in northern Haiti because of lack of cocoa processing plants in the area. Moreover, investment in cocoa processing are very low in Haiti.

Though the variety of cocoa found in the area was much appreciated worldwide, most farmers did not know that information. In addition, most farmers did not have managerial skills such as production record keeping and traceability of production that would facilitate them to sell their cocoa on specialty market. Farmers in northern Haiti well not well informed about the price of cocoa on the international market.

#### 4.6.1.3 Production Opportunities

Contrary to strengths and weaknesses, opportunities are external to the cocoa sector and producers have no direct control over them. Opportunities are favorable for the growth and

profitability of the cocoa sector. More than 50% of cocoa production came from small producers. In general, most cocoa farmers had between 10 and 200 cocoa trees, according to most participants interviewed. Many have been excluded from current cocoa programs that try to improve quality and increase production. For instance, some interviewees asserted that the biggest project that invests in cocoa in the region has not given technical assistance to farmers who did not have more than 100 cocoa trees on a parcel or who committed to plant at least 100 trees. In fact, the production could increase significantly if a suitable formula was found to have all cocoa producers, regardless of the number of trees they managed, take care of their trees so as to optimize production. The production opportunities are listed in Table 5 below in two categories: socio-economic and managerial.

Table 5: Production Opportunities

Socio-economic Production Opportunities
1. Investment of projects and governmental programs in the cocoa sector.
2. Availability of some technical support given by some projects.
3. Distribution of seedling by some institutions.
4. Availability of qualified professionals.
5. Distribution of agricultural tools (watering cans and secateurs) by some institutions.
Managerial Production Opportunities
1. Attractive markets for Haitian cocoa in the European Union and the U.S.
2. Potential for total production and yield improvement.

Some farmers and cooperative leaders strongly recognized the support some international organizations, partnering with the Ministry of Agriculture, have provided to improve the quality of cocoa production and increase profits. Indeed, the cocoa federation would not have been involved in exports without such a help. Farmers have argued that the increase in the price of

cocoa over the last few years has to some extent been due to the hard work of a few institutions that had been committed to helping them benefit more from the products they grow.

The international markets where cocoa beans from Haiti was sold constituted an opportunity for the cocoa production in Haiti because their demand surpassed the supply capacity of the cocoa sector in 2014. That surplus demand can be an incentive for cocoa producers to increase their production. Cocoa production also could be increased through increasing yield if farmers decided to provide more maintenance to their cocoa plantings. The reported yield, 250kg/ha, was less than yield that follow minimal maintenance worldwide, which is 300kg/ha.

#### 4.6.1.4 Production Threats

Threats were external factors that could undermine the growth of the cocoa sector. The production threats are depicted in Table 6. Biophysical threats are factors related to the physical and biological environment that have interacted with cocoa farms. The socio-economic threats, on the other hand, had to do with institutional impacts and farmers socio-economic situation.

Lack of concentration of cocoa incentive programs on small producers becomes a very significant threat since these programs risk ignoring real issues of the greatest quantity of producers. Despite the help and good work of some international groups and NGOs, others have become obstacles to the development of the cocoa sector. These projects somehow have not allowed local actors to become autonomous. These projects have undermined local creativeness that would address problems of the sector and come up with innovative solutions that could increase yield and value added. Indeed, there has been a loss of local initiatives that would have mobilized ideas and local development initiatives focused on agriculture and strengthening the local economy. According to participants, many of the people involved in some projects had

insufficient knowledge of cocoa so that their efforts were ineffective. For instance, many of the seedlings that were produced did not conform to certain local agricultural norms, according to many interviewees. As a result, there had been distribution of low quality seedlings which did not survive transplantation.

Table 6: Production Threats

Biophysical Threats
<ol style="list-style-type: none"> <li>1. Droughts and climate change.</li> <li>2. Biological destructors --- rats, birds, escargots, caterpillars.</li> <li>3. Non-treatment of tools after and before using to practice cut in cocoa farms.</li> <li>4. Animal raised unattached.</li> <li>5. Reluctance towards change.</li> <li>6. Black pods.</li> </ol>
Socio-economic Threats
<ol style="list-style-type: none"> <li>1. Buyer's power situation and prevalence of low price.</li> <li>2. Lack of focus or concentration of cocoa incentive programs on small producers.</li> <li>3. Intervention of some projects on the cocoa sector.</li> <li>4. Cocoa robbery.</li> </ol>

In addition to some cocoa projects that had undermined local initiatives and creativeness in the cocoa sector, the socio-economic threats included cocoa robbery and long prevalence of low producer price. Indeed, in almost all focus groups, participants reported that robbery of cocoa pods on farms was a serious problem they faced. Regarding the producer price, some farmers were skeptical that significant progress would make in the cocoa sector and reduce cocoa buyers' power.

Among the biophysical threats, climatological disturbance such as severe droughts resulted from climate change had decreased cocoa production significantly according to some participants. Damage caused by animals, birds, rats, and domestic animals posed severe threats to cocoa plantings too in the study area. For instance, at Limbé, farmers indicated that they cannot even think about planting cocoa because unattached animals would eat the seedlings. Some farmers indicated that black pods disease was a serious problem to cocoa production. Figure 8 depicts a branch of cocoa that shows at least seven black pods.



Figure 8: Black Pods of Cocoa (Photo taken at Plaisance)

#### 4.6.2 Post-Harvest SWOT Analysis

The post-harvest SWOT analysis was conducted in a similar way to the production SWOT analysis, except in the post-harvest, the analysis excluded all factors involved before harvesting cocoa pods.

##### 4.6.2.1 Post-Harvest Strengths

The post-harvest strengths were biophysical and entrepreneurial in nature. The three post-harvest strengths identified are listed in Table 7. The varieties of cocoa grown in Haiti, *Criollo*

and *Trinitario*, and the fermentation capability of cocoa beans were two factors that could increase the value of the cocoa production in northern Haiti. In 2014, the cocoa federation, FCCANO, used less than half of its fermentation capability which is 400 metric tons. Another exporter installed significant fermentation boxes in 2014. As a results the fermentation capability of the cocoa sector increase. Besides institutional fermentation boxes, some farmers manifested their desire to use basket to ferment their cocoa to product a value-added product. The high fermentation capability combined with the *Criollo* cocoa variety can increase profit of the cocoa sector if farmers take advantage of them.

Table 7: Post-Harvest Strengths

Biophysical Strengths
1. High unused available fermentation capability.
2. Existence of a fine cocoa which is highly sought internationally.
3. Dominance of <i>Criollo</i> variety.
Entrepreneurial Strengths
Tendency of individual farmers to ferment their cocoa and produce a value-added product.

#### 4.6.2.2 Post-Harvest Weaknesses

Weaknesses of the cocoa sector in Haiti, after harvesting, had more to do with management and physical infrastructure. Indeed, farmers in some provinces have not managed to create cooperatives that would allow them to benefit more from their cocoa production. Regarding physical weakness, appropriate infrastructure was the major issue. Some people dry their cocoa on sand. Though all farmers did not lay their cocoa on the ground, many dry their cocoa close to roads where vehicles, people, and animals pass. Hence, these cocoa are easily subject to smell contamination and debris. The weaknesses are listed in Table 8.

Table 8: Post-Harvest Weaknesses

Physical Post-Harvest Weaknesses
Lack of appropriate drying and storage infrastructure.
Managerial Post-Harvest Weaknesses
Non-existence of cocoa cooperatives in some provinces.

#### 4.6.2.3 Post-Harvest Opportunities

Similar to post-harvest strengths and weaknesses, post-harvest opportunities could be grouped into two categories (Table 9): commercial and socio-economic. Cocoa demand had increased. According to exporters, Haitian cocoa is in demanded increasingly on the international market. Another geographical advantage that Haiti has is its closeness to the U.S. (with lowest transportation costs) which is one of the biggest cocoa importers.

Other opportunities lay in the cocoa federation holding Fair-Trade and organic cocoa certification that allowed farmers to sell some of their cocoa some specialty markets that paid a higher prices than traditional cocoa market. The Cap-Haitien International Airport was factor that helped farmers to not incur high transportation costs. The proximity of the Airport to the cocoa production area explained a low transportation costs. Some participants indicated that speculators paid a lower price to non-fermented cocoa that in areas farther to Cap-Haitien. For instance, though the price fermented cocoa was among the highest in Borgne because it has two cocoa cooperatives, the price of non-fermented cocoa was among the lowest in Borgne. The distance of Borgne to the Cap-Haitien Airport partly explain that discrepancy in price of non-fermented cocoa between Borgne and other places.

Technical exchange with farmers from Latin American countries had played a crucial role in improving the cocoa sector in Haiti. For instance, cooperatives had received Peruvian technicians who trained cooperatives leaders and farmers fermentation techniques. Since the

previous exchange on fermentation was successful, possible exchange on other technical aspects are opportunities that can lead to increase of yield and profit of the Haitian cocoa sector in the future.

Table 9: Post-Harvest Opportunities

Commercial Post-Harvest Opportunities
<ol style="list-style-type: none"> <li>1. Favorable markets.</li> <li>2. Recent penetration to some interesting markets.</li> <li>3. Proximity to the United States.</li> <li>4. Possession of organic and other high value international certification by the cocoa federation.</li> </ol>
Socio-economic Post-Harvest Opportunities
<ol style="list-style-type: none"> <li>1. Existence of the Cap-Haitien International Airport.</li> <li>2. Exchange with farmers from Latin American countries where the most innovative techniques of cocoa fermentation have been developed.</li> </ol>

#### 4.6.2.4 Post-Harvest Threats

The post-harvest threats listed in Table 10 are in two categories: commercialization and marketing and socio-economic. Regarding to commercialization, a brilliant future was guaranteed on the international markets where Haitian cocoa exporters trade cocoa due to incapacity of the Haitian cocoa sector to keep up satisfying some volumes. For instance, some buyers would like to sign some long-term contract with FECCANO, but the federation cannot make such a commitment because the production of its members is not stable. Instability of prices on the domestic market combined with aggressive competition among cocoa buyers discouraged farmers from increasing their cocoa production.

Table 10: Post-Harvest Threats

Commercial and Marketing Threats
<ol style="list-style-type: none"> <li>1. Aggressive competition.</li> <li>2. Low bargaining power of local cocoa buyer on the international markets.</li> <li>3. Instability of prices and fragile or destructive market behavior.</li> </ol>
Socio-economic Threats
<ol style="list-style-type: none"> <li>1. Political situation.</li> <li>2. Bad rural roads.</li> <li>3. Lack of transparency and corruption within some cooperatives.</li> <li>4. Poor and lack of local processing.</li> </ol>

The socio-economic threats were related to physical infrastructures and human relationships. For instance, participants of the study reported that current politicians in Haiti have favored business-people over farmers. To illustrate, some participants mentioned that some cooperatives have been advised by people working in the public sector to give up exporting and sell their cocoa only to domestic buyers.

In addition to political situation, physical infrastructure and networking such as bad rural roads, lack of cocoa processing as well as bad cocoa cooperative leadership are other factors that hindered cocoa sector in Haiti. Cocoa producers had almost only cocoa speculators to sell their cocoa beans because the small cocoa processing units did not buy significant cocoa beans. Bad rural roads increased transportation costs and prevented some farmers to go to places where they could obtain better prices for their product. Although cocoa cooperatives were the channel that allowed farmers to obtain better prices, some participants indicated that some cooperative leaders are corrupted. Consequently, many farmers did not perceive the gain to join a cocoa cooperative.

#### 4.7 Potential of Increase Fermented Cocoa Production

Given the current installed fermentation capacity (400 metric tons) of the cocoa federation, there is sufficient room to significantly increase capacity in the near future. Hitherto, the federation, which was the only institution that exported fermented cocoa from Haiti, traded about 150 metric tons cocoa bean annually. More buyers have expressed interest in buying cocoa from the federation. Indeed, the federation expected a significant increase of its trade in 2015. One of the goals of the federation was to double its business so that it can support its administrative charges and be autonomous. In addition, a new cocoa competitor, which will make its first import in 2015, has installed substantial fermentation boxes. This buyer has used a strategy of acquiring a noticeable market share as quick as possible. It has employed agents who mobilize farmers to harvest and extract the cocoa bean from the pods the same day in a given area. Thus, the institution comes to the farm to buy directly from farmers. This competitor may reduce the federation's market share because most farmers want to quickly exchange their product for cash. The strategy of the new competitor is more appropriate for many producers as they don't need to bring their cocoa to a cooperative. Besides, farmers often are not sure whether the cooperative will have sufficient cash to pay them immediately. As the federation signs most of its contracts before it makes its collection, it will need to adjust its strategy so that it can at least satisfy its customers and meet its delivery quota. Consequently, one can expect the production of fermented cocoa to oscillate around 200 metric tons in 2015.

Furthermore, the investigation revealed the existence of some farmers who ferment their own cocoa. Some even claimed that they have mastered fermentation techniques and have used baskets named *paniers* to ferment their cocoa. Nevertheless, they complained that no institution wants to recognize their effort nor offer a higher price for their product. As the cocoa sector

moves forward, there must be a system that verifies, makes appropriate recommendations for improving those on-farm fermentation units, and validates their process.

## **Chapter 5: Discussions and Interpretations**

The results of this study shed light on the problem investigated. One key issue was a lack of information on influencing the decision to adopt sustainable cocoa production in northern Haiti. The hypothesis that “The adoption of sustainable cocoa production is affected by the socio-economics factors” was supported by the findings. The findings confirm that some of the primary factors driving adoption are the socio-economic ones. Indeed, producer price, farm size, ownership of property, financial situation of farmers, and social networks, such as farmer associations and cooperatives, all were identified as central in the farmers’ decision making process about production of cocoa in general and sustainable cocoa specifically.

The findings do not support the second hypothesis that physical factors do not influence sustainable cocoa production adoption. In fact, the study results suggest that land location, soil characteristics and physical infrastructure such as an irrigation system do matter in farmers’ decision making processes regarding cocoa farming.

The findings are in line with many empirical studies which used mostly quantitative analysis. Regarding price received by producers as a major determinant of sustainable cocoa production, results of this study concur with studies related to cocoa production in which price was a significant driver of adoption. Dormon et al. (2004) asserted that a low producer price was among the relevant factors of low cocoa productivity and production in Ghana in a study which investigated the causes of low cocoa productivity. Blowfield (2004) provided a descriptive support of the role of commodity price, which encompassed many aspect of sustainability. He argued that low producer prices of crop trees led to behaviors such as low wage, exploitation, and poor environmental management, a situation that contradicts principles of ethical markets. Wubeneh et al. (2006), Mzoughi (2011), and Subervie (2008) described similar results with

regard to price in studies that identified determinants of adoption of agricultural practices.

Though this research used a qualitative method, as opposed to the quantitative methods used in the studies mentioned above, similar empirical findings were observed.

Similar to producer price, farm size has long been identified empirically as a significant factor influencing agricultural technology adoption. Sodiya et al. (2007) indicated that farmers whose farm size is small allocate most of their land property to subsistence crops. That is exactly the case in northern Haiti. Research participants made it clear that they prioritized annual crops because these crops were essential for family food. Several quantitative studies have shown similar results. Feder, Just and Zilberman (1985) found that larger farmers were among the early adopters of technology for farmers in developing countries. Similarly, Adebisi and Okunlola (2013) reported that farm size and years of experience farming were significant factors in renovating cocoa farms in Nigeria. The current Haitian law allows continuous division of land. Many participants in the focus groups indicated that in the next decade farmers may not be able to increase their farm size. However, if the construction of the north industrial CARACOL Park is completed, it could employ thousands of people in the region, and possibly cause the agricultural sector to lose some labor to the textile industry. As a consequence, there may be a slight increase of farm size so that sustainable cocoa production may be positively impacted.

As the findings point out, property ownership and land insecurity are fundamental issues, which constrain possible expansion of cocoa production in Haiti. Sunding and Zilberman (2001) in their review of agricultural technology adoption argued that short-term tenure had a negative impact on adoption of new agricultural techniques. Article 290-4 of the applicable Haitian rural code limits the non-written land lease to ten years for cultivation of crops that take three years until the first harvest. Cocoa farms fall into that category. Moreover, in a series of legal

framework published by Les Classiques des Sciences Sociales, Larose (2008) argued that the maximum legal lease term should be nine years. In addition, Pierre (2009) mentioned in a legal report of land arrangements that oral contracts were the norm for land leases in rural zones in Haiti. Cocoa plants reach their production peak after twenty years according to empirical investigation. As a result, one can reason that the prevailing legislation and traditions have not encouraged farmers to grow tree crops on land which does not belong to them. The landlords would end up enjoying any investment in cocoa plantings on leased lands.

Another factor influencing technology adoption was age which has empirical support. A positive association between age and adoption of agricultural technology was consistent with the findings of Giovanopoulou et al. (2011) that showed higher tendency among older farmers to embrace agricultural techniques which reduced nitrate pollution. Baffoe-Asare et al. (2013) found similar results in a study that investigated variables that influenced adoption of cocoa pest and disease management techniques. Experienced farming, which has been positively correlated with age in many studies on agricultural practices, has also been identified as positively influencing technology adoption. While experience may help explain, in part, why some Haitian cocoa producers adopt new technology, social capital appeared to have more influence on farmers' behavior. In fact, farmers themselves indicated that older people often turn to cocoa production as a source of revenue in retirement.

Because wealth accumulates through time, older farmers may have more land than younger producers do. So, older farmers may have more land and be more likely to produce cocoa when considering the simultaneous effects of farm size and age.

Farmers have obtained land ownership through many means. In Haiti, it has been common for some people to become squatters on government owned land and gain ownership

after a certain amount of time. Farmers with substantial off-farm income had an edge over others regarding legal acquisition of land. Inheritance, enjoyment of significant relatives' farm land, as well as money transfer from loved ones living abroad have been other means of legally obtaining farming land. The results of this study showed that age and farm size have significant explanatory power on adoption practices of sustainable cocoa.

Although most cocoa farms in Haiti are potentially sustainable because of the prevailing Creole Garden, which can meet production sustainability criteria, the current low producer price reduces the sustainability score of the cocoa sector. As Cappelle (2008) pointed out, a “sustainable cocoa economy is where each person investing time or money into the supply chain is able to earn a decent income for themselves and their family.” The investigation revealed that the price farmers have received for their cocoa bean, between \$0.44 and \$1.32 a pound in 2014, was far from satisfactory to farmers.

The current low productivity of the cocoa sector in Haiti is a byproduct of a set of ongoing issues. Producer price, low maintenance of plantings, lack of effective and progressive collaboration among public sector and organizations (international institutions, NGOs and grassroots organizations) all have been factors that have diminished a successful environment for the cocoa sector. With regard to low agricultural maintenance, published findings indicate a negative impact on cocoa production. Ayenor et al. (2004) emphasized that the lack of pruning was a major facilitator of black pod development, a serious cause of cocoa fruit loss worldwide and in Haiti. Zuideman et al. (2005) found photosynthesis and maintenance respiration played a prominent role in cocoa productivity in their investigation of cocoa physiological production models in ten countries.

Dense cocoa plantings are common in Haiti. Dense cocoa plantings are a factor which prevents solar radiation from reaching the leaves of the lower parts of trees. As a result, these leaves may not be effective in fruit production because they consume part of biological energy of the plant while they do not produce fruit. This situation lowers the fruit production potential of cocoa trees and lowers yield. On the other hand, black pod disease development, which follows dense farms and plants that were not well maintained, further reduces the production of the cocoa. The combined negative effects of black pod and lack of solar radiation to cocoa plants are concerns that need serious attention to improve Haitian cocoa production systems.

The present socio-organizational environment within the agricultural sector in Haiti appears to be inefficient in promoting sustainable cocoa production. Support to the cocoa sector exists as there are many agricultural projects in the study area. Farmers confirmed the effort of some organizations. That institutional assistance is important as previous research indicated. For instance, Jones and Gibbon (2011) found that implementation of credible incentives to improve cocoa quality provided increased revenue for organic cocoa producers in Uganda. However, the form of the prevailing assistance requires more thorough review of their impacts. The findings of this study point out wasted resources and possible adverse selection and moral hazard programs of NGOs and international aids efforts. Lack of collaboration among institutions and low or no consideration of real actors' inputs, especially farmers, in the major decisions concerning the cocoa sector has resulted in low impacts of such institutions and minimum effect on productivity and sustainability of cocoa production. A real collaboration among all parties involved in this sector would be ideal as research findings support this. Indeed, Shapiro and Rosenquist (2004) suggested a collaborative approach in the cocoa supply chain to facilitate sustainable cocoa

production worldwide. Such a collaboration is needed in Haiti to make significant progress toward sustainability in the Haitian cocoa chain.

## **Chapter 6: Conclusions and Recommendations**

Adoption of sustainable agricultural practices in Haiti lags behind that used in the cocoa sector of major cocoa producing regions, including West Africa, Asia and Latin America. The small cocoa farms of Haitian famers somehow limits interest of many producers in adopting high productivity techniques. Many producers seem unable to assess and value the marginal gains that are more likely to occur in well maintained cocoa fields. This inability to perceive gains, combined with farmers' limited financial capacity, which limits purchases of maintenance tools such as electrical saws, along with poor credit access, restrict progress of cocoa production in Haiti; this despite some domestic and international organization incentive programs.

Based on the results obtained from this investigation, increased incentive programs to promote new cocoa plantings may not produce the intended results for a variety of reasons. First, currently the idea of establishing more cocoa farms is not consistent with farmers' livelihood strategies and resources. Indeed, most farmers cannot afford planting more cocoa trees because of their limited land holdings and responsibility to provide food for their family. Second, there is little evidence, whether economic studies or price of cocoa on the national market, to convince many farmers that cocoa is more profitable than the other annual crops they produce. The situation may stay like that for the foreseeable future. In addition, given the long period that the sector has been controlled by a few buyers and the ongoing corruption within cocoa cooperatives, farmers are very reluctant to believe they would be able to obtain a satisfactory share of the value of cocoa production.

In response to the research questions, the inquiry identified the key determinants of sustainable cocoa production in northern Haiti. Indeed, farm gate price, farm size, land tenure, land configuration, rural infrastructure, social networking, and husbandry practices have been

identified as the dominant elements which support the existence of cocoa farms in general and sustainable cocoa practices specifically. In addition to the revealed factors influencing sustainable cocoa production in northern Haiti, the SWOT analysis identified factors and issues which presented the constraining and favorable elements for expansion and growth of the cocoa sector.

Finally, it is the responsibility of any potential user to practice discernment regarding the findings of the study just as it is true for all qualitative research. The study could not quantify the explanatory power of each factor due to limitation of the methods used. Consequently, quantitative analysis must follow this study for better understanding how influential factors are at adoption of sustainable cocoa production, as well as possible correlation between the factors. Moreover, due to low negotiation capabilities of cooperative leaders, along with reported corruption within the cooperatives, studies that would investigate entrepreneurial level and community development commitment of rural communities of the study area would be beneficial. Furthermore, research investigating economies of scope of cocoa production systems or agroforestry production system in Haiti would be helpful to the producers and better assist the rural community.

For significant improvement of the cocoa sector and a better contribution of that sector to the national economy the following recommendations are listed.

For the Ministry of Agricultural, Natural Resources and Rural Development (MARNDR) and other institutions that invest to improve the cocoa sector in Haiti:

1. Facilitate exchange of agricultural practices with technicians and farmers from Latin America countries. Similar to the success of the fermentation technique exchange, more technical cooperation whose content emphasizes best production practices and techniques for

maintaining plants, are needed with farmers from Latin America countries or areas where more advanced production techniques have been developed. Hence, farmers can significantly increase cocoa production in Haiti, even with current area under cocoa because of such an information exchange between farmers.

2. Provide technical support to small producers at the same level it is given to larger-scale operations.
3. Encourage and promote development of entrepreneurial skills for cocoa producers.
4. Create a National Cocoa Research and Development Institute which would conduct research, propose and promote activities that aim to increase cocoa production, and develop the cocoa value chain. This recommendation is primarily for the Ministry of Agriculture which has the responsibility for creating such an institution to promote the cocoa sector and national economy. However, in the process of putting in place this national cocoa institute, the Ministry must engage all partners who are involved in the sector including international institutions, NGOs, cocoa cooperatives, and farmers.
5. Conduct a technical study whose goal is to determine whether necessary investment in cocoa plant maintenance and associated increase in output will compensate producers for the increased expenses of maintenance. Now most farmers believe that expected increases in yield would not cover the additional cost of production.
6. Investigate the economic impact of black pod disease. For most technicians who work in cocoa sector in northern Haiti, black pod disease is not presently a significant threat for cocoa production. However, for some farmers who participated in the study, this issue was a serious threat.
7. Put in place and define national quality norms and local biological certification for cocoa.

Given the important role cocoa cooperatives play in improving the cocoa sector, some recommendations are directed to them.

1. Develop a procedure which helps small cocoa producers to realize the benefits of membership in a cooperative.
2. Establish a reliable and transparent accounting system within the cooperatives. Many farmers indicated that cooperatives have inaccurate scales, which the cooperative leaders fail to calibrate to take advantage of producers. Many farmers complain about antiquated practices of measurement such as use of bowls that inaccurately weigh product and create an advantage to buyers. Moreover, others expressed frustration at the practice of some cooperative leaders who often raise humidity problems at payment time and consequently decrease the price for product. For transparency and effectiveness of the cooperatives, it is important to control the humidity at buying and state clearly the price for each level of humidity.
3. Use transparency in all aspects of the cooperative including administrative procedures and renewing of the cooperative board to obtain trust of members so that the cooperatives can improve.
4. Practice a multi-crop strategy. A cooperative does not need to focus solely on a particular crop, especially when that crop is very seasonal. A multi-crop strategy would allow better use of current assets such as buildings and human capital. Though each crop requires specific handling, it's possible for cocoa cooperative to engage in the collection and export of coffee for example. Furthermore, instead of only exported cocoa bean, cooperatives may look into processing and exporting also value-added cocoa products.

5. Encourage establishment of cocoa cooperatives in cocoa production areas that currently do not have a cocoa cooperative. As cooperatives are committed to community development, one of the best ways to participate in development is to transfer knowledge to others. The cocoa cooperatives are the best resource for helping farmers to create a cooperative that is familiar with all the legal requirements.

In addition to MARNDR, agricultural service institutions, and cooperatives, specific recommendations are given to farmers for the improvement of the cocoa sector in Haiti.

1. Provide a minimal level of maintenance to cocoa plants. Though most plants are old, producers may increase productivity if basic best practices are followed. Since subsistence cocoa production with minimal maintenance allows 500kg/ ha, Haitian farmers may be able to obtain 400kg/ha if some additional good maintenance is provided.
2. Plan your cocoa harvest with foresight so that the beans can be sold through a system that provides a higher price, especially through a system that ferments the cocoa and provides ristourne.

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## **Appendix: Questionnaire Route**

### **Opening Question**

1. Please, take a minute to introduce yourself, your general activities, your passion, what you are better at doing, and what do you like to do in your free time.

### **Introductory Question**

2. When considering sustainable cocoa production, what do you think are the general impacts?

### **Transition and Key Questions**

3. What do you think are the key factors which lead farmers to choose sustainable crops?

4. According to you what are the farming characteristics of those who engage in sustainable cocoa production? Can you provide some differences (structural, financial, etc.) regarding the farming characteristics between farmers who grow a high or low quantity of sustainable cocoa within your restricted geographical region?

5. Can everyone, please, take a few minutes and list all of the important factors (whether positive or negative) that a farmer considers when deciding to have a sustainable cocoa production and why do you think these factors are the important ones?

6. Let's summarize the most important factors of sustainable cocoa production.

7. From all the factors listed, we want each of you to please rank with those 10 colored buttons given to you the most important ones. You can assign all of your buttons to either one factor or as many factors as you want. You can rule out factors if it's (they are) not important to you.

Moreover, you don't need to equally assign them. For instance, you can assign 5 to a factor and 3 or 2 to another; the more the number of button assigned to a factor, the more importance it is according to you.

8. According to your opinion, what should and can be done for each of these identified factors for the benefit of the cocoa industry in Haiti and the agricultural sector in general?
9. Based on the course of action you just listed, using a set of colored button again can you please, rank them from the most to the least feasible (and urgent).
10. What are the strengths, that is, factors which you are controlling on your farm or people in the cocoa industry have control over that are advantageous for increasing productivity and profit, of the (sustainable) cocoa industry? Ex. Good production practice.
11. What are the weaknesses, that is, absence of some strengths or factors that you could control in your farm (or people in the cocoa industry), which are disadvantageous for increasing productivity and profit, of the (sustainable) cocoa industry? Ex. Lack of cocoa fermentation skill.
12. What are the opportunities, that is, external forces (social, economic, financial, cultural, environmental, etc.) that people in the cocoa industry do not have control over, but taking advantage of them can be very profitable for the cocoa and sustainable cocoa industry? Ex. Exemption of tariffs on cocoa exports.
13. What are the threats, that is, external forces (social, economic, financial, cultural, environmental, etc.) that represent challenges or which can be detrimental to the growth of the cocoa and sustainable cocoa industry? Ex. Transportation network.

### **Ending Question**

14. Is there anything important that you think we missed? Is there anything that any of you wanted to say that you did not get a chance to express?

## **Vita**

Wegbert Chery is a native of Haiti. He received his bachelor's degree at Université d'Etat d'Haiti in 2011. After receiving his bachelor's degree, Mr. Chery worked at the Ministry of Agricultural Natural Resources and Rural Development in Haiti. Besides, Mr. Chery had done consultation work for some institutions including Centre d'Etude et de Coopération Internationale (CECI), Collectif du Financement Populaire (COFIP), Association Nationale des Tranformateurs de Fruits (ANATRAF), and Coordination of Actions in Health and Development in Haiti (COSADH). He decided to start a master's degree in Agricultural Economics in the Department of Agricultural Economics and Agribusiness at Louisiana State University in 2013. He expects to receive his master's degree in May 2015 and plan to go back to Haiti and look for job opportunities. He intends to begin a doctorate degree in 2016.