BRIDGING THE GAP BETWEEN SMALLHOLDER FARMERS AND MARKET ACCESS THROUGH AGRICULTURAL VALUE CHAIN DEVELOPMENT IN HAITI

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ABSTRACT

Smallholder farmers in Haiti face many challenges such as fragmented market structures, inefficient supply chain and lack of competitiveness. Despite being major food contributors, farmers are part of a repeated cycle of poverty, unable to improve their livelihood and increase food security. Agriculture has been a means of survival for many small-scale producers and efforts towards value chain development can identify ways for farmers and agroenterprises to tap into new opportunities towards profitable markets. The purpose of this research is to conduct an analysis of the agricultural value chain in Haiti and understand factors keeping farmers from participating in domestic and regional food chains. To achieve this goal, this research paper will identify key inefficiencies of the value chain's structure and understand the relationship among stakeholders to create pathways that would bridge the gap between producers and consumers. The result of the analysis leads to proposed recommendations to integrate agribusiness actors in more inclusive models and strategies for increasing market access for smallholder farmers and industry growth.

BIOGRAPHICAL SKETCH

Ashley Casandra Célestin was born in Queens, NY and was raised in Port-au-Prince, Haiti. She received a bachelor's degree in Agricultural Business from State University of New York College of Agriculture and Technology at Cobleskill. After graduating in 2015, Ashley worked for A.J. Trucco at the Hunts Point Produce Terminal Market in NYC, where she oversaw operations, warehouse management and import freight coordination and documentation. In recent years, she had the opportunity to develop an agricultural curriculum for a free summer camp program for underprivileged youth in rural Haiti; as well as volunteering in a non-profit organization for reforestation and agriculture development in Croix-des-Bouquets, Haiti. Ashley enrolled in the Master of Professional Studies program for International Agriculture and Rural Development at Cornell University, where she participated in the Student Multidisciplinary Applied Research Teams (SMART) program in Nairobi, Kenya. Ashley was also a panelist at the 2019 5th Agrobusiness and Economic Industry Summit, held at the headquarters of the United Nations, where she presented her capstone research paper.

To my parents

Alix et Danielle

Thank you for all your love and support

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

AVC: Agricultural Value Chains

CASELI: Center for Support and Services for Local and International Businesses

CFI: Centre for Investment Facilitation (CFI in French)

CIA: Central Intelligence Agency

DR: Dominican Republic

EU: European Union

FAO: Food and Agriculture Organization

FFV: Fresh Fruit and Vegetables

IADB: Inter-American Development Bank

IFAD: International Fund for Agricultural Development

MARNDR: Ministère de l'Agriculture, des Ressources Naturelles et du Développement Rural

PBG: Producer Business Groups

UN: United Nations

US: United States of America

WB: World Bank

CHAPTER 1

INTRODUCTION

By 2050, the global population will have reached 9 billion people, while farmlands decrease and food demand increases (UN, 2017). Smallholder farmers contribute to about 70 percent of the food produced globally, yet they often remain in poverty and face problems of food insecurity (FAO, 2018). In Haiti, the situation is not any different, as agriculture contributes little to the country's economy but employs almost half the population (FAO and CDB, 2019). Smallholders form the bulk of the farming community and produce the majority of the domestic food consumed on less than 2 hectares of land per farmer that make up between 7 to 17 percent of the country's gross domestic product (FAO and CDB, 2019). However, agriculture continues to be a widely underserved sector impacting the livelihoods and food security of millions of people. In Haiti, as in many other low-income countries, to feed its growing population and get out of poverty, value chain efficiency would need to improve in order to meet the demands of a population of ten million people. Currently, Haiti relies heavily on imports and food aid to feed its population, therefore it is imperative for value chain structures to improve for Haiti's self-sufficiency. Agricultural value chains (AVCs) have been a common key strategy to promote economic development and a method to alleviate rural poverty through building market linkages. Nevertheless, trade and new competitive markets have transformed food systems, therefore it is particularly difficult for small scale farmers to catch up with competition on the domestic as well as on the international market.

Haiti is a beautiful country, especially in rural areas where the landscape is filled with lush green layouts of maize fields, banana and mango trees and other tropical species. Nonetheless, Haiti is also poor. In rural communities, at least 50 percent of the population is employed in agriculture. In a recent survey in 2012, over 6 million habitants fall below the poverty line and live with less than US $2.41 a day (World Bank, 2019). For rural peasants, farming is not only a tradition, but farming activities can also present various profit opportunities with the right market-driven approach. For example, the demand for staple crops such as maize, millet, sorghum and tropical fruits is greater than what the country supplies. Furthermore, with frequent natural disasters landing on the island territory, fields are subject to low yields and land degradation, limiting the supply of these important crops.

This study focuses on constraints and challenges faced by smallholders to access markets in Haiti and to integrate profitably into the value chain. Small producers are faced with strong competition from subsidized imported products in their own domestic market and are unable to compete with their low production output (Chisenga, Entsua-Mensah, & Sam, 2007). Meanwhile, the rate of growth of the population is increasing faster than agricultural outputs, affecting Haiti's ability to sufficiently supply and meet the domestic demand. Urban migration, change in consumer taste, followed by the effects of climate change are pushing some resources to their limit, and thus making production even more critical across Haiti, similar to other developing countries (Pretty, Toulmin, & Williams, 2011). Smallholders are both producers and consumers of the food supplied on the local market and they are the main drivers of food security given their large contribution in traditional AVCs. Food insecurity is prevalent in Haiti and malnutrition affects at least 50% of the population given that farms' productivity has decreased and food affordability has become a major threat to poor households including smallholder

farmers (USAID, 2017). Commercial crops generally include cabbage, carrots, tomato, eggplants, spinach, onions, leek, watermelon, and tropical fruits depending on the season and agroecological zones (MARNDR, 2013). Many of these crops, in addition to pulses and starchy vegetables are consumed in many forms providing nutritional value high in vitamin C and B-Carotene to the population. Given the availability of diverse crops, it is reasonable to promote smallholder farmers towards commercialization, to increase production of quality product and make more nutritious food accessible, through sustainable production systems with good market access that can benefit the food security of the population and pull rural peasants out of poverty (Kissoly, Faße, & Grote, 2017). Moreover, food production ought to be a united effort at community and national levels that allows food systems transformation to support availability, accessibility and nutritional quality for everyone (Babu, 2019).

This study reveals that high transportation costs, competitive imported products, lack of marketing skills, as well as an unorganized value chain structure are some of the main issues keeping farmers from participating in markets. Moreover, the findings indicate that the agricultural sector is poorly funded and neglected by government institutions. Farmers have little to no support, except from agribusinesses and industries in the private sector that have a stake for particular commodities and the capacity to provide technical support to farmers to produce adequate quality products for a given market. Regardless, the agricultural sector has been given little attention, therefore it is necessary to analyze ways in which farmers and value chain actors can create opportunities and invest in partnerships that can create solid networks and business structures that lead to the improvement of farmers' role in food value chains. The paper will approach the concept of a value chain, and what that means for farmers and other stakeholders.

The objectives are to analyze barriers to formal market participation and factors that influence smallholders' decisions. This report will cover traditional commodities and fresh produce. First, an overview of Haiti's agricultural sector and factors influencing its growth will be considered. Second, an analysis of the current structure of the agricultural value chain and identify the challenges faced in the different market dynamics will be made. Last, recommendations on agribusiness models and infrastructure needs will be highlighted that could bridge the gap from producers to markets.

CHAPTER 2

HAITI COUNTRY BACKGROUND

Economic Context

The first nation in Latin America and the Caribbean to gain independence in 1804, the Republic of Haiti is located in the Caribbean Sea, sharing the island of Hispaniola with the Dominican Republic. Haiti has the largest GDP share in agriculture than any country in the Caribbean of at least 17% and where 50% of the population is employed in the agriculture sector (FAO and CDB, 2019); making it an important sector of the economy. The agricultural sector is characterized by small scale farming, limited technology, lack of storage facilities, scattered markets and limited agricultural industries (Diao & Hazell, 2004). According to an IFAD report from 2018, the country's agriculture sector only satisfies 45% of its food demand and is highly dependent on import and food aid resulting in a negative trade deficit. For many developed countries and developing countries across the globe, structural transformation has played a major role in moving from a dominating agriculture sector towards a more service and manufacturing transition for development, prompting the share of agriculture to decline the more a country moves towards a service-oriented economy. Although there are investments in the service sector, the majority of the rural poor are employed in agriculture that explains why the attention needs to be given to this sector, which remains a big part of Haiti's economic engine. Recently, the Haitian government has identified key agricultural investments to benefit the development of rural areas in both food production and processing activities (CFI, 2015). As of 2012, the Haitian government has set out goals to increase productivity for food security and allocated roughly

5.7% of the national budget to the agriculture sector, according to the Food and Agriculture Organization (FAO), to promote efficient and environmentally sustainable farms and ways to avoid natural disasters (FAO, 2018). However, this low rate of funding stifles the ability of the country to achieve productivity achievements, and gain competitiveness on the domestic and international markets. Far greater financial assistance and external donations come from private sector investments and international organizations (IDB, 2014).

Environmental Context

Haiti is the highest mountainous country in the Caribbean, with a total area of 27, 750 square kilometers (World Bank, 2015) of which one fifth is arable flat land, and one-seventh is part of the arable mountainous area (Sebrell W et al., 1959). The topography is mostly of steep slopes combined with eroded lands unfavorable for crop production and susceptible to landslides (Jolly & Shannon, 2005). In Haiti, environmental degradation is one of the contributing factors to low agriculture productivity, including soil erosion, low water quality and lack of ability to manage resources in a primarily rain fed cropping system. In rural areas, an important segment of the population resorts to cutting trees as a source of energy and also an income generator causing deforestation that has affected two thirds of the forest areas. Ultimately, this practice has had detrimental effects on the cultivation of these peasants' farmlands and with negative environmental consequences when facing hurricanes, floods and landslides that wipe out the agriculture of small landholders for the season. Unfortunately, natural resource policies have yet to implement strategies to address climate change; although some reforestation efforts have focused on agroforestry as well as crop diversification and intercropping systems that can assist

farmers manage risk associated with climate fluctuation and improve economic opportunities (Singh & Cohen, 2014). Climate change has had unfavorable effects on the livelihood of smallholders and continues to be a threat to the Haiti food security and across the globe. The variability of weather and extreme temperatures has affected both subsistence and cash-dependent farmers, and resulted in new pests and diseases that are causing significant losses to major crops such as corn, coffee and cassava in Central America and Haiti (FAO and CDB 2019).

In Haiti, where the environment suffers from massive deforestation and land degradation; the use of conservation agriculture, agroforestry and intercropping can help mitigate environmental threats. Coffee for example, is a crop that is grown in shaded areas with high altitudes and contributes positively to the natural eco-system and can promote agricultural economies if well managed (Kilian, Pratt, Jones, & Villalobos, 2004). Coffee can also be simultaneously intercropped with other products such as banana for crop diversification (van Asten, Wairegi, Mukasa, & Uringi, 2011). However, global market prices of coffee are very volatile, forcing farmers to halt coffee production and find other profitable and less volatile crops that potentially have fewer negative effects on soil quality. Also, fruit trees such as mango and avocado have positive soil preservation and environmental benefits that can bring economic security to smallholders if proper tools and education are circulated down the chain to improve agriculture practices and provide markets for these perishable crops (Hyppolite L, Teixeira A, Roka F, et al., 2013). Environmental improvements can also be achieved if farmers were to adopt cropping systems where crops and trees are grown together in agroforestry systems that result in multiple crops per season instead of only one (Pretty et al., 2011). Adopting techniques to

improve cropping systems that improve organic carbon content of the soil like conservation agriculture, and promotion of organic residues, leguminous crops for nitrogen fixation and replace the need for inorganic fertilizer would all be positive. Ultimately, the farmer's rationale is to simultaneously maximize profits and reduce its risks; therefore small producers could be motivated through monetary incentives to adopt natural resource management systems that can prevent degraded slopes, enhance soil and field quality while linking their agro-environmental condition to market economies (Smucker, Fleurantin, Mcgahuey, & Swartley, 2005).

Agriculture Sector in Haiti

Production output is primarily dedicated to the domestic market with supply of mainly cereals such as rice, millet and sorghum, protein crops such as beans, and a combination of starchy vegetables such as plantain, yam, cassava (manioc), and sweet potatoes are the main crops cultivated and used in diets that occupy 85% of the total cultivated land (Pressoir G, Gresh F, Lamure F, Lançon F, 2016). Only a small percentage of fields and farmers are dedicated to the export market, since most of the production is for the local consumption.

Similar to other developing countries in Latin America and Sub-Saharan Africa, agriculture in Haiti is performed by smallholders for subsistence purposes, and it is characterized by low productivity, ageing peasants with limited selling opportunities for markets. In these circumstances, the constraints are not only from natural resources but also from the ability to use technical options and optimal use of quality inputs to boost productivity (Whitbread, Robertson, Carberry, & Dimes, 2010). Few farmers have access to quality inputs, and some have also highlighted that labor is becoming scarce with the younger population moving from rural to

urban cities because the youth also does not find agriculture attractive given the rigors and drudgery and poor economic returns.

Agriculture in Haiti is mainly a rainfed tropical cropping system; characterized by many small, scattered parcels of land, with smallholders cultivating less than one hectare (The World Bank, 2017). The growing seasons with intense rainfall occur in April to July and September to November (Mcclintock, 2003). The two main production sites are the high-altitude humid mountains, such as Kenscoff, Furcy, Thiotte and the irrigated lowlands Artibonite Valley, Gonaïves, Plaine du Cul-de-Sac (MARNDR, 2013). Producers generally cannot afford fertilizer, so most crops are grown naturally and food products in Haiti, compared to other countries in the region, use little or no fertilizer nutrients or crop protection chemicals. However, agriculture has been subjected to low yields and poor crop quality when compared to its neighbors in the Latin America and the Caribbean region. Haiti has a high potential to boost food production with a topography that offers multiple microclimates from tropical to semi-arid and a production season that can extend to over five months compared to other neighboring countries that average from three to four months (CFI, 2015). However, due to lack of market information and access to markets, small producers are unable to schedule growing seasons to take advantage of market demand and increase profits.

CHAPTER 3

LITERATURE REVIEW

In developing countries, market-based value chain development has been a key strategy for connecting smallholders to markets (Chagomoka, Afari-Sefa, & Pitoro, 2014). Value chain analysis can help explain where the inefficiencies occur and how to encourage competitiveness in production output and improve overall structure. There is a need for reinforcement of connections between producers and buyers to build a consistent supply chain. It is particularly difficult for the least developed countries to fully exploit the local demand when there are inconsistencies in the domestic market.

Many tropical crops are grown in Haiti for domestic consumption and only a few select crops are exported to regional and international markets. Nonetheless, while agriculture production that is dedicated towards export can pull poor farmers up the chain, international markets can also promote positive externalities for low cost quality food for consumers, employment for rural communities and employment opportunities from post-harvest processing and transformation (Gomez et al., 2011). An efficient agricultural value chain can lead to significant economic development while eradicating rural poverty and increase food security. In developing countries where most agriculture is for subsistence needs or cultural heritage, farming needs to become smart, efficient and adopted as a business operation if farmers want to upgrade and serve a growing market (Mbaka, Mwangi, & Mwangi, 2008).

The concept of agricultural value chain represents the many activities and actors that bring production to the end consumer through a series of processing, marketing, and distribution activities (Humphrey J, 2006). For Godfrey et al., (2019), a value chain can be described as information and perception of the final consumer that is transferred to the producer in order to supply the market according to attributes actors perceive as value. This model also puts emphasis on the type of relationship that is being built amongst stakeholders that add value and goes beyond the product itself (Marsden, Banks, & Bristow, 2000). This method could bring cooperation across players within the chain and allow participants to understand the others' needs and work to enhance competitiveness while working towards a common goal and promote transparency and information flow. This progressive environment can lead to better business practices and build trust amongst farmers and the agribusiness industry.

Inclusive value chains promote partnerships amongst traders, processors, agribusinesses and retailers, so that farmers can have more knowledge and participate as a competitive business amongst other players in a chain that is profitable for everyone and builds equitable markets (Trienekens, 2011). In Haiti, the majority of smallholders do not have the capacity and economic resources to take advantage of lucrative markets because they are either physically isolated and too far away to access markets because of poor road networks, high transaction costs, low crop productivity to supply high demand, and limited storage abilities that would allow them to capture a larger proportion of the value generated by their crop. Similar to other developing countries, the majority of the road networks are poor and many areas with good production are isolated and inaccessible especially in the rainy seasons (FAO, 2018). Inclusivity should also support flexible trading arrangements, establish stronger negotiation positions for small

enterprises, build skills and expertise, provide good governance, allow participation and scalability in the sense that the business model can also be replicated in other value chains pipelines. The enterprises developed under inclusive business models have been focused towards building chain-wide competitiveness, improving relationships between players with transparency along the value chain. Linking producers to markets by stimulating diverse business models in the industry as a form of partnership can pull vulnerable groups out of poverty, and ultimately improving food security of the country is needed (FAO, 2015).

Agriculture development remains one of the key strategies to reduce rural poverty and improve food security (World Bank, 2016). One way to increase agricultural production is climate smart agriculture and sustainable use of natural resources; along with sustainable intensification of agriculture where farmers can produce more output from the same plot of land however while reducing environmental stress and avoiding negative externalities; these are strategic techniques that support development of sustainable food value chains (Pretty et al., 2011). This will require farmer training in utilization of alternative cropping systems and management skills and for investment in agricultural enterprises to generate enough growth to increase farmer income (Lipper et al., 2014). Therefore, farmers should not only rely on increasing yields, but also assure that production will meet the quality standards and requirement of the market.

Investing in agricultural markets can support the introduction of new services that can help smallholder farmers participate in more formalized markets and become suppliers to a growing domestic market. Agriculture compared to other businesses, comes with significant

risks, given the multiple factors that can affect potential profits. In rainfed agriculture, production is vulnerable to weather uncertainties caused by climate change. For this reason, many efforts are needed to shift from a production first mindset to a market-based strategy. This includes market research and analysis, contract sourcing and support of local business. However, not every farmer has the same needs or has the capacity to join markets especially if costs of production are higher than profits, which is the case for the majority of peasant farmers participating in disjointed markets. That is why extension and advisory services, and business development strategies (such as CASELI- a consulting firm in Haiti providing advisory services to investment projects and transfer of business skills to farmers) are meaningful to tailor the right support to small farmers towards the appropriate marketing channels.

Riisgaard et al., (2010), suggest that in order for smallholders to upgrade to commercial markets, the target market will determine the supply chain producers need to follow. Strategically, farmers can move away from the repetitive spot market and form relationships with processors and retailers looking to source from producers directly. This route could encourage the use of contracts between producers and buyers. In contract farming, buyers supply growers with inputs such as land preparation equipment, fertilizer, seeds and technical assistance. In return, growers are required to supply the volume and quality demanded by the buyer. These sale contracts can help the farmers reduce price risks, expand production, reduce marketing costs, provide access to finance and credit, and improve crop quality. Furthermore, the growers can benefit from positive spillovers by learning market standards, technological training, and access to certification.

On the other hand, business models such as associations, cooperatives and farmers' groups have gained much attention to achieve poverty reduction and resilience in rural communities (Ferris et al., 2014). Essentially, farmers who come together by forming cooperatives, can exchange resources and establish connections that can allow them to improve their business and negotiate collectively with buyers and other service providers to achieve fairness and better prices. This collaborative effort gives the farmers leverage to negotiate and bargaining power in the market (Riisgaard et al., 2010). While promotion of local markets can bring profits to smallholders, this model can encourage marketing channels towards the export market (Lee, Gereffi, & Beauvais, 2012) (Helmsing & Vellema, 2012). Farmers may also choose to adopt private standards such as organic or fair trade certification that can foster premium pricing and penetrate global food chains (Lee et al., 2012). However, standards come with considerable investments, increase competition and high costs that may be difficult for smallholder farmers to participate, due to the stringent regulations as opposed to affluent larger farms with economies of scale who are better suited to take advantage of these approaches (Lee et al., 2012). In retrospect, creating a demand for traditional products on the export market would compete with the food security needs of the local population. Considering the lower entry barriers and less severe regulations of the domestic market, integrating smallholders into local agricultural value chains may be a better alternative especially with the rapid growth of supermarkets in large urban areas (Markelova, Meinzen-Dick, Hellin, & Dohrn, 2009).

CHAPTER 4

RESEARCH METHODOLOGY

This study combines qualitative and descriptive approaches to analyze the agricultural value chain structure in Haiti to find similar challenges amongst different commodities and identify opportunities to improve overall value chain efficiency. Much of the information in this research paper was drawn from secondary data and field visits to Haiti. Figure 1 shows the sites where research interviews were conducted in surrounding areas of Port- au -Prince, Pétion-Ville, Kenscoff, Croix des Bouquets, Bas-Boen, Thomazeau and Ganthier regions. See map for site location.

Figure 1. Map of Haiti indicating study sites. Source: Geology.com

A specific value chain was not chosen, but the focus was mostly given to subsistence commodities and traditional fresh fruits and vegetables (FFV) cultivated by smallholders, mainly

consumed and demanded in the domestic market, given the untapped opportunities for local growers in this market channel. The study also focuses on the sorghum crop, a cereal widely produced in various parts of Haiti. A combination of semi-structured face-to-face and on the phone interviews using a questionnaire were used to interact with and elicit information from a variety of key players of the agricultural sector and stakeholders of a particular agribusinesses in order to describe their role as participants and how they perceive the value chain concept from their specific industry. Moreover, focus group interview with sorghum producers and buyers allowed a better understanding of the production activity of the chain.

This study was conducted during April 2019 and field work continued during the month of June 2019. The author interviewed 15 participants and conducted a detailed analysis of the value chain for the aforementioned products. The goal was to meet with key players and agents that play a role in the agriculture value chain in Haiti. The questionnaires for data collection were tailored according to the audience because key informants had different activities, both from the private sector and from public institutions. Interviews and meetings were conducted with producers, buyers, exporters, agro-consultants, industry experts, and supermarkets. However, common questions asked in all interviews included the following themes 1) role and perception of the value chain in Haiti; 2) relationship amongst the different players and activities particularly the producer- and the reasoning behind their behavior with each other; 3) the reasons for sourcing local or importing, and level of engagement with the market as well as consumer preferences. Additionally, interviews were conducted with international organizations such as the Food and Agriculture Organization (FAO) and the International Fund for Agricultural Development (IFAD) of the United Nations to learn about the country programs on agricultural development in collaboration with the Ministry of Agriculture of Haiti. By doing so, a holistic

understanding of the experience of several actors were taken into account. Lastly, recommendations and strategies were discussed with the various stakeholders for additional comments or inputs.

CHAPTER 5

VALUE CHAIN STRUCTURE IN HAITI

The value chain represents a group of diverse stakeholders involved in different activities from production to consumption and the relationship that is formed to generate value and create market linkages (Ayele, Duncan, Larbi, & Khanh, 2012). In Haiti, food value chains are highly complex and informal involving multiple actors such as producers, collectors, exporters, processors, logistic personnel, distributors and end consumers. Many smallholder producers in Haiti do not have the concept of a formal value chain. Figure 2 demonstrates a traditional agricultural value chain mapping in Haiti, which is highly concentrated with a small number of players interacting mostly in trading and merchandising. The content of this section relies on a combination of secondary sources and the author's own fieldwork in Haiti.

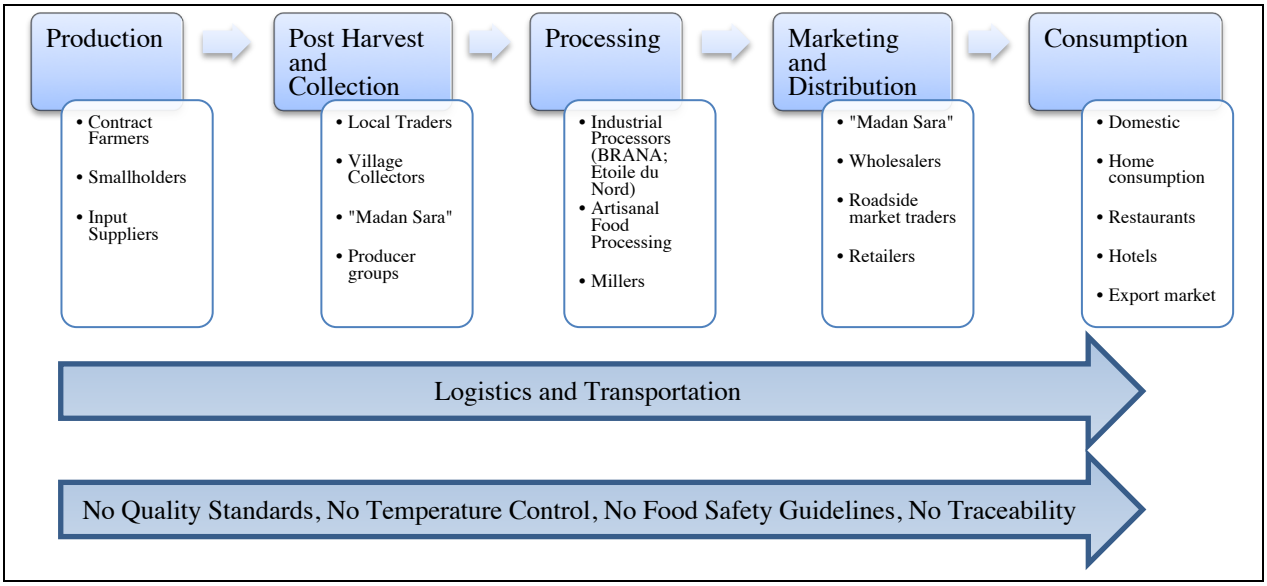

Figure 2. Mapping of a traditional agricultural value chain in Haiti. Source: (A.T. Kearney, 2016) and modified by author

Description of key value chain actors

Farmers are the first link in the agricultural value chain and tend to be the most underserved and neglected actor. These small landholder producers are amongst the poorest in the community who farm on less than one hectare of land. Issues of land tenure have made it more difficult for these farmers to fully invest in their land due to mishandling of land ownership and urbanization in rural areas that has threatened the livelihood and food security in these regions. Given the lack of organization and few resources to acquire modern techniques for produce handling and storage, farmers find themselves harvesting and selling their crop without the ability to negotiate and bargain for better prices. There are also few input suppliers in Haiti that offer services to small producers. Those services are mostly supplied by the private sector through contract, such as seeds, fertilizer and land preparation.

Traders such as the "Madan Sara or Grossistes" are market ladies throughout the country that carry the role of middlemen and marketing of produce from the farm to the main cities. They buy directly from the farmer and make their way to rural and urban markets to sell their commodity. Though there are no guidelines in place for these merchants, the food marketing depends on their participation for product distribution.

Transport and Distributors are stakeholders who offer services to producers such as packing and transportation of products to a large market gathering from one area to another. Poor handling of the products, especially vegetables and fruits, on pick-up trucks result in the produce getting bruised and decreased in quality and value.

Exporters play an intermediary position of procuring products from multiples producers and supplying the international market. The products that are intended for the export market have less intermediaries and part of a straightforward supply chain. In global food value chains,

exporters are expected to maintain food safety standards for product differentiation aiming at quality, to stand out amongst competitors. The main export commodities for Haiti are fresh mango fruit, bananas and cacao as well as vetiver grass for essential oil. Haiti is the second global producer and supplier of vetiver grass (Murdo J. MacLeod, Robert Lawless, 2019). These contracted farmers are organized in cooperatives and associations organized by processors and Producer Business Groups (PBGs) in charge of collection and marketing to packhouses for grading, sorting and export.

Processors servicing the value chain can undertake several activities depending on the commodity. It is directed towards value adding and transformation of raw materials for beverage, breweries, fermented and packaged goods. The processing industry can allow producers and firms to create different products that meet the standards required by consumers and create competitiveness in the industry (Cucagna & Goldsmith, 2018). Moreover, food processing has been a strategy to reduce food waste and create employment opportunities in rural areas. In Haiti, artisanal processors are small medium enterprises (SME's) located primarily in rural areas; they transform fruit and vegetables into jam, condiments, flour or roasted coffee. Dried fruits processing is also becoming a profitable agribusiness; however, these SMEs are having difficulty accessing capital and market research for guaranteed sales. This industry contributes a small percentage to the food processing industry in Haiti.

Consumers are participants at the last step of the value chain are known as consumers who purchase goods for their own consumption and needs. Depending on their socio-economic status, consumers with greater purchasing power, have the ability to secure produce in retail supermarkets with better quality and better presentation of diversified products, though the

presence of roadside sellers and market ladies make fruits and vegetables accessible to everyone during the production seasonality of certain traditional crops.

Food Marketing

Informal Marketing Channels

In rural areas, the food crops produced and consumed domestically are provided through informal markets by farmers from their fields and a network of traders that assure the distribution and retailing of the agricultural products to the consumer with no barriers to market entry. Products brought to traditional domestic markets are traded based on price and quality with limited quality standards or brand recognition (Lee et al., 2012). The farmer may decide to take his product to a local market or the other where the middleman comes to the village and buys the produce. The former requires the farmer to take the time to come to the market with the probability of getting a better price. The latter may require a lower price, but the transaction costs and time consumed by the farmer are lower. Due to the uncertainty of prices, many farmers are price takers and do not have the means to travel further away and participate in more lucrative markets (Makhura, 2001). In the case of Haiti, market ladies play a fundamental role in agricultural marketing and getting produce to the end consumer (Jolly C, 1998). Marketing in rural areas happens on several market days where multiple traders and farmers gather and buy large quantities of farm produce to be distributed to a secondary market and transported to larger market (Jolly C, 1998). However, the number of intermediaries and instability in these imperfect markets create high transactions costs and contribute to low market participation at the producer level (Henning & Henningsen, 2007). These transaction costs and commercialization factors

influence the decision making of growers when they have to take into account the time, logistics and transport costs, technology and additional costs associated with meeting market standards required by retailers and processors (Umberger et al., 2015). Consequently, commercialization benefits are not directly transmitted to poor farmers when those inefficiencies are impacted by wide margins and high price fluctuation from season to season; pushing farmers to sell low and buy high, when they should be selling higher for the product and paying lower prices for inputs (Chirwa & Matita, 2012). Producers pay large transportation costs; and these are not only hurting their income but when farmers raise productivity and yields, market prices often fall reducing incentives for farmers to increase agricultural productivity. Typically, in these disjointed markets there are no quality standards or traceability and there is a need to modernize in order to monitor them.

Formal Marketing Channels

Formal markets offer the opportunity for growers to integrate into modern food chains and become more competitive with commercial buyers. Poole (2000) says that marketing channels take the framework where information from consumer demand is translated from buyer to producer. To satisfy the end of the value chain's demand, market information will be more valuable through the ability to successfully develop that knowledge into what the consumers want, will be a key instrument to engage and connect production to business activities favorable to consumers. Usually, this market attribute applies to retailers and in most cases for crops destined for export channels, such as fresh mango fruit in Haiti where producers and buyers have contract arrangements and are willing to pay premium prices for sorted and graded products. Farmers are responsible to deliver a quality product, comply with food safety standards and

adhere to best practices for production. To work within this system, growers are willing to take lower prices compared to prices in informal markets, due to an agreement for longer term sourcing, access to services and volume procurement. Formal markets allow these smallholders to be part of contracts to secure provision and access markets; but also have to compete with quality and food safety regulations. With globalization and the changing dynamics of the food system, consumers are informed and demand high quality produce and food safety standards throughout the value chain, relying on appearance, taste, size, nutritional value and agricultural practices for consumer choice; hence these attributes are to be consistent along the supply chain (Dequiedt, 2018). Small scale farmers are generally not equipped with the knowledge and tools to improve harvest and handling practices; therefore, it is difficult for smallholder producers to get higher prices from seasonal crops when quality is not up to consumer demanded standards (Ajiboye & O, 2009). As a result, local retailers are likely to source agricultural products from import suppliers to guarantee quality and reduce risks and product inconsistency from local suppliers. Strategic alliances between grower associations and private sector companies provide efficiency along the chain and optimized performance. These relations could bring technology spillovers for growers to become competitive amongst suppliers, bring investment and promote national production and local economies (Zeller, 1998).

CHAPTER 6

RESULTS

This chapter highlights the key findings of this study based on surveys in study sites and secondary data collection. This section will be divided into groups of participants that have commonalities in their roles or similarities in regard to how they view and recognize respective value chains. In addition to interviews, field observations and remarks on the market place were noted.

Producers, Consultants and Industry expert outlook

- Industry experts and consultants have described the value chain and market dynamics to have no set structure and nonexistent guidelines for value chain actors to refer to. Participants specified the difficulty for farmers to gain access to seeds, water, input providers and extension assistance. Agriculture production in Haiti is not subsidized and farmers receive little to no support from the Government in case of crop or market failure. One sugarcane producer mentioned that finding labor was an issue with the aging community and logistics. At times, it would take several days for a truck to pick up the sugarcane to take to the mills which would result in loss of sucrose content and as a consequence affect their earnings.
- Additionally, an industry expert emphasized the need for proper organization and guidelines for a production calendar and scheduling through proper market analysis and forecasting to supply market demand.
- *Addressing Post Harvest Losses* - Post-harvest losses and waste is a big issue in Haiti, where farmers lose 40%-50% of their crops in the fields due to pest and disease as well as

inadequate handling and infrastructure (FAO, 2017). Also, along the supply chain, inadequate transportation methods and handling throughout distribution channels increase the likelihood of damaged produce affecting its value and quality. Product losses can take the form of quantity in terms of volume and weight, plus quality such as physical damage and looks. Moreover, fresh produce that is intended for the export market is often not marketed because it does not meet quality standards with infrastructure challenges such as lack of temperature-controlled packing house facilities adding to the problem. In developing countries, post-harvest loss result largely from biological spoilage due to absence of storage and inadequate conditioning of perishable foods (Hodges, Buzby, & Bennett, 2011) because the use of cold chain technology is poor (World Bank, 2018). Cold chain systems enable a controlled environment when the produce travels at a specific temperature to stabilize the rate of ripeness, quality, and longer shelf life throughout distribution (Houghton & Portougal, 1997). To improve post-harvest management, processing facilities located near harvesting sites that farmers can access in order to reduce on loss and extend onto future market predictions (Gandhi, (1999). Also, the firm CASELI indicated that it would be useful if producers could improve their market competitiveness by making new products from their raw materials using preservation technologies that add value and provide longer shelf life.

- *Distribution system: a contributing factor to post harvest loss* - Distribution is performed by local traders, roadside sellers and small-scale wholesalers that market the product throughout the domestic market. Transportation of produce is through pickup trucks with poor handling. Products are transported and sold on the local market in polypropylene bags (typically used for rice and other cereals), baskets or single loose pouches. The poor

type of packaging of the products increases the loss occurred during transportation due to physical shock that the produce is exposed to in the vehicle and handling at the market, plus the exposure to sun at the roadside street markets. The lack of facilities to reinforce proper presentation and handling of produce at the market means there is no control of hygiene, sanitary measures or risks of contamination. The traders that were interviewed reiterated that there is no system in place to regulate the sale of food crops at the market and consumers only have leverage to bargain for better quality when there is abundance of supply in the market.

Supermarkets and Consumer outlook:

The findings summarized below were collected from four supermarket managers, a restaurant owner and from consumer observation. The participants were interviewed to gain their insights on sourcing local produce, the challenges faced procuring from smallholder farmers, how important is freshness and quality, packaging and consumer preferences.

- Retailers commonly stated that buying local fresh fruits and vegetables is a priority except for temperate products such as table grapes, pears and apples, which are best imported. The fresh local produce is collected by traders who source them from different suppliers within 15 kilometers away and seasonal horticulture crops from two greenhouse operations. Transport used are small trucks that local merchants use to deliver and market the products to supermarkets and are inspected for any quality defect. The process of cleaning and washing is done by the warehouse of the supermarket who re-package and prepare produce with labels and bar codes. While managers assure that good

manufacturing practices and sanitation are followed in the establishment, there is rarely any third-party inspector or certification body reinforcing food safety standards.

- Poor infrastructure is an issue for supermarkets when local produce delivery cannot be guaranteed when heavy rain or floods in an area affects transportation. This problem causes shortages on supermarket shelves and use of imported products are needed to buffer inventory uncertainties. For the retailer, if there were a robust and reliable supply chain, supermarkets would not have to worry about getting products the next morning.
- Retailers were also asked about the possibility of a formal and reliable distribution center to deliver produce. Two mentioned they would be interested in regulated distribution that would ensure sourcing and vetting of quality. One retailer was indifferent to having a formal distributor making deliveries to supermarkets. The fourth one did not think it would be beneficial, because formal distributors would most likely source from the same merchants that come directly to the supermarket. Moreover, the fourth retailer also emphasized the close relationship the supermarket has with informal local traders and would prefer to keep that supply chain instead of paying a higher price. Although, the retailers mentioned that having a formal distributor handling the produce from the field to the supermarket would ensure quality and food safety traceability, retailers would have to pay a higher price if they source from third party suppliers that would handle the vetting of the quality and distribution to them.
- Supermarkets are optimistic about the domestic agricultural sector and stated that consumers look for local products first and purchase imported products as substitutes, if the former are not available. Consumers are mostly domestic with a small percentage of expats from international organizations. Domestic consumers prefer local produce

because it has better taste and color than imported products. Local consumers also want to support national production and contribute to the growth of the sector.

CASELI- Papyrus for Sorghum Value Chain

Papyrus is a local company that offers advisory services, project management and agricultural value chain development in Haiti. In this similar framework, CASELI provides workshops on financial training and capacity building as well as assisting farmers and buyers through value chain mapping.

- The SMASH (Smallholder Alliance for Sorghum in Haiti) program is led by Heineken through BRANA (Brasserie Nationale), a multinational beverage and brewery company, producing malt concentrate from sorghum grains. The goal of this project is to source sustainably and strategically while building capacity of stakeholders across the value chain. The beverage company guarantees smallholder producers a market for their sorghum crop and promises to buy a certain volume of raw material per year. Given that the market already exists, they are able to move backwards across the value chain, and take control of planting techniques, post-harvest phase and processing of the products to maintain quality and add value. Most of the challenges encountered in the development of the project are logistical issues or pest infestation, especially of aphids, that have caused severe crop loss and damage in recent years. The company was also asked about their best strategies have been to engage and organize farmers who are mainly smallholders and dispersed. One of the main challenges were to aggregate and procure small batches of sorghum from each producer. The SMASH program was able to group farmers into zone blocks in clustered growing areas, offer refinanced services, such as mechanized land preparation and on the ground technicians. This strategy has allowed the

project and the farmers to improve agronomic practices, reduce transaction costs and aim towards a more reliable logistics network.

CHAPTER 7

DISCUSSION

As the surveys show, the key concerns from the value chain actors were concerns for the lack of infrastructure, supply chains and market structure. The overall relationships amongst value chain actors were found to be weak. Farmers had no established connections with consumers and interacted mainly on the local spot or in village markets. This is due to the lack of leadership, lack of trust amongst competitors and weak information. Traders and buyers were found to have interactions amongst with farmers, but affiliation was based mostly on marketing of products. Processors who sourced directly from farmers were found to have closer links, given their contractual agreements. Accordingly, we can characterize relationships among value chain actors in three groups: spot markets directly linked to roadside/ village markets; consistent middlemen network; and vertical integration towards an existing market. More detailed attention should be given to market ladies who trade, buy and distribute produce in harsh environments and how can institutions can improve their working conditions and reduce risks during transportation.

Traditional food crops are the most affected by inefficient value chain and unstructured marketing channels. Moreover, fresh fruits and vegetables are perishable items, which require a specific approach from harvest, handling, and packhouse facilities and are vulnerable to production practices and poor transportation methods. This traditional agricultural value chain structure in Haiti, will need to be renovated to make room for a modern system with strict requirements on product quantity, availability and quality. An analysis of the strengths, weaknesses, opportunities and threats (SWOT) is summarized in the table 1 below.

The value chain SWOT analysis provides an overview of key interpretations of the agribusiness sector and factors that could influence endeavors in the development of markets and food value chains. These categories can be interpreted as internal factors such as strengths and weaknesses that may entail in-house facilitation. Similarly, opportunities and threats are addressed as external factors that may impact the agribusiness sector and foster future investment. A few conclusions are highlighted below:

Table 1. SWOT Analysis of the agribusiness sector

STRENGHT	**WEAKNESSES**
Existing domestic market Diverse and nutrient dense crops Favorable microclimates Competitive advantage and prospects for organic products	Poor Infrastructure Fragmented Market Lack of contractual agreements Lack of processing facilities Poor collaboration amongst actors
OPPORTUNITIES	**THREATS**
Growing domestic demand Regional markets Tourism industry	Strong import competition Climate change Lack of governance Lack of food safety regulation

- Instead of applying much effort towards the weaknesses, Government institutions can balance the emphasis on the strengths already available. There is an existing health-conscious demographic which is emerging in a progressive way demanding nutritious products that should be considered as a strength to promote diversified crops and a healthy consumption. Furthermore, there are favorable microclimates that allow various crops to be grown year-round and support the diversity in diets as well as safely grown

crops. However, in spite of the country's ability to produce, the root of the problem may not be of production but instead a distribution problem, such as poor infrastructure including lack of roads, transport, processing facilities to link producers with agroprocessors. Furthermore, farmers are skeptical to participate in a highly fragmented market that leads to high fluctuation in prices and low profit margins. There may be a need to implement contract agreements that will incentivize input suppliers and allow farmers to interact in a more stable market economy.

- Considering the diversity in crops, there are opportunities to leverage unique varieties, such as the Francis mango variety native to Haiti, that has gained a significant market demand in the US. Regional markets and the hospitality management industry with respect to the tourism sector will be elaborated later following recommendations. In-depth market research is crucial to establish value chain development towards new sources of investments.
- In this context, strong competition from imported agricultural food products need to be given a closer look in order to protect and support national production and overall economic development. Supply of cheaper foods from imports are pushing producers out of the agricultural sector who are unable to compete with low returns and high costs of production. This pattern can also be a threat to food security if producing food internally is diminishing. Furthermore, agri-food governance becomes a critical aspect to bring coordination and establish clear operations that will specify which actor will carry out which activity along the value chain. Threats that are dealt with strategically can become opportunities, such as implementing food safety regulatory systems that meet international standard and reach global markets.

Recommendations

Focus on opportunities in the current market

- Farmers need better markets and domestic consumers have the willingness to buy local products. Furthermore, the urban population represent a growing market opportunity, because they are seeking better quality and diversified food with an increase of purchasing power and higher incomes. Therefore, priority could be given to national production and create fair competition from imported products. Additionally, the government could encourage policies and create avenues for farmers to become food suppliers to schools, hospitals and other public institutions. However, the former requires the intervention of policy makers for this category of value chain development.
- The tourism sector is a significant contributor to the country's economy and offers a market to farmers to increase sale of their products. This sector offers hotel and restaurant businesses that are consistently purchasing fresh produce to satisfy the domestic and international clientele. This can be used to stimulate a strategic alliance between smallholders and tourism endeavors to accelerate investment in the agriculture sector and so increase farmer incomes. Subsequently, this relation will bring processors and distributors on board to create better linkages between farmers and consumers and share common values across the chain.
- Looking beyond the domestic market, there are opportunities for Haiti to export products to neighboring countries. An emphasis on regional markets is given since production standards are similar but not as strict as the US market. Haiti's agricultural production

can be introduced to buyers in the Caribbean and South America given the similarities in the crops that are produced and consumed. Countries have expressed a particular interest in importing agricultural goods from Haiti because of shortage of food, and the inability to produce in their country to feed the growing population. An example is Martinique, which is interested in importing FFV from Haiti because the majority of Haitian products are biologically grown (Fresh Plaza, 2018). Furthermore, there are market reports and observations from the IADB and CFI concerning merchandise informally traded at the border between Haiti and the Dominican Republic (IADB, 2006). This informal market amounts to an estimated USD 375 million unaccounted revenue of exports that bypass Haiti and the DR customs, that could contribute to the Haiti's GDP (CFI, 2016).

Recommendations to Improve Value Chain Performance

- Haiti must improve field and natural resource management practices to increase production to allow consistent supply of product to the market and a continuous flow of products in the value chain. This can be achieved by implementing agricultural extension services to strengthen farmer production activities. In addition, farmers require increased access to skills that lead to adoption of modern technology for better and more productive farming and get business exposure to markets critical to smallholders' success. Efforts to organize farmers into cooperatives or farmer producer groups (FPGs) that can help them secure higher prices through formal market connections, adopt better harvest and post-harvest practices, and access to finance are needed. More importantly, a production schedule should be encouraged to lead value chain by market versus production. A

favorable business environment is needed for companies to invest in local production and contribute to poor household incomes.

- Improve distribution through road rehabilitation is key to service and provide farmers proximity of markets but cannot deliver due to lack of transportation infrastructure. Building infrastructure can facilitate the connections between rural areas and urban markets. Physical structures such as warehouse receipts, terminal markets, and packing houses located at close proximity to production sites could be center aggregation points for distribution channels.
- The farming community is aging, and the youth is moving away from agriculture. There is a stigma of poverty and drudgery attached to agriculture of developing countries, which makes it difficult for youth to embrace farming activities. The change of image and investments in agribusiness is a way to start rebranding the agriculture sector. It is important to develop policies that create new economic opportunities in agriculture and encourage future generations to participate in a field that will soon have to feed billions of people.

CHAPTER 8

CONCLUSION

This paper covered an analysis of the agricultural value chain in Haiti and market access for smallholders through field observation and secondary data collection. Particular attention was given to the disconnect between smallholder farmers and market opportunities in order to identify factors influencing inefficiencies encountered in the value chain. We found that inclusivity amongst stakeholders is recommended so that different players can understand each other's need to ensure a robust supply chain for producers, agribusiness and consumers. The development of the right market-driven approach to integrate smallholders in the agricultural value chain will involve, marketing structures that can provide services related to market information and product quality standards, appropriate transport systems that can help reduce transaction costs for smallholders and local agroenterprises and the transfer of skills for growers to satisfy market demands. Accordingly, investments in appropriate infrastructure will need to be established in order to improve efficiency of agri-food value chains and develop distribution channels to expand the market place. More importantly, the adoption of improved agronomic techniques, efficient use of natural resources, product quality and agri-food safety will be crucial for smallholder farmers to participate in high value food chains that would support the development of rural farming, alleviate poverty and increase food security. Until the barriers to an efficient value chain are addressed, the performance of the agricultural value chain will remain fragmented and continue to delay future development of market opportunities for smallholders and agribusiness.

REFERENCES

Ajiboye, A., & O, A. (2009). The impact of transportation on agricultural production in a developing country: A case of kolanut production in Nigeria. In *International Journal of Agricultural Economics and Rural Development*.

A.T. Kearney. (2016). Africa's Agricultural Transformation Opportunity. Retrieved August 9, 2019, from www.atkearney.co.jp/documents/10192/7167515/Africas+Agricultural+Transformation+Opportunity.pdf/8481675a-4942-42cf-a212-4135b85a16ac

Ayele, S., Duncan, A., Larbi, A., & Khanh, T. T. (2012). Enhancing innovation in livestock value chains through networks: Lessons from fodder innovation case studies in developing countries. *Science and Public Policy*, *39*(3), 333–346. https://doi.org/10.1093/scipol/scs022

Babu, S. (2019, May 28). To transform the global food system and feed the world sustainably, start at the local level | IFPRI. Retrieved June 27, 2019, from https://www.ifpri.org/blog/transform-global-food-system-and-feed-world-sustainably-start-local-level?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+BlogWorldHunger+%28IFPRI+Blog%29

CFI. (2015). Why Invest in Agriculture and Agribusiness in Haiti? Retrieved June 25, 2019, from Agribusiness website: http://cfihaiti.com/index.php/investment-sectors/agribusiness

CFI. (2016). *Trade Flows Between Haiti and the Dominican Republic*. 82.

Chagomoka, T., Afari-Sefa, V., & Pitoro, R. (2014). *Value Chain Analysis of Traditional Vegetables from Malawi and Mozambique*. (4), 28.

Chirwa, E. W., & Matita, M. (2012). *From Subsistence to Smallholder Commercial Farming in Malawi: A Case of NASFAM Commercialisation Initiatives*. 21.

Chisenga, J., Entsua-Mensah, C., & Sam, J. (2007). *Impact of Globalization on the Information Needs of Farmers in Ghana: A Case Study of Small-Scale Poultry Farmers*. 12.

Cucagna, M. E., & Goldsmith, P. D. (2018). Value adding in the agri-food value chain. *International Food and Agribusiness Management Review*, *21*(3), 293–316. https://doi.org/10.22434/IFAMR2017.0051

Dequiedt, V. (n.d.). *Product quality in developing countries agrifood supply chains: A survey of theory*. 19.

Diao, X., & Hazell, P. (2004). Exploring Market Opportunities for African Smallholders. *International Food Policy Research Institute*, 6.

Donatti, C. I., Harvey, C. A., Martinez-Rodriguez, M. R., Vignola, R., & Rodriguez, C. M. (2019). Vulnerability of smallholder farmers to climate change in Central America and Mexico: Current knowledge and research gaps. *Climate and Development*, *11*(3), 264–286. https://doi.org/10.1080/17565529.2018.1442796

FAO. (2017). Post-harvest losses: Prevention is the cure | FAO. Retrieved May 9, 2019, from Food and Agriculture Organization of the United Nations website: http://www.fao.org/cfs/home/blog/blog-articles/article/en/c/1052829/

FAO. (2018). Sustainable Food Value Chains Knowledge Platform. Retrieved December 22, 2018, from http://www.fao.org/sustainable-food-value-chains/home/en/

FAO and CDB. (2019). *Study on the State of Agriculture in the Caribbean*. Retrieved from FAO website: http://www.fao.org/3/ca4726en/CA4726EN.pdf

Ferris, S., Robbins, P., Best, R., Seville, D., Buxton, A., Shriver, J., & Wei, E. (2014). *Linking Smallholder Farmers to Markets and the Implications for Extension and Advisory Services*. 52.

Fresh Plaza. (2018). Haitian organic fruit and vegetables in the Martinique market? Retrieved July 29, 2019, from Haitian organic fruit and vegetables in the Martinique market? website: www.freshplaza.com/article/2192926/haitian-organic-fruit-and-vegetables-in-the-martinique-market/

Gandhi, V. (1999). Agroindustry for rural and small farmer development: Issues and lessons from India. *The International Food and Agribusiness Management Review*, *2*(3–4), 331–344. https://doi.org/10.1016/S1096-7508(01)00036-2

Godfrey, S. S., Ramsay, G. C., Behrendt, K., Wynn, P. C., Nordblom, T. L., & Aslam, N. (2019). Analysis of agribusiness value chains servicing small-holder dairy farming communities in Punjab, Pakistan: Three case studies. *International Food and Agribusiness Management Review*, *22*(1), 119–136. https://doi.org/10.22434/IFAMR2017.0122

Gomez, M. I., Barrett, C. B., Buck, L. E., De Groote, H., Ferris, S., Gao, H. O., … Yang, R. Y. (2011). Research Principles for Developing Country Food Value Chains. *Science*, *332*(6034), 1154–1155. https://doi.org/10.1126/science.1202543

Helmsing, A. H. J. (Bert), & Vellema, S. (2012). *Value Chains, Social Inclusion and Economic Development: Contrasting Theories and Realities*. Routledge.

Henning, C. H. C. A., & Henningsen, A. (2007). Modeling Farm Households' Price Responses in the Presence of Transaction Costs and Heterogeneity in Labor Markets. *American Journal of Agricultural Economics*, *89*(3), 665–681. https://doi.org/10.1111/j.1467-8276.2007.00980.x

Hodges, R. J., Buzby, J. C., & Bennett, B. (2011). Postharvest losses and waste in developed and less developed countries: Opportunities to improve resource use. *The Journal of Agricultural Science*, *149*(S1), 37–45. https://doi.org/10.1017/S0021859610000936

Houghton, E., & Portougal, V. (1997). Reengineering the production planning process in the food industry. *International Journal of Production Economics*, *50*(2–3), 105–116. https://doi.org/10.1016/S0925-5273(97)00036-4

Humphrey J. (2006). Global Value Chains in the Agrifood Sector. Retrieved May 8, 2019, from https://www.mendeley.com/library/

Hyppolite L, Teixeira A, Roka F, et al. (2013). *Characterization of the Haitian Mango Industry*. 9.

IADB. (2006). *All Documents*. Retrieved from https://www.mendeley.com/library/

IDB. (2014). *PRIVATE SECTOR ASSESSMENT OF HAITI*. Retrieved from http://www.fomin.org./

Jolly C. (1998). Market Structure of Food Markets in Haiti. Retrieved May 8, 2019, from https://www.mendeley.com/library/

Jolly, C. M., & Shannon, D. A. (2005). *Population pressure, land tenure, deforestation, and farming systems in Haiti: The case of Foret des Pins Reserve*. 213.

Kilian, B., Pratt, L., Jones, C., & Villalobos, A. (2004). *Can the Private Sector be Competitive and Contribute to Development through Sustainable Agricultural Business? A Case Study of Coffee in Latin America*. *7*(3), 25.

Kissoly, L., Faße, A., & Grote, U. (2017). The integration of smallholders in agricultural value chain activities and food security: Evidence from rural Tanzania. *Food Security*, *9*(6), 1219–1235. https://doi.org/10.1007/s12571-016-0642-2

Lee, J., Gereffi, G., & Beauvais, J. (2012). Global value chains and agrifood standards: Challenges and possibilities for smallholders in developing countries. *Proceedings of the National Academy of Sciences*, *109*(31), 12326–12331. https://doi.org/10.1073/pnas.0913714108

Lipper, L., Thornton, P., Campbell, B. M., Baedeker, T., Braimoh, A., Bwalya, M., … Torquebiau, E. F. (2014). Climate-smart agriculture for food security. *Nature Climate Change*, *4*(12), 1068–1072. https://doi.org/10.1038/nclimate2437

Makhura, M. T. (2001). *OVERCOMING TRANSACTION COSTS BARRIERS TO MARKET PARTICIPATION OF SMALLHOLDER FARMERS IN THE NORTHERN PROVINCE OF SOUTH AFRICA*. 207.

Markelova, H., Meinzen-Dick, R., Hellin, J., & Dohrn, S. (2009). Collective action for smallholder market access. *Food Policy*, *34*(1), 1–7. https://doi.org/10.1016/j.foodpol.2008.10.001

MARNDR. (2013). *FILIÈRE DES CULTURES MARAICHÈRES ET OPPORTUNITÉS POUR UN CRÉDIT SÉCURISÉ- Ministère de l'Agriculture*. Ministere de l'Agriculture des Ressources Naturelles et du Developpement Rural.

Marsden, T., Banks, J., & Bristow, G. (2000). Food Supply Chain Approaches: Exploring their Role in Rural Development. *Sociologia Ruralis*, *40*(4), 424–438. https://doi.org/10.1111/1467-9523.00158

Mbaka, J. N., Mwangi, M., & Mwangi, M. N. (2008). Banana Farming as a Business: The Role of Tissue Cultured Planting Materials in Kenya. *Journal of Applied Biosciences*, *9*, 8.

Mcclintock, N. C. (2003). *AGROFORESTRY AND SUSTAINABLE RESOURCE CONSERVATION IN HAITI: A CASE STUDY*. 11.

Murdo J. MacLeod, Robert Lawless. (2019). Haiti—Agriculture, forestry, and fishing. Retrieved June 29, 2019, from Encyclopedia Britannica website: https://www.britannica.com/place/Haiti

Poole, N. D. (2000). Production and Marketing Strategies of Spanish Citrus Farmers. *Journal of Agricultural Economics*, *51*(2), 210–223. https://doi.org/10.1111/j.1477-9552.2000.tb01224.x

Pressoir G, Gresh F, Lamure F, Lançon F. (2016). Une étude exhaustive et stratégique du secteur agricole/rural haïtien et des investissements publics requis pour son développement. Retrieved July 2, 2019, from https://agritrop.cirad.fr/580386/1/ID580386.pdf

Pretty, J., Toulmin, C., & Williams, S. (2011). Sustainable intensification in African agriculture. *International Journal of Agricultural Sustainability*, *9*(1), 5–24. https://doi.org/10.3763/ijas.2010.0583

Riisgaard, L., Bolwig, S., Ponte, S., Toit, A. D., Halberg, N., & Matose, F. (2010). Integrating Poverty and Environmental Concerns into Value-Chain Analysis: A Strategic Framework and Practical Guide. *Development Policy Review*, *28*(2), 195–216. https://doi.org/10.1111/j.1467-7679.2010.00481.x

Sebrell W et al. (1959). *Appraisal of Nutrition in Haiti*. Retrieved from http://www.ajcn.org/

Singh, B., & Cohen, M. (2014). Climate Change Resilience: The case of Haiti. *Oxfam Research Report*, 36.

Smucker, G. R., Fleurantin, G., Mcgahuey, M., & Swartley, B. (2005). *AGRICULTURE IN A FRAGILE ENVIRONMENT: MARKET INCENTIVES FOR NATURAL RESOURCE MANAGEMENT IN HAITI*.

The World Bank. (2017). *The World Bank Resilient Productive Landscapes in Haiti (P162908)*. Retrieved from http://documents.worldbank.org/curated/en/530031490893777775/pdf/ITM00184-P162908-03-30-2017-1490893775479.pdf

Trienekens, J. H. (2011). Agricultural Value Chains in Developing Countries A Framework for Analysis. *International Food and Agribusiness Management Review*, *14*(2), 32.

Umberger, W. J., Reardon, T., Stringer, & Mueller Loose, S. (2015). Market-Channel Choices of Indonesian Potato Farmers: A Best–Worst Scaling Experiment. *Bulletin of Indonesian Economic Studies*, *51*(3), 461–477. https://doi.org/10.1080/00074918.2015.1108389

UN. (2017, June 21). World population projected to reach 9.8 billion in 2050, and 11.2 billion in 2100. Retrieved May 9, 2019, from UN DESA | United Nations Department of Economic and Social Affairs website: https://www.un.org/development/desa/en/news/population/world-population-prospects-2017.html

USAID. (2017). All Documents. Retrieved August 4, 2019, from AGRICULTURE & FOOD SECURITY FACT SHEET website: https://www.usaid.gov/sites/default/files/documents/1862/FINAL_Food_Security_March_2017.pdf

van Asten, P. J. A., Wairegi, L. W. I., Mukasa, D., & Uringi, N. O. (2011). Agronomic and economic benefits of coffee–banana intercropping in Uganda's smallholder farming systems. *Agricultural Systems*, *104*(4), 326–334. https://doi.org/10.1016/j.agsy.2010.12.004

Whitbread, A. M., Robertson, M. J., Carberry, P. S., & Dimes, J. P. (2010). How farming systems simulation can aid the development of more sustainable smallholder farming systems in southern Africa. *European Journal of Agronomy*, *32*(1), 51–58. https://doi.org/10.1016/j.eja.2009.05.004

World Bank. (2015). *All Documents*. Retrieved from documents.worldbank.org/curated/en/319651467986293030/pdf/97341-SCD-P150705-IDA-SecM2015-0130-IFC-SecM2015-0071-MIGA-SecM2015-0046-Box391466B-OUO-9.pdf

World Bank. (2016). Agriculture Development. Retrieved March 25, 2019, from International Development Association—World Bank website: http://ida.worldbank.org/results/agriculture

World Bank. (2018). Is Post-Harvest Loss Significant in Sub-Saharan Africa? [Text/HTML]. Retrieved May 9, 2019, from World Bank website: http://www.worldbank.org/en/programs/africa-myths-and-facts/publication/is-post-harvest-loss-significant-in-sub-saharan-africa

World Bank. (2019). The World Bank in Haiti [Text/HTML]. Retrieved July 9, 2019, from World Bank website: https://www.worldbank.org/en/country/haiti/overview

Zeller, M. (1998). Market access by smallholder farmers in Malawi: Implications for technology adoption, agricultural productivity and crop income. *Agricultural Economics*, *19*(1–2), 219–229. https://doi.org/10.1016/S0169-5150(98)00027-9