



**CONNECTING TO THE WORLD THROUGH REGIONAL VALUE CHAINS:
Partnership Opportunities in Coconut Value Chain
for the Small Caribbean Economies**



June 2016



This report was prepared on behalf of the International Trade Center. It draws on primary information from field interviews in the Dominican Republic, Jamaica, and Guyana during July-August 2015 and phone interviews with stakeholders in Belize, Suriname, Saint Lucia, Saint Vincent and the Grenadines, and Trinidad and Tobago during September-November 2015. The aftermath of Tropical Storm Erika in Dominica in August 2015 did not permit primary research in the country. Errors of fact or interpretation remain the exclusive responsibility of the author. The opinions expressed in this report are not endorsed by the International Trade Center or the interviewees.

Acknowledgements

The author would like to thank all of the interviewees, who gave generously of their time and expertise. The author would also like to convey thanks and appreciation to the International Trade Center and its regional partner the Caribbean Agricultural Research & Development Institute with respect to the arrangement and organization of field research. In particular gratitude is due to Hernan Manson and Bree Romuld for their tremendous support to the field research and insightful comments on earlier drafts.

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Acronyms

AHFS	Agricultural Health and Food Safety
ADM	Archer Daniels Midland
APCC	Asian and Pacific Coconut Community
CAHFSA	Caribbean Agricultural Health and Food Safety Agency
CARDI	Caribbean Agricultural Research & Development Institute
CARICOM	Caribbean Community
COGENT	Coconut Genetic Resources Network
CGA	Coconut Grower Associations
CIB	Coconut Industry Board
DCP	Dominica Coconut Products Ltd
JAD	Dominican Agribusiness Board (<i>Junta Agroempresarial Dominicana Inc.</i>)
FDA	Food and Drug Administration
FSMA	Food Safety Modernization Act
FOB	Free on Board
FTE	Full-time equivalent
GVC	Global Value Chain
GDP	Gross Domestic Product
GMC	Guyana Marketing Corporation
GVC	Global Value Chain
HACCP	Hazard Analysis Critical Control Point
IICA	Inter-American Institute for Cooperation on Agriculture
LSCI	Liner Shipping Connectivity Index
MT	Metric Tons
NAREI	National Agricultural Research & Extension Institute
NCBJ	National Certification Body of Jamaica
PEPA	Pomeroon Export Producer's Association
IPPED	Institute for Private Enterprise Development
PPPs	Public-Private Partnerships
PPP	Purchasing Power Parity
RPM	Red Palm Mite
RRD	Red Ring Disease
RBD	Refined, Bleached and De-odorized
RVC	Regional Value Chain
R&D	Research and Development
SPS	Sanitary and Phytosanitary
SBDT	Small Business Development Trust
TEU	Twenty-Foot Equivalent Unit
UNCTAD	United Nations Conference on Trade and Development
VCO	Virgin Coconut Oil

Summary Findings and Recommendations

The coconut global value chain (GVC) is at a critical juncture, characterized by a rapidly growing demand in global markets and a stagnant supply base in danger of collapse in origin countries. Market demand is rising for traditional and non-traditional coconut products across the three ‘chain strands’: coconuts-food chain, coconuts-‘sports drink’ chain, and coconuts-chemicals chain (Figure 2). In the coconuts-chemical chain, the traditional export product is *coconut oil* used as a feedstock in manufacturing oleochemicals (see pp. 12-13 for details). Consumer preference for ‘naturalness’ in personal care and cosmetic markets has expanded the demand for oleochemicals, which account for nearly 45%-50% of coconut oil consumption worldwide (BCC Research, 2015). In the coconuts-‘sports drink’ chain, *coconut water* has remarkably grown to an estimated US\$1.36 billion market in 2014 and is projected to grow at more than 25% per year over 2015-2019, reaching approximately \$4 billion in 2019 (Technavio, 2015b). Since the early 2000s, breakthroughs in processing technology and consumer awareness about the health benefits of coconut water have remarkably expanded markets beyond the tropics. Leading global brand manufacturers such as the Coca Cola Co., Pepsi Co. and Red Bull GmbH, as well as niche players such as Vita Coco have driven product and market development through their investment in coconut water products and brands.

Growth in the ‘coconut-food’ chain is also driven by the non-traditional products. ‘Alternative dairy food and beverage’ markets in the U.S. has grown 25-30% per year during 2009-2014, with *coconut milk* market reaching US\$193 million in 2014 (Frost & Sullivan, 2015). This market segment is projected to grow 18% per year during 2014-2021 (Frost & Sullivan, 2015). Similarly, launched in the early 2000s, exports of *virgin coconut oil* (VCO) from the Southeast Asian and Pacific countries, the main coconut growing region worldwide, have grown manifold, reaching 7,300 tons in 2012 (APCC, 2015b). Although the Refined, Bleached and De-odorized (RBD) coconut oil, the traditional product in the ‘coconut-food’ chain, has rebuilt its healthy profile in the edible oil markets, it has never recovered from the market collapse of 1970s-80s. It has lost sizeable market share to the other major competitors in the global vegetable oil market. Its global share has declined from nearly 12% in 1960 to just below 3% in 2010 (APCC, 2015b; Frost & Sullivan, 2011a).

Besides the three kernel-based chains, coconut by-products, i.e. *coconut shells and husks*, have also found niche markets in the activated carbon and coconut coir industries. *Coconut shell* supplied approximately 19% of the feedstock in production of activated carbon, with an estimated global market value of US\$2.35 billion in 2014, and a projected market of US\$3.92 billion by 2019 (Technavio, 2015a). Coir, extracted from the *coconut husk*, has also become a widely used input in geotextile, horticulture, and recently as a natural fiber in composite applications. Husks are, however, still largely wasted and has marginally been processed into commercial products primarily in India and Sri Lanka (APCC, 2015b). From the 5-6 million tons global supply, only 10-15% of the husk volume enters international commercial markets (EMIS Intelligence, 2011).

Coconut value chains in the Caribbean region have mirrored the positive global market trends. Since 2008, regional trade of coconuts and coconut products has grown by approximately 230%, reaching US\$8.6 million in 2014 (UNComtrade, 2015). The trend starkly contrasts a general decline of intra-

regional trade for the other products over the period (Figure 10). An emerging regional value chain (RVC) -- fragmented production networks involving vertically-coordinated trade between the Caribbean countries --has driven regional and global trade expansion for coconuts. Two production networks, with the regional lead firms geographically located in Dominican Republic and Trinidad and Tobago, and integrating Guyana as the regional supply 'basket' of raw materials, have grown since 2008. The production network coordinated by processors in Dominican Republic produces desiccated coconuts, coconut milk and cream for export to the U.S. The other production network, coordinated by the leading regional RBD coconut oil processor, Trinidad Coconut Grower Associations Ltd (CGA), has integrated many of the Caribbean countries, including: Guyana as an upstream supplier of raw materials, Trinidad as the refining and packaging segment, St. Lucia and Jamaica as the major downstream consumer markets.

Whereas demand at the global and regional levels, propelled by corporate strategies and the rising health and wellness trends in consumer markets, is set to steadily grow over the medium- to long-terms, restricted supply is the critical constraining barrier to industry growth. Following the decline of 'copra oil' oil industry in the 1980s, little incentive was there for value chain actors to invest in coconut plantations until the market resurgence in the early 2000s. A resurgent industry now has to struggle with declining raw material supplies due to stagnant coconut supplies from aging and unproductive plantations. More concerning to the industry is the inevitable slow replanting rate due to limited supply of seedlings.

Investment to reverse the sluggish supply is desperately needed worldwide. Regional collaboration is paramount for the Caribbean countries where the limited resources for research and development (R&D) and the inefficient maritime connectivity prohibitively constrain productive capacity and market access. In 2013, the nine Caribbean countries¹ covered by this study only produced 493 million coconuts, representing less than one percent of the estimated 62 billion coconuts produced worldwide (FAOSTAT, 2015). In comparison, Southeast Asian countries accounted for 83% of the global production, dominated by Indonesia (29%), the Philippines (25%) and India (19%) (FAOSTAT, 2015). Regardless of the size of producing countries, the structure of coconut farming is currently beset with poor organization, typically a smallholder activity concentrated in areas deprived of financial and technological resources. Only a more concerted intervention by the public-private stakeholders can feasibly divert the industry's current course, set head-on towards a supply chain crash.

To engender consensus and drive the needed 'systemic' change, international agencies, or external facilitators, should engage in 'multi-scalar' interventions relevant to the 'multi-level' context of coconut GVC at the national, regional, and global levels. The 'multi-level perspective' helps to identify the relevant intervention spaces for the public and private stakeholders as well as the 'leverage points' or opportunities for 'unlocking' systemic change (Figure 1). Although change in markets is difficult to design and manage, it is needed to realize external economies offered by the small Caribbean countries and to strengthen industry competitiveness. And, it is most likely to arise when 'niche' intervention spaces are

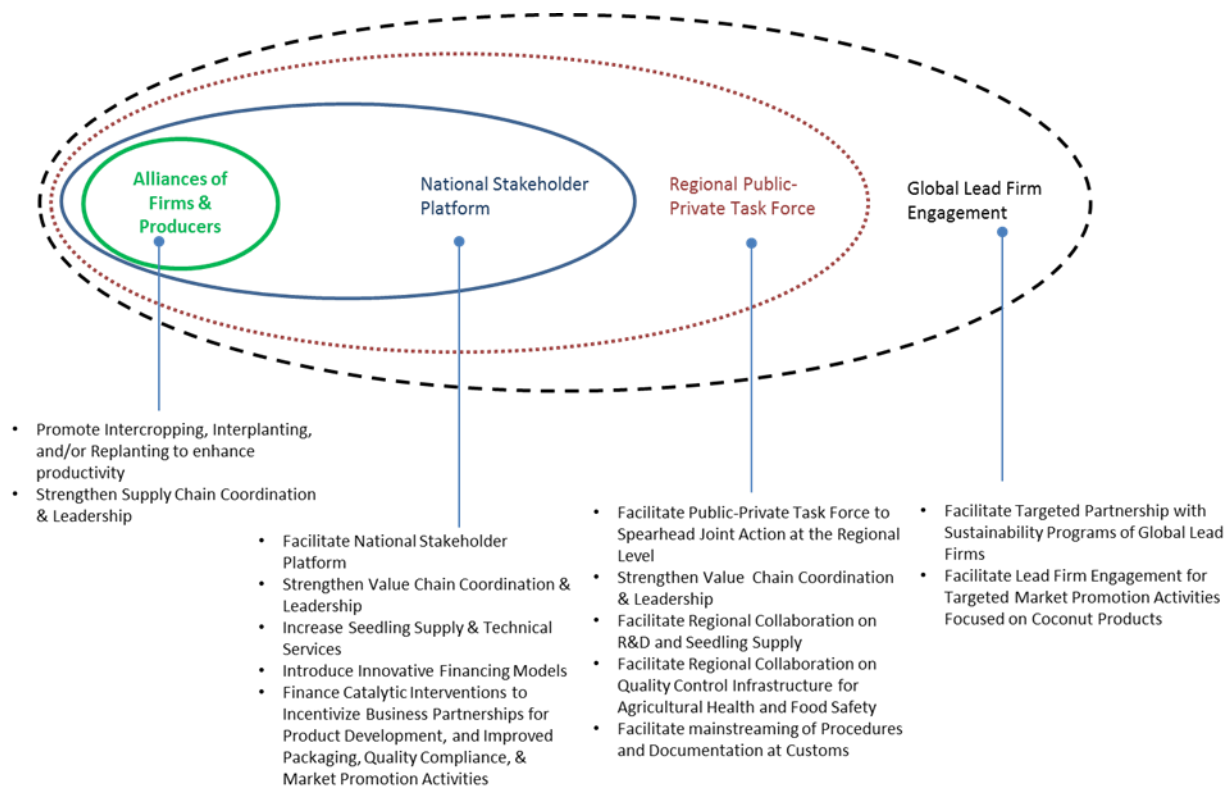
¹ Belize, Dominica, Dominican Republic, Guyana, Jamaica, Suriname, St Lucia, St Vincent and Grenadines, and Trinidad and Tobago

identified and coordinated public-private interventions take advantage of the window of opportunity created by the growing market trends.

International agencies should focus on convening stakeholders, helping with articulation of national and regional strategic objectives for the industry, building consensus, and leveraging the ‘extra-jurisdictional’ legitimacy and reach they have to catalyze development of ‘inclusive’ value chains at the national, regional and global levels.

Informed by the ‘multi-level perspective’, the report presents detailed analysis and recommendations for the Caribbean countries. The following summarizes the recommended areas of integrated interventions in catalyzing global market connections through RVCs.

Figure 1: Multi-Scalar Catalytic Interventions to Drive Upgrading at Industry Level



Note: The different line styles denote the progressively declining intensity and frequency of interventions moving away from the firm-producer level alliances to the engagement with global lead firms

Source: Author based on ITC approach (Alliances for Action 2015)

1. Country Level:

1.1. Establish national stakeholder platforms to champion development and implementation of a multipronged ‘adaptive’ national upgrading strategy. Realization of country-level upgrading strategies is going to be hinged on buy-in and decision making by the leading firms in the industry and policy makers in the relevant ministries. Leading partners to these interventions are the ‘national stakeholder platforms’ whose potential members are identified and listed in the body of

the report for the respective countries. Country-level interventions should focus on improving productive capability of smallholders and industrial organization of coconut supply chains. For interventions to remain flexible and ‘responsive’ to market conditions, ‘public-private’ stakeholders should jointly be leading the prioritization, financing, and implementation of interventions. Flexibility in approach is critical for partnership interventions to remain focused on development goals and capable of coordinating private investment and policy action.

1.2. Promote alliances of ‘firms-producers’ in the context of national stakeholder platforms and the associated national upgrading strategies. Ultimately, it is ‘firms’ that embrace market risk and make investment in product development, business models, and supply chain coordination. Alliances of ‘firms-producers’ are the building blocks of national upgrading strategies. Business partnerships have increasingly emerged as a central strategy to international development over the last decade. Firms maintain the relevant technological capabilities, financial resources, and most important the powerful coordinating role in the ‘multi-scalar’ market systems or GVCs.

To effectively support development objectives, business partnerships or alliances of ‘firms-producers’ should be formed only in the context of the ‘national stakeholder platforms.’ Firm-level partnerships should be pursued once an industry-level vision and upgrading strategy is in place. Isolated business engagements have often resulted in small ‘pockets’ of success that generally failed to achieve development outcomes at the industry level or at scale (Abdulsamad, Stokes, et al., 2015). Increasingly, the isolated business engagements, seeking to leverage private finance, have suffered a ‘discontinuity’ syndrome similar to the traditional economic development projects. The resulting ‘islands of success’ have struggled for sustainability against the prevalent dysfunctional systems of institutions. Very concerning, engagements with the individual firms have the potential to reinforce the existing power imbalances in the GVCs.

Aligning the objectives of the ‘national stakeholder platforms,’ involving public and private actors, is likely to be slow and a complex process. Important strategies to speed up the process may include understanding of the market trends, convening and facilitating stakeholder meetings, and facilitating articulation of the overarching policy and strategic objectives for industry upgrading at the country level. Catalyzing finance by the international agencies is also critical to incentivizing change when these agencies assume the important role of an ‘informed’ convener or facilitator (Abdulsamad, Stokes, et al., 2015). The GVC governance concepts and the ‘multi-scalar’ perspective can help identify entry or ‘leverage’ points for catalyzing interventions.

2. Regional Level: Develop a regional public-private task force. Its mission is to spearhead regional interventions that help reduce trade transaction costs and capture scale economies for joint action. The recommended areas of regional intervention are (See pp. 29-34 for details): R&D on planting material; quality control infrastructure; mainstreamed procedure and documentation for customs.

2.1. Facilitate regional interventions to increase planting material supply and create quality control infrastructure for agricultural health and food safety. Although a coconut RVC has developed since 2008, it still is at its nascent stages of development. Across the region, access to planting materials is the top concern for value chain actors. Future growth of the coconut RVC depends on supportive

regional institutions and infrastructural capabilities. First, regional R&D collaboration is needed to increase seedling supply and resuscitate plantations. Second, a quality control infrastructure is needed to assure safe cross-border flow of agricultural and food products. At the individual country level, the absolute amount of R&D investments is very small even if public R&D spending is relatively high as a share of agricultural Gross Domestic Product (GDP), or per farmer. As a result, country-level research agencies face challenges of dwindling resources and limited size and scope of research activities (Flaherty et al., 2015).

2.2. Reduce international trade costs through regional collaboration focused on enhancing ship liner services and streamlining cross-border processes of ‘customs and document preparation.’

Whereas transaction costs arising primarily from specific features of a traded product and/or supplier capabilities determine the nature of trade and value chain linkages in the current globalized economy (Gereffi et al., 2005), international transport cost is still the dominant element for the Caribbean countries. Very importantly, the Caribbean countries have special geographic and economic characteristics which have negatively influenced the frequency, regularity and competition in shipping services with a strong impact on international transport costs. Additionally, the costs attributed to ‘customs and document preparation’ for export and import account for a major share of trade costs across borders in the region.

- 3. Global Level:** Targeted interventions at this level should focus on leveraging global lead firms’ buying-power, technological capabilities, and sustainability programs. The goal is to support investment and international market linkages. Global level engagements should be pursued in two areas. **First, leverage the sustainability programs of the lead global brands to achieve local development objectives.** Over the last two decades, global lead firms have committed to sustainable development in their global supply chains to manage brand risk and take advantage of new business opportunities. **Second, engage lead firms for targeted market promotion.** These interventions have proven effective when they transcended beyond an isolated action in itself and incorporated simultaneous development of local supply chain capabilities (Abdulsamad, Stokes, et al., 2015).

1. Introduction

This research project was commissioned by the International Trade Center (ITC). Its primary objective is to build understanding of dynamics in the coconut GVC and recommend regional upgrading strategies for the coconut industry in the Caribbean region. Findings from this research will inform the strategy of a multi-year program, “Coconut Industry Development for the Caribbean,” funded by the European Union and jointly implemented by ITC and Caribbean Agricultural Research and Development Institute (CARDI). The program targets nine countries in the region; Dominican Republic, Jamaica, Guyana, Trinidad and Tobago, Belize, Surinam, Dominica, St. Lucia, and St. Vincent and Grenadines.

The research is guided by the GVC framework and focuses on assessment of global and regional market trends as well as detailed mapping of the regional and national coconut industry structures. Very specifically, the report follows a tiered or ‘multi-scalar’ approach assessing local, regional and global value chains. The goal is to identify upgrading opportunities at the country and regional levels as well as the relevant ‘niche’ intervention areas for private investment and policy action.

Data collection and analysis was conducted in three phases and involved joint work with the project teams from ITC and CARDI. In the first phase, a series of country-level stakeholder workshops were held across the region. During April and May, 2015, approximately 20-60 coconut value chain stakeholders from each of the nine participating countries attended the workshops. Participating stakeholders represented all stages of the value chain including coconut producers, processors, exporters, government ministries, and other support agencies. Outputs included a participatory assessment of the current status of the sector, ranking of problems and participatory definition of potential solutions.

In the second phase, assessment of global and regional markets was conducted. Desk research covered the relevant literature and market statistics, including: academic journals, industry reports, publications by the international organizations, and data from public and proprietary databases.

The third phase involved field research and detailed interviews with value chain stakeholders during July-August 2015. During this period, three countries in the region were visited: Dominican Republic, Jamaica, and Guyana. These countries on average accounted for 85% of regional coconut production in 2010-2013 (CIB, 2013; FAOSTAT, 2015; Homenauth, 2015). Dominican Republic and Jamaica as regional hub countries and Guyana as the regional supply ‘basket’ are critical to future growth of coconut RVC. Stakeholders in the other countries were subsequently interviewed over the phone during September-November 2015. Semi-structured interviews were conducted with the public and private stakeholders, including: farmer groups, local traders, coconut processors, financial service providers, bureaus of standards, market promotion agencies, and representatives from the government ministries.

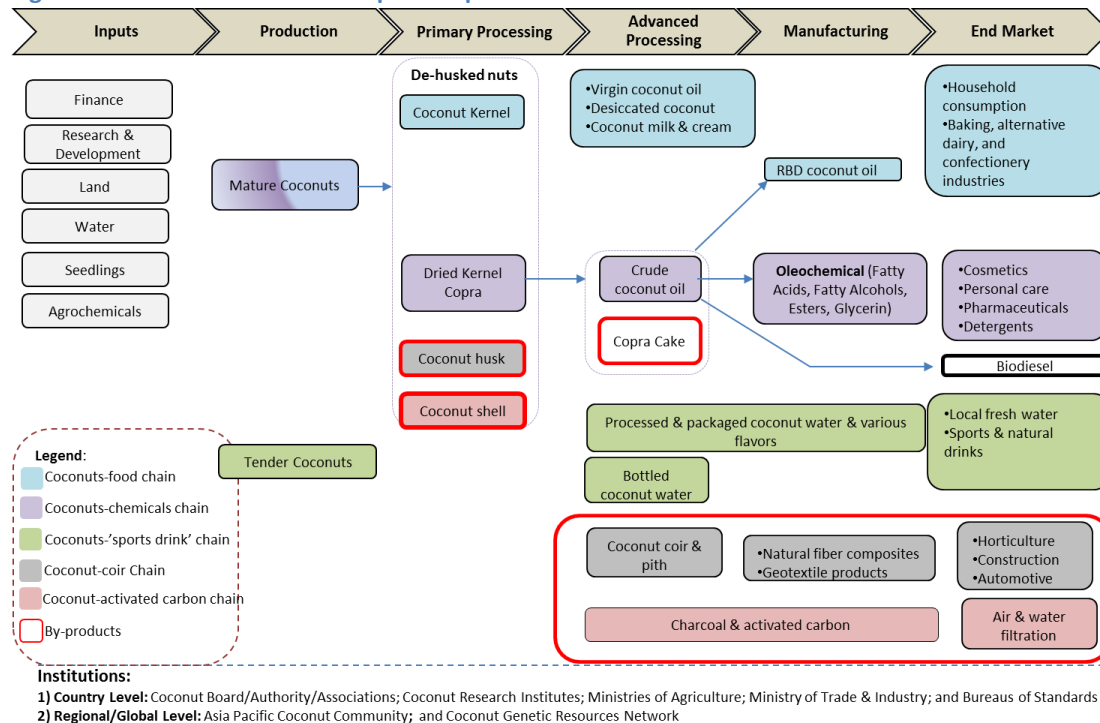
While research covered all target countries for the purpose of program planning, this report presents country-level analysis only for the three countries visited. The remaining parts of this report are organized into three sections. The first section presents the coconut GVC input-put structure and market trends, lead firms and governance, and upgrading opportunities. This analysis is followed in the second section by a regional overview, the emerging coconut RVC, challenges and recommendations for

upgrading. The third section focuses on country level coconut value chain analyses, identifying upgrading challenges, and providing policy and program level recommendations.

2. The Coconut Global Value Chain

The coconut GVC has a complex multi-product structure. The three main end markets and the associated value chain strands are: coconuts-food, coconut-‘sports drink,’ and coconut-oleochemicals chain. No previous study has comprehensively mapped the coconut GVC. For the purpose of this report, an all-inclusive map of coconut GVC encompassing the three chain strands was created (Figure 2).

Figure 2: Coconut Value Chain: Input-Output Structure



Source: Author

Inputs: Quality planting material, especially in the case of perennial crops like coconut, is the critical input. Coconut cultivars are generally classified into tall and dwarf varieties which differ in important economic features (Table 1). Tall coconuts grow fast, are less care intensive, have longer productive life, can better sustain the forces of tropical storms, and are widely adopted by smallholders. Dwarfs have short stature, are quicker to come to bearing and easier to harvest, but are short-lived and require relatively intensive care to yield optimal output.

R&D related to planting materials has focused on producing hybrids which are inter-varietal crosses, having Tall’s and Dwarf’s as parental varieties. Whereas inter-varietal breeding typically has targeted yield growth, context-specific objectives were also pursued. Hybrid breeding programs, such as the Maypan hybrids in Jamaica, were specifically designed to help affected areas fight lethal yellowing diseases (Myrie, 2015). Local R&D capabilities and continued varietal breeding are essential because

experience has shown that genetic disease resistance may only persist for up to 15 years (Johnson & Bourdeix, 2014).

Nevertheless, country level R&D activities have been scant and under-resourced due to market conditions over the last three decades. Globally, an estimated 85% of planting materials were produced by farmers using traditional nursery methods and from the local varieties available (Johnson & Bourdeix, 2014). Before the revival of markets in the late 2000s, high cost of inputs has generally inhibited adoption of hybrids by smallholder farmers. Hybrid planting materials are expensive and demand very intensive care, including fertilizer and pesticides, to exhibit the desired rapid fruit bearing and increased nut yield (Perera, 2014).

International R&D collaboration has also been limited to support information sharing. Coconut Genetic Resources Network (COGENT), having 39 members including Guyana, Jamaica, and Trinidad and Tobago, is the only international organization mandated to facilitate description and exchange of coconut germplasms (COGENT, 2015). International transfer of coconut embryo, however, has been constrained. Lack of internationally-recognized phytosanitary infrastructure among the COGENT members and the associated risks of disease transmission and quarantine restrictions, however, has hindered international transfer of coconut embryo (Johnson & Bourdeix, 2014). Yet, another international organization, the Asian and Pacific Coconut Community (APCC), established in 1969, is mandated with coordinating industry information collection and circulation among the 16 members from the Asia-Pacific countries, and the two associate members, Kenya and Jamaica (APCC, 2015a).

Table 1: Comparison of Characteristics of Main Coconut Varieties

Trait	Tall	Dwarf
Commercial distribution	Widespread	Limited
Use by smallholders	Widespread	Very Limited
Time to first bearing after planting	5-8 years	3-4 years
Productive life (high yielding)	Up to 50 years	Up to 30 years
Senile age (tree cease production)	Between 60-70 years	Between 30-40 years
Lifespan (at death of tree)	Between 80-100 years	Up to 50 years
Mature height	20-30 meters	10-15 meters
Susceptibility to storms	Low (strong trunk)	High (Thin and weak)
Yield (Nuts/palm/year)	Average 40-60	Average 80-100
Whole fruit size	Very small to large	Very small to medium
Copra amount and quality	200gram/nut; good	80-100gram/nut; inferior
Planting density	160 palms/hectare	330 palms/hectare
Bearing nature	Continuous	Seasonal
Average plantation yield	9,700 nut/hectare/year	11,000 nut/hectare/year
Harvesting without mechanization	Difficult	Very easy
Potential for intercropping	High	Low
Inputs required for good growth	Low to medium	High
Productivity without applied inputs	Low to medium	Very low
Suitability for logging	High	Low

Source:(Perera, 2014; Warner et al., 2007)

Production: Coconuts are perennial plantation crops suitable for smallholder farming due to its labor intensity and revenue stream throughout the year. Global plantation area is estimated 12 million hectares, with about 96% of the farmers tending less than four hectares (Batugal et al., 2005). Production is year-round, at least one matured ready-to-harvest bunch of coconuts every quarter, with Tall and Dwarf varieties producing on average 40-60 and 80-100 coconuts per year, respectively (Table 1). Global production is estimated 61 billion coconuts per year (FAOSTAT, 2015).

Coconut harvesting is a labor-intensive activity. Coconuts are harvested at two different stages of development, depending on the intended use. For production of coconut oil, desiccated coconut, milk or cream, coconuts are harvested at a mature stage, usually 12 months after flowering (Batugal et al., 2005). Coconuts intended for the water market are harvested when the fruit have reached full size. This coincides with maximum water content and occurs about 7 months after flowering (Batugal et al., 2005).

For enhanced land productivity, and depending on market opportunities, coconut plantations are predominantly dual cropping systems where in the field with coconuts as main crop, other annual or perennial crops, such as pineapple, cocoa, coffee, root crops, banana, or fodder for livestock are intercropped (Nair, 2009).

Primary Processing: Primary processing, usually involving hired labor, includes additional farm level value-adding activities of de-husking, grading and sorting coconuts for fresh market and industrial use in advanced processing. For the purpose of oil production, primary processing also covers copra production which encompasses splitting the coconut shell and removing, cutting, and drying the kernel. Husks and shells, valuable by-products, usually forming 25-45% weight of the whole nut, can be marketed separately (Table 2). Husks are used by the natural fiber and horticulture industries. Coconut shells are used in producing shell charcoal and activated carbon. Primary processing are typically manual activities carried out at or near the farm either by farmers or local traders.

Table 2: Average Annual Export Prices, Sri Lanka, 2013

Product	Average Price (US\$/MT)
Activated Carbon	1,940
Shell Charcoal	524
Coir Yarn*	763
Fiber Pith*	315

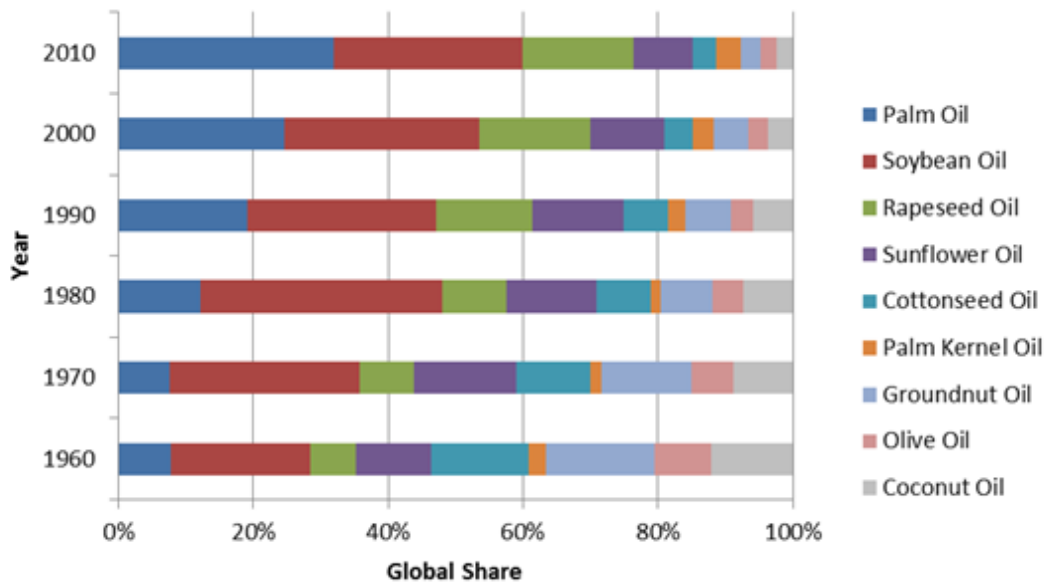
*Coir fiber constitutes nearly 30% of husk and the balance 70% is pith
Source: (APCC, 2015b)

With a shelf life of nearly two months at temperatures 0-1 °C, it is possible to ship de-husked coconuts, without further processing, by refrigerated sea containers to any destination worldwide. De-husked coconuts are consumed fresh in producing countries and exported to high priced niche consumer markets.

Advanced Processing: The downstream processing is the gateway to different market channels with coconut kernel and by-products used in multiple industries. Each of the three chain strands--coconuts-food, coconuts-‘sport-drink’, and coconut-oleochemicals--has specific industrial organization, value chain structure, and set of lead firms.

The coconut-food chain encompasses RBD coconut oil, VCO, desiccated coconut, coconut milk and cream. RBD oil processing involves large scale operations for oil extraction and refining. Initially, crude coconut oil is extracted, using solvents—98% of the oil production worldwide is carried out by solvent extraction—in industrial scale oil mills (O'Brien, 2009). The crude oil is, then, further processed by refining, bleaching and deodorizing. Refining is normally carried out close to consumer markets. In the edible oil market, however, coconut oil has experienced a considerable downfall in the global market. Coconut oil’s global market share of major vegetable oils has declined from nearly 12% in 1960 to just below 3% in 2010 (Figure 3).

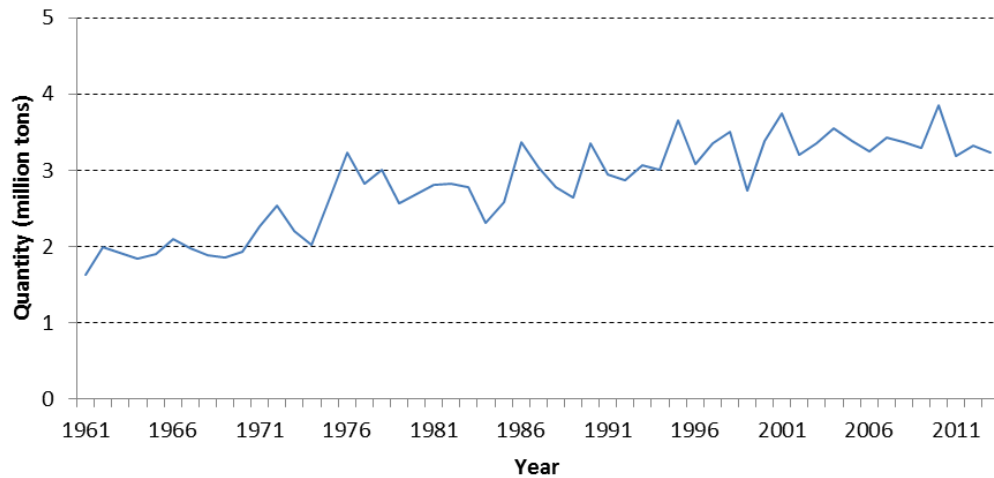
Figure 3: Trend in Coconut Oil Global Market Share



Source: (APCC, 2015; Frost & Sullivan, 2011)

The spiraling downfall is partly attributed to the alleged correlation between consuming coconut oil, as a saturated oil, and cardiovascular disease in the 1970s and 1980s (Hedge, 2006). Although this claim was later proved unfounded and coconut oil is now even believed to be the source of various nutritional benefits, market recovery was not possible with the rise of competing substitutes, particularly palm and soybean oil. Coconut oil now faces intense competition not only in export markets but also in countries of origin, such as Indonesia and the Philippines, where it has largely been replaced by palm oil (Gaskell, 2015). With these market conditions, global supply volume of coconut oil has stagnated around three million tons since 1970s (Figure 4).

Figure 4: Trend in Crude Coconut Oil Production



Source: (FAOSTAT, 2015)

VCO, instead, has received an increasing focus in edible oil industry. Export of VCO from the Southeast Asian and Pacific countries has exponentially grown to reach 7,300 tons in 2012, starting from only two tons in 2001 (APCC, 2015b). It has also fetched better revenue, with prices up to five times that of crude coconut oil in global markets.

For production of high-quality virgin oils, the processing technology is typically small and medium scales. It involves only pressing and purification by sedimentation, filtration or centrifugation (Bawalan, 2011). No further treatment by chemicals is allowed. Sometimes, cold-pressed oils are also washed by hot-water steam just to improve the taste and the smell of the oil as well as its oxidative stability.

Coconut milk and cream products have also experienced growing demand with the rising consumer awareness about health benefits these products. In 2014, retail value of coconut-based ‘alternative dairy food and beverage’ products in the U.S. was estimated US\$193 million, dominated by coconut milk at US\$104 million (Frost & Sullivan, 2015). The market for dairy alternatives, predominately derived from almond, soy and coconut, has been projected to grow 18% per year during 2014-21, reaching US\$6.27billion in 2021 (Frost & Sullivan, 2015). If proper investment is made in quality standards and workforce skills to control risk of contamination, the processing technology for grated coconut and milk and cream products is competitive at small and medium scales. It simply involves extraction using expellers and filtration processes (PHA, 2014).

Coconut-‘sport-drink’ chain encompasses flavored and unflavored coconut water products, a newly-found ‘sports-drink’ market, growing faster than any other coconut product. In 2014, the global coconut water market was estimated US\$1.36 billion and is projected to increase to US\$ 4billion in 2019, growing at more than 25% a year over the period (Technavio, 2015b). The rapid growth is driven by the marketing strategies of the lead global ‘soft drink’ firms (brands), Coca-Cola (Zico), Pepsi (O.N.E.) and Vita Coco (Technavio, 2015b). The latter is one of the pioneers and the largest private firm in coconut in global coconut water market.

Because coconut water rapidly ferments and spoils after exposure to air, it could not be globally traded and has traditionally been consumed only in coconut growing countries. Technological advancements since the early 2000s, however, have helped extend coconut water’s shelf-life—now nine to 18 months, depending on the applied processing and packaging technology—and have facilitated expansion of its market beyond the native consumption zones in the tropics. Modern commercial processing technologies are: thermal treatment, micro- and ultra-filtration, and pasteurized packaging, commonly in Tetra Pak packages (Prades et al., 2012). In 2012, Tetra Pak opened a knowledge center in Singapore to provide new innovative technologies to firms in the global coconut water markets (Technavio, 2015b). Setting up processing plants equipped with the modern technologies requires large scale investment and demand a reliable supply of tender coconuts (Flowers, 2015). For small bottling plants in the growing countries, including those in the Caribbean, which rely on thermal treatment or chilled bottling technology, the main challenges against industry expansion and export is cost of cold chain for storage and transport (Myrie, 2015).

It is still difficult to control the natural taste, aroma and color of coconut water with the current processing technologies (Prades et al., 2012). Packaged coconut water is mostly sweetened, accounting for 75% of the packaged coconut water market (Technavio, 2015b). Flavored products are the newly emerging market segment. In 2014, flavored products dominated new product launches, accounting for nearly 68% of total launches led by pineapple, green tea, mango and orange (Technavio, 2015b).

The coconut-oleochemicals chain accounts for approximately 45-50% of coconut oil consumption worldwide (BCC Research, 2015). The processing operation is capital and knowledge-intensive and centers on fractionating coconut oil, also other vegetable oils and fats, into its constituent basic building blocks: fatty acids, fatty alcohols, and glycerin. In this market, coconut oil is only directly competing with palm-kernel oil that has a uniquely comparable chemical composition, each containing 40-50% lauric acid (BCC Research, 2015). This market represents a major growth driver for coconut oil (Table 3).

Table 3: Coconut Oil Market: Drivers Ranked in Order of Impact

Rank	Driver	Short-term	Medium-term	Long-term
1	Growing demand for oleochemical	High	High	High
2	Biodiesel mandate in the Philippines ²	Medium	Medium	Medium
3	Increasing awareness about the health benefits of coconut oil in food consumption	Low	Low	Low
4	Increasing focus on VCO	No Impact	Very Low	Low

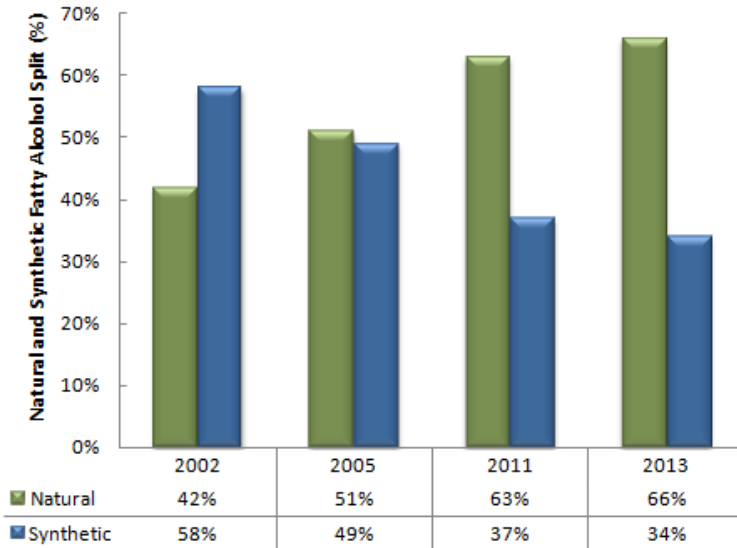
Source: (Frost & Sullivan, 2011)

The related downstream markets are personal care, detergents and pharmaceutical products. In these markets, consumer preference for “naturalness” has increased demand for oleochemicals over the last decade (Euromonitor, 2014b, 2014c, 2015). Oleochemical products have extensively substituted petroleum-based or synthetic chemicals (Frost & Sullivan, 2014a). Natural fatty alcohols, for instance,

² Industrial scale biodiesel production from coconut oil only occurs extensively in the Philippines; modest growth in this market was driven by the Philippines Biofuel Act of 2006, which raised the mandatory blends of renewable oil from one to two percent in 2010 (Frost & Sullivan, 2011).

has increased its share of global market from 42% in 2002 to 66% in 2013, replacing its synthetic competitor (Figure 5).

Figure 5: Global Trend in Natural and Synthetic Fatty Alcohol's Consumption



Source: (Frost & Sullivan, 2014a)

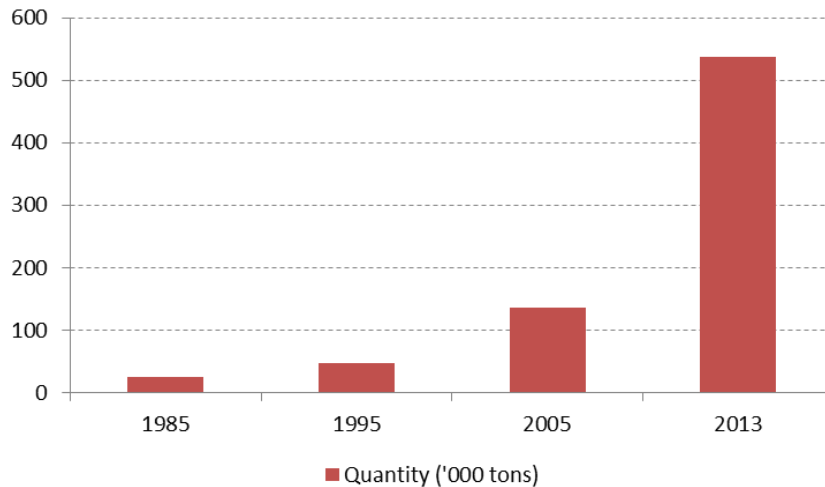
Coconut shells and husks, or by-products, are processed into charcoal/activated carbon and natural fibers with various industrial applications. Activated carbon, a form of porous carbon, is a processed product of coconut shell that after carbonization is treated with oxygen or chemicals (Technavio, 2015a). Other organic materials with high carbon content, such as metallurgical coal and wood, are competitors in this market. In terms market share, coconut shell supplied approximately 19% of the feedstock for activated carbon production in 2014 whereas metallurgical coal accounted for the largest share, approximately 58%, followed by wood and at 21% (Technavio, 2015a).

Activated carbon is valued for its porosity and high absorption power and is mainly used in treatment and purification of gas, liquid, or vapor to remove unwanted adsorbates. Rapidly growing demand since 2010 has resulted in price increase of 40-50% during 2011-2014 (Technavio, 2015a). Global demand was stimulated by new regulations in North America and Europe on mercury emissions from the power plants and a range of other industrial facilities. In 2014, the related global market was estimated 1.68 million tons, valued at US\$2.35 billion, and it is projected to grow approximately 10% per year over 2015-2019, reaching US\$3.92 billion in 2019 (Technavio, 2015a).

Similarly, coir, extracted from the **coconut husk**, has a growing market in natural fiber market for composite applications and also in the horticulture industry for soil conditioning. In the horticulture industry, Scotts Miracle-Gro, a U.S.-based firm with global operations, utilizes an estimated US\$108million of coconut coir in a year in its consumer products (Frost & Sullivan, 2011b). Similarly, in the construction industry, coconut coir-based geotextile has widespread applications in slope and shoreline stabilization because of its strength and biodegradability (EMIS Intelligence, 2011). Processing of coconut husks, in large scale, however, only occurs in India and in Sri Lanka (APCC, 2015b). Globally,

coir production potential is estimated to be in the range of 5-6 million tons per year, but only an estimated 10-15% of the potential volume enters international commercial markets (EMIS Intelligence, 2011).

Figure 6: India's Export of Coir Products



Source: (EMIS Intelligence, 2015)

The natural fiber market was estimated US\$900 million in 2013 (Frost & Sullivan, 2014b). Although in traditional coir markets, including brushes, ropes, and padding for mattresses, coconut fiber is now outcompeted by plastic products in many countries, the natural fiber composites promise a new market for coconut coir, particularly, in the automotive industry. Stringent emission standards have pushed original equipment manufacturers to redesign vehicle structures, focusing on weight reduction (Frost & Sullivan, 2014b). Natural fibers have increasingly penetrated various interior applications, such as door and seat modules, in cars. Apart from the light weight, some key factors driving the growth of natural fibers in composite applications are low cost, environmental footprint, and easy recycling.

2.1 Geographic Distribution

Global supply of coconut products, except refined oil, is concentrated in the tropics and particularly in Southeast Asia (Table 4). The Philippines and Indonesia, respectively, accounted for approximately 55% of global coconut production in 2013 (FAOSTAT, 2015). Netherlands is an exception, and following the Philippines and Indonesia it is the world’s third largest exporter of refined coconut oil. The country is a regional hub for coconut oil refining in Europe, with the Rotterdam and Amsterdam ports providing competitive maritime connectivity, and global oil processor firms, such as Cargill, Archer Daniels Midland (ADM), Bunge, Unilever, and many others, consolidating the country’s leading position in oils & fats processing, food manufacturing, oleochemicals (OMV, 2013). Among the 28 European countries, Netherlands is ranked first in oils & fats refinery and storage, third in biodiesel production, and fourth in oilseeds crushing and margarine production.

De-husked coconuts are also exported fresh. Indonesia (25%), Vietnam (20%) and Thailand (19%) were the top three global exporting countries of de-husked coconuts, competing very closely with nearly

equal market shares in 2014. Similarly, the Philippines (43%) in 2014 was the leading exporter of desiccated coconuts, followed by Indonesia (25%) and Sri Lanka (12%).

Table 4: World's Top Five Exporters, 2014

Exporters	De-Husked Coconuts	Desiccated	Crude Coconut Oil	Refine Coconut Oil
World Total (US\$ million)	316	769	1,442	1,429
Philippines	--	43%	51%	33%
Indonesia	25%	25%	35%	29%
Netherlands	--	--	2%	17%
Malaysia	--	--	3%	11%
Sri Lanka	4%	12%	2%	--
Vietnam	20%	8%	--	--
Thailand	19%	1%	--	--
Germany	--	--	--	2%
Cote d'Ivoire	5%	--	--	--
Share of top 5	73%	89%	93%	92%
HS Codes	080119	080111	151311	151319

Source:(UNComtrade, 2015)

Note: (--) denotes the country is not among the top five for the respective coconut product

The overall size of the global coconut trade is certainly larger than what is reported by international trade databases. The international trade databases do not maintain consistent and disaggregated trade data for coconut water, shell activated carbon, and coconut coir. APCC data identified India as the leading coconut coir exporter (Figure 6). Disaggregated trade data is not available on the global supplier of activated carbon from coconut shell.

Global demand in 2014 for major coconut products was approximately US\$4 billion dollars, led by the U.S. (25%), Netherlands (11%), Germany (9%), China (8%) and Malaysia (4%), among the top five importers (UNComtrade, 2015). Demand for the crude coconut oil is primarily driven by the refining industry, Netherlands accounting for a third of global demand (Table 5). Whereas fresh coconuts are primarily marketed in the consumer markets through retailer channels in the import countries, desiccated coconut is mainly used by the confectionery industry (Euromonitor, 2014). Although trade statistics does not make a distinction between tender and mature coconuts, China's import of de-husked coconuts has quadrupled over the last five years, increasing from less than US\$26 million in 2010 to US\$117 million in 2014, positioning the country as the world's largest importer for de-husked coconuts (UNComtrade, 2015). The top chocolate manufacturing countries are leading global demand for desiccated coconuts: the U.S. (17%), Netherlands (6%), Belgium (6%), Brazil (6%) and Germany (5%) (Abdulsamad, Frederick, et al., 2015).

Table 5: World's Top Five Importers, 2014

Importers	De-Husked Coconuts	Desiccated	Crude Coconut Oil	Refined Coconut Oil
World Total (US\$ million)	316	769	1,442	1,429
USA	12%	17%	25%	32%
Netherland	5%	6%	27%	--
Germany	--	5%	18%	5%
China	37%	--	3%	11%
Malaysia	--	--	11%	--
Rep. of Korea	--	--	--	5%
Japan	--	--	--	5%
Brazil	--	6%	--	--
Belgium	--	6%	--	--
Thailand	6%	--	--	--
United Kingdom	5%	--	--	--
Share of Top five	65%	40%	84%	58%
HS Codes	080119	080111	151311	151319

Source: (UNComtrade, 2015)

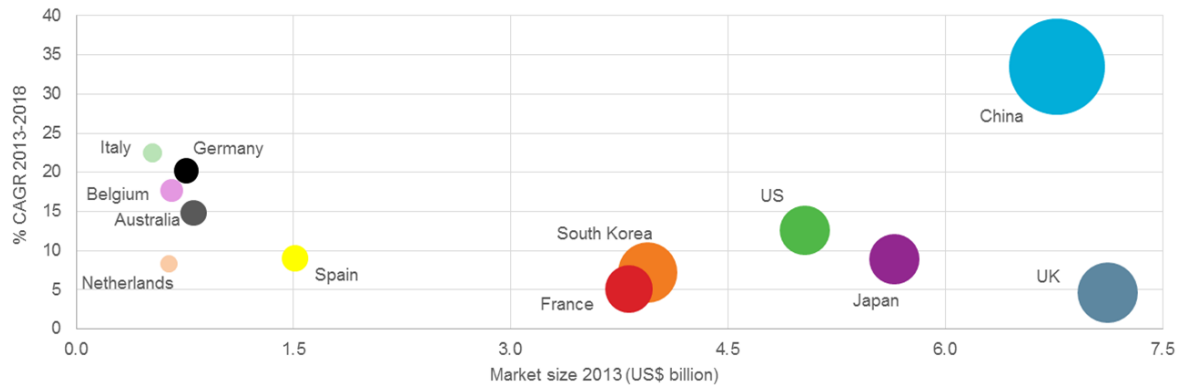
Note: (--) denotes the country is not among the top five for the respective coconut product

Just as an estimated market distribution, the retail value of coconut water was estimated US\$1.36 billion in 2014, with the U.S. (45%), U.K. (12%), and Brazil (10%) as the three leading markets (Technavio, 2015b).

2.2. Lead Firms and Governance

At the regional and global levels, *lead firms* coordinating the coconut value chain are brand manufacturers in packaged food, beauty and personal care, and beverage industries (Table 6). Retailers, such as Kroger Co. and Costco Wholesale Corporation, have increasingly launched private brands of coconut products, particularly, for coconut milk, cream and virgin oil. These firms control the highest value-adding steps in the chain including marketing, branding and new product development (Abdulsamad, Frederick, et al., 2015). Some of them, like Unilever, operate in multiple market segments such as packaged foods and personal care whereas others are specialized in only one specific market segment, for instance, L’Oreal in the beauty and personal care market (Table 6). As brand product manufacturers, these firms market their products through different channels. Food and beverage products are marketed through supermarket chains whereas beauty and personal care products are marketed through specialized retail chains, including salon distributors; active cosmetics are for sale only through pharmacies (Euromonitor, 2015). Private brands increasingly compete with manufacturers over store shelf-space and through online distribution which is an emerging trend in the U.S. but is more advanced in the U.K., and rapidly growing in China (Figure 7).

Figure 7: Food and Drink Internet Retailing: Market Sizes and Growth Prospects by Country 2013 - 2018



(Euromonitor, 2014)

Lead firms both in the oleochemical and packaged food segments have outsourced ingredient manufacturing and the associated raw material sourcing to global commodity traders, such as Cargill, ADM, and Bunge, which are in direct trade relationship with local lead firms and/or suppliers in origin countries (OMV, 2013). In the 1990s, leading U.S. - and Europe-based firms, such as Unilever Group, Procter & Gamble Co., and Henkel AG & Co. have restructured their supply chains to cope with the risk in global commodity markets (BCC Research, 2015). Manufacturing of basic oleochemicals was outsourced to large plantation firms in the Southeast Asia that now dominate the industry (BCC Research, 2015). These outsourcing strategies have since resulted in the rise of large vertically-integrated plantation firms, such as Wilmar International (BCC Research, 2015). Similarly, in food industry, large commodity traders, such as Cargill and ADM, are now the major suppliers of RBD coconut oil to brand manufacturers in food industry. These intermediary actors supply coconut products in large volume and under long-term supply contracts to large brand manufacturers such as Nestle, Mondelez International, and Unilever (Abdulsamad, Frederick, et al., 2015; BCC Research, 2015).

Large multinational 'soft-drink' companies, the Coca-Cola Co, PepsiCo and Red Bull Energy, now own or have made significant investment in leading brands of coconut water (Euromonitor, 2011; Technavio, 2015b). After PepsiCo invested in O.N.E. in 2009, Coca-Cola acquired a majority stake in the Zico in 2012, and shortly after that fully acquired Zico in 2013 (Technavio, 2015b). Similarly, Red Bull China acquired a 25% stake in Vita Coco in July 2014 to start distributing the brand in China (Beverage Industry, 2014). These three brands together constitute approximately 60% of the global coconut water market in revenue terms (Technavio, 2015b). Upstream, these firms have entered into contract manufacturing operations with coconut water packaging firms initially in Brazil, and then expanded to Southeast Asian countries as global demand has surged.

The coconut GVC has a consolidated global industrial organization. Downstream, oligopolistic market structures are controlled by a handful of lead firms at the marketing and processing segments. The

market structure at the bottom of the chain in the growing countries has remained highly fragmented. With the outsourcing strategies since the 1990s, they seek to occupy those niches in which they can create barriers to entry, cope with supply chain risks and to capture higher share of the value for the final product. These entry barriers are remarkable at the downstream end of the value chain and are low or non-existent at the upstream segments. Trade transactions in the GVCs are negotiated and the terms of those transactions reflect power asymmetries along the chain. In setting the terms of those transactions, lead firms coordinate the upstream supply chains and the conditions of market access.

Table 6: Lead Firms in Beauty & Personal Care, Packaged Food, and Beverages (Health and Wellness)

Firm	Headquarters	Market Segments	Annual Revenue (US\$ billions)
A. Global Lead Firms (Brand Manufacturers)			
Beauty and Personal Care			
Procter & Gamble Co	United States	Beauty, Personal Care, Health Care, Home Care	83
L'Oréal Groupe	France	Beauty	30
Unilever Group	United Kingdom	Personal Care, Packaged Food, Refreshments	64
Colgate-Palmolive Co	United States	Oral, Personal & Home Care	17
Beiersdorf AG	Germany	Beauty and Personal Care	8
Packaged Food			
Nestlé SA	Switzerland	Packaged Food, Beverages, Pharmaceutical	100
Mondelez International Inc.	United States	Packaged Food, Beverages, Confectionary	34
PepsiCo Inc.	United States	Packaged Food and Beverages	67
Unilever Group	United Kingdom	Personal Care, Packaged Food, Refreshments	64
Danone, Groupe	France	Packaged Food and Beverage	26
Beverages (Health & Wellness Drinks)			
Coca-Cola Co, The	United States	Energy, Sport and Juice Drinks	46
PepsiCo Inc.	United States	Packaged Food and Beverages	67
Red Bull GmbH	Austria	Energy and Sport Drinks	6
Vita Coco	United States	Beverages	0.25
B. Regional Lead Firms (Brand Manufacturers)			
Ventura Foods	United States	Packaged Food (LouAna)*	2.5
Hain Celestial	United States	Packaged Food (Spectrum)	2.2
Goya Foods Inc.	United States	Packaged Food & Beverage (Goya)	1.2
Vogue International	United States	Personal Care (Oxy)	1.2
C. Private Brands			
Kroger Co.	United States	Grocer Retailer (Simple)	108
Costco Wholesale Corporation	United States	Membership Warehouse (Kirkland)	116

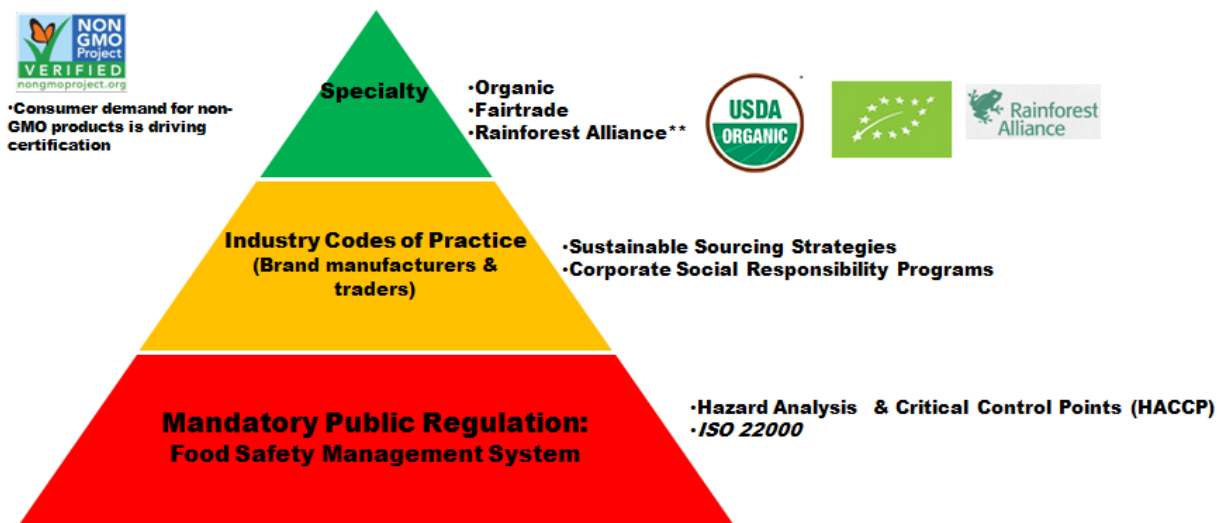
*Brand names that include coconut products

Source: (Euromonitor, 2014a; OneSource, 2014; PrivCo, 2015)

Market access is governed through a number of closely related mandatory public and voluntary private standards required by buyers, at industry and firm levels, to ensure food safety and compliance with

social and environmental demands in niche markets (Figure 8). For products requiring further processing, such as crude coconut oil, standards are relaxed but industry has specific technical requirements to control contaminants and adulteration, including free fatty acids and moisture content (O'Brien, 2009). One of the main contaminants, for instance, often present in coconut oil is polycyclic aromatic hydrocarbons, which come from the smoke drying process of copra, the raw material for oil extraction (O'Brien, 2009). Similarly, APCC has developed technical standards for VCO (APCC, 2015b).

Figure 8: Major Public and Private Standards



Other niche market standard and certification agencies: Ecocert, France <http://www.ecocert.fr/>; Soil Association, UK <http://www.soilassociation.org/>; Ethical and Environment Certification Institute, Italy <http://www.icea.info/en/>; BDIH, Germany <http://www.bdi.de/bdi news.htm>; Nature, Belgium <http://www.natrue.org/>; NSF International, U.S. <http://www.nsf.org/about-nsf/>

Source: Author

Certifications: Buyers in the consumer markets, particularly, in the U.S. and Europe, the two major destination markets for coconut products, commonly require suppliers to control food safety hazards in their production processes. They usually demand third party certifications for Hazard Analysis Critical Control Point (HACCP), or other Global Food Safety Initiatives based on HACCAP principles, such as ISO22000 (IFT, 2015; Mosquera et al., 2013). More information on food safety requirements for the U.S. and European markets can be found, respectively, on the respective websites of the U.S. Food and Drug Administration (FDA) and the European Food Safety Authority, which lay down the general principles, procedures, and compliance requirements for food safety. Firms exporting to the U.S. will in the near future face increasingly more stringent public standards spurred by the U.S. FDA's Food Safety Modernization Act (FSMA), signed into law in 2011 (Mosquera et al., 2013). FSMA, which is being rolled out over 2015-2018 (IFT, 2015), requires supplier verification, food safety certification, and traceability for all food imports to the U.S. (Mosquera et al., 2013).

In addition to food safety standards, private standards primarily used for product differentiation in consumer markets are also required by the industry and individual firms in niche markets. These standards include Organic, Fairtrade, Rain Forest Alliance and non-GMO certifications (Figure 8). Since 2012, Cargill and BASF in partnership with *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ) GmbH have developed first ever Rain Forest Alliance-certified copra in the Philippines (Cargill, 2015). Some of the popular fairtrade and organic coconut water brands are Coco Zumi, Da Naha, Harmless Harvest, and O.N.E. In 2014, Fair Trade USA launched fairtrade certified coconut products (Technavio, 2015b). Many of the leading private brands of VCO products, such as Simple (Korger Co.) and Kirkland (Costco), are organic certified.

2.3. Upgrading Trajectories

Upgrading refers to moving between different stages of the chain, or ‘adding value’ to existing activities within a particular segment of the value chain (Gereffi et al., 2005). Depending on the context, upgrading in the coconut GVC can be undertaken in multiple ways: to increase productivity at the plantation level; to improve processing –in particular to add value to by-products of the coconut processing operations, e.g. husk, or shell; to move from plantation to the higher value-added stages of processing, manufacturing and marketing; and/or to integrate new ‘chain’ strands from the coconut-food, coconut-‘sport drink’, and coconut-oil-chemical chains.

Table 7 summaries some of the more common upgrading trajectories in coconut value chains. These upgrading strategies broadly aim to gain improved efficiency/cost advantage, product differentiation through branding and standard compliance, and/or shaping demand around unique products such as, a shift in demand to coconut water or VCO in recent years.

At an industry level, especially in the small-actor dominated local industry in origin countries, upgrading also includes reorganization of the intra-industry relationships in local coconut value chains. The intended purpose is efficiency gains in trade relationships between the different segments connecting producers and final customers at the lowest possible costs and risks. This local industry-level efficiency gains significantly influence competitiveness in global markets where it is not the individual actor but the entire coconut-chain from a country that competes against the same from another.

These economic upgrading strategies are intended to facilitate access to low-value and progressive entry into higher value markets. The progression represents a movement from localized low-value wholesale markets toward increasingly higher-value domestic, regional and global markets. This end-market upgrading is accompanied by progressively stricter requirements of buyers for food safety, product quality, and delivery (Figure 8). Market upgrading, therefore, is associated with changes in cost and risk facing producers as well as cost-benefit distributions along the value chains with significant local economic development implications (Abdulsamad, Stokes, et al., 2015).

Sustainable development outcomes in developing countries, therefore, are not automatically associated with economic upgrading and require public and private collaboration to overcome the existing barriers. These barriers vary depending on the relative position of a country in the value chain. Small actors in developing countries often face upgrading challenges, such as: difficulty to self-organize at the

production level to achieve economies of scale; poor access to key services, such as: finance, technical services, and market information; weak institutional services with respect to quality control and Sanitary and Phytosanitary (SPS) regulation; and also absence of capable local lead firms. Detailed analyses of these topics are provided in the subsequent sections where potential upgrading trajectories for the Caribbean region are discussed.

Table 7: Select Upgrading Strategies in Coconut Global Value Chain

Upgrading Trajectory	Description
Process Upgrading	<ul style="list-style-type: none"> • <i>Plantation level:</i> process upgrading focuses on productivity enhancement that can be undertaken through intercropping, interplanting, and/or replanting high-yielding varieties • <i>Processing Level:</i> Value addition to by-products, coconut husk and shell, that are most often either wasted due to inadequate industrial organization of the coconut value chain or used as fuel which does not allow optimal value capture
Product Upgrading	<ul style="list-style-type: none"> • Production of virgin coconut oil and coconut water. These non-traditional products have established growing markets both in the region and globally. Processed and packaged coconut water extends product shelf-life and allows entry into export markets. • Product differentiation in terms of packaging design, or social and environmental commitments (Organic, Fairtrade, Rainforest Alliance certified VCO)
Functional Upgrading	<ul style="list-style-type: none"> • Moving from crude coconut oil processing to manufacturing oleochemicals, personal care products, and/or other detergents. Functional upgrading can occur along any of the three coconut chain strands: coconut-food, coconut-‘sports drink’, and coconut-oil-chemicals
Organizational Upgrading	<ul style="list-style-type: none"> • Horizontal-organization at a specific segment of the chain and/or vertical-organization along the value chain allow(s) considerable efficiency gains through minimizing buyer transaction costs and building economies of scale for quality control, product development, and marketing. Organizational upgrading is fundamental to competitiveness of small-actor-dominated coconut value chains
End Market Upgrading	<ul style="list-style-type: none"> • Progressive entry into higher value markets. Different market channels at local, national and global levels are characterized by different cost, risk and revenue structures largely arising from buyer requirements and levels of competition (broker/agent, wholesale distributor, brand manufacturer, and private brand retailers)

3. Regional Coconut Value Chain

3.1. Overview of Regional Trade Infrastructure

International transport cost is a critical competitiveness barrier for exports from the Caribbean countries. The cost has been particularly high when it involved intra-regional trade. According to Isik (2012), the average freight rates for shipping a 20-foot container from Miami to Caribbean countries were approximately 36% lower than shipping the same container from Dominican Republic (Port Caucedo). Similarly, field interviews in August 2015 revealed that local traders had to bear a shipping cost of US\$1,800 for a 20-foot dry container with an approximate consignment value of US\$10,000, carrying 55-60,000 coconuts from Guyana to Dominican Republic (Ali, 2015). This freight rate amounts to 18% of the consignment value, which is more than twice the 8% world average for freight-cost-to-value ratio (UNCTAD, 2014b). Whereas the Caribbean countries face high international transport costs, the region is very diverse. An understanding of the existing capabilities is critical in formulating interventions to catalyze growth of coconut RVC and to promote access to high value global markets.

Whereas countries in the region are generally disadvantaged across variables determining international transport cost, they bear important differences. Noting the importance of these variations in offering entry points to foster regional and global trade linkages, this section categorizes the target Caribbean countries into three groups: *the small island states*, *the continental Caribbean*, and *the regional hubs* (Table 8). Accordingly, it compares them with respect to the determinants of international transport costs. Empirically, the related determinants have been classified into six main variables: the size of the economy, the trade imbalance, the type and value of the traded goods, the geographical distance, the level of competition among maritime transport service providers, and the capacity and efficient management of port infrastructure (UNCTAD, 2014b). These variables are also the constituent elements of the 'liner shipping connectivity index' (LSCI) developed and maintained by United Nations Conference on Trade and Development (UNCTAD) (UNCTAD, 2014a).

In terms of the size of economy and trade imbalance, the *small island states*, encompassing Dominica, St. Lucia, and St. Vincent and the Grenadines, each with a population of less than 200,000 people, are the most disadvantaged group. Their domestic economies range from approximately US\$550,000 to less than US\$1.5 billion (The World Bank, 2015). Driven by the heavy reliance on tourism sector for exports, their merchandise trade portfolio has also been characterized by a sizeable imbalance, ranging between 70% and 90% of the total merchandise imports (Table 8). A comparatively less advantaged group, the *continental Caribbean* countries--Belize, Guyana, and Suriname-- are in a relatively better position compared to the small islands. With a domestic economy ranging between US\$1.5-US\$5.5 billion, they have a considerably smaller trade imbalance owing to their strong resource-based sectors, including the agricultural sector (Table 8). The *regional hubs*, comprising Dominican Republic, Jamaica, and Trinidad and Tobago, are the most advantaged group of countries. They maintain the largest economies in the region. Dominican Republic's economy is six times larger than the combined economy of the continental Caribbean countries, and is twenty-four folds the entire economy of small islands (Table 8). Similarly, Trinidad and Tobago and Jamaica, respectively, have economies that are nine- and

six-folds the combined economy of small islands. The sizeable receipts from the tourism sector have also resulted in imbalanced merchandise trade for Dominican Republic and Jamaica.

Table 8: Critical Determinants of International Transport Costs for the Different Categories of the Caribbean Countries

Countries	2014 Population ('000)	2014 GDP (US\$ million)	Merchandise Trade Balance** (% of imports)	International Tourism Receipts (% of exports)	Agriculture Share of GDP (%)	Ports	Estimated Annual Capacity (TEU)	Number of Ship liner companies	Largest Ship (TEU)*
Small Islands									
Dominica	72	538	-83	48	17	Roseau (1)	113,256	5	430
St. Lucia	184	1,365	-72	58	3	Castries, and Vieux Fort (2)	309,563	7	1,284
St. Vincent and the Grenadines	109	729	-88	47	8	Kingstown (1)	197,343	5	1,122
Continental Caribbean									
Guyana	764	3,229	-33	5	18	Georgetown (1)	203,769	6	N/A
Belize	352	1,624	-32	33	14	Belize City (1)	40,248	3	N/A
Suriname	538	5,300	30	4	7	Paramaribo (1)	164,375	7	N/A
Regional Hubs									
Dominican Republic	10,410	63,970	-48	32	6	Caucedo, Rio Haina, Puerto Plata, Manzanillo, and Boca Chica (5)	6,005,626	37	6,750
Jamaica	2,721	14,360	-74	48	7	Kingston, and Montego Bay (2)	7,458,960	22	6,750
Trinidad and Tobago	1,354	24,430	56	0	1	Port of Spain, and Point Lisas (2)	1,988,430	18	5,089

*Data from May 2014

**Merchandise balance average 2010-2014

Sources: (Briceño-Garmendia et al., 2015; The World Bank, 2015; UNCTAD, 2014b)

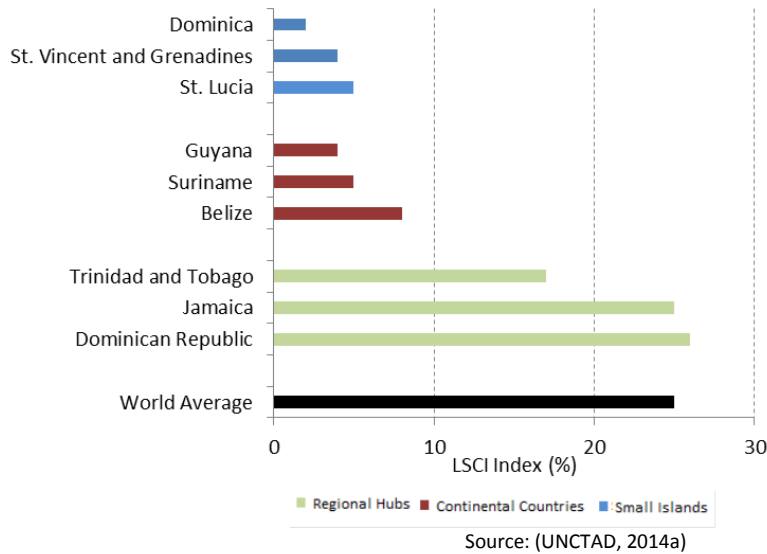
When compared in terms of the other two important variables, i.e., the capacity of port infrastructure and the number of liner shipping companies serving these ports, the *regional hubs* have starkly different and high capabilities among the three groups of countries (Table 8). The estimated annual capacity of ports, in terms of 20 Foot Equivalent Units (TEU), for Jamaica, Dominican Republic and Trinidad and Tobago are, respectively, 12, 10, and three times that of the combined capacity for the *small islands*, that have a relatively higher port capacity than *the continental Caribbean* countries. Additionally, the ports at the *regional hubs* are served by 37 of the 40 ship liner companies providing service to the Caribbean region (Briceño-Garmendia et al., 2015). In contrast, small islands and continental Caribbean countries are serviced by seven or less companies (Table 8).

In fact, all of the seven ship liners serving *the small island states* originated from outside the Caribbean with five from the U.S., one from France, and one from the UK (Briceño-Garmendia et al., 2015). With the least intra-regional connectivity, the *small island states* often prefer to use ports in Florida as the hub even when they engage in intra-regional trade. In contrast, the *continental Caribbean* countries are better connected with the regional hubs. For instance, two of the three routes serving Belize passed through Kingston Jamaica; all six routes serving Guyana passed through Trinidad meanwhile two also passed through Kingston, Jamaica; and for the seven ship liners that served Suriname, six went through Trinidad, and one actually had its main hub at Rio Haina in the Dominican Republic (Briceño-Garmendia et al., 2015)

Overall, intra-regional container traffic between *the regional hubs* and the rest of Caribbean countries has not been serviced by the global carriers due to the low freight volumes. Instead, specialist regional ship liners, such as Tropical Shipping and Seaboard Marine, filled the gap in serving the intra-regional traffic, and specialized in less than container load cargo (Briceño-Garmendia et al., 2015). In addition, the informal sector, mostly a fleet of converted fishing boats, also serve intra-regional trade primarily involving small-parcel size between *the small island states* and Trinidad as the hub (Ali, 2015; Silva, 2015).

These capabilities directly influence the frequency, regularity and competition in shipping services. UNCTAD's LSCI, a composite measure of shipping services and port capacity, is much lower for the *small island states and continental Caribbean* countries, than *the regional hubs*, which are on par with the world average (Figure 9). With the exception of *the regional hubs*, maritime services for the individual markets in the Caribbean are highly concentrated, resulting in high international transport costs. In 2011, *the regional hub* countries accounted for approximately 90% of the total cargo delivered to the Caribbean region by 40 ship liner companies, using a fleet of roughly 140 vessels (Briceño-Garmendia et al., 2015). In comparison, small island states received less than 5% of the volume delivered by a total of seven ship liners. Although controversial, lack of competition correlates with the exorbitantly high return on capital, i.e., 18% to 28%, for major specialized regional ship liners, in comparison to a return of 4% for Maersk as the world's largest company whereas the formers is ranked 34th globally (Briceño-Garmendia et al., 2015).

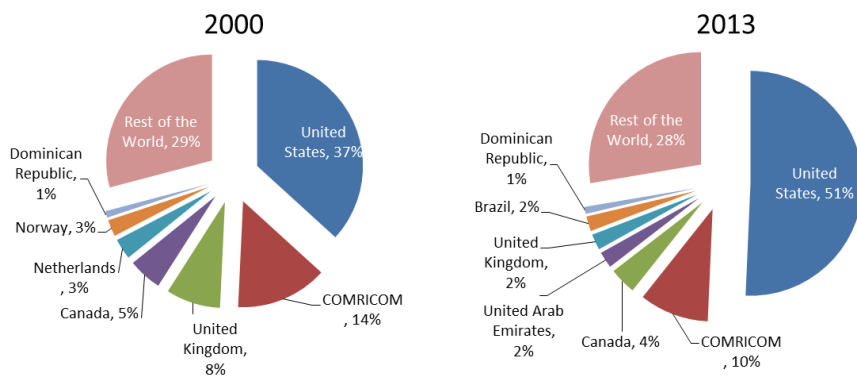
Figure 9: Liner Shipping Connectivity Index, Caribbean Countries and World Average, 2014



3.2. Intra-Regional Trade and the Emerging Regional Coconut Value Chains

The relatively higher intra-regional shipping costs have disproportionately affected regional trade. Intra-regional trade has been declining over the last decade (See Figure 10) despite a dedicated strategic focus on regional integration through the CARICOM agreement.

Figure 10: Top Markets for Non-Oil Exports from the Nine Target Caribbean Countries



Source: (UNComtrade, 2015)

Although the share of intra-regional exports has fallen by four percent points since 2000, the U.S. has consolidated its dominant position, accounting for over 50% of total non-oil exports from the nine target Caribbean countries in 2013.

Despite the overall declining pattern, trade has rapidly grown along the coconut RVC, which is defined here as a fragmented production network dispersed across Caribbean countries and involving vertically-coordinated trade. Coconut RVC encompasses trade both in unprocessed and value-added coconut products. Beginning from a small base in 2008, intra-regional export of de-husked coconuts has grown exponentially. Astonishingly, a much faster growth has occurred in the intra-regional trade, reaching 75% of the total market segment in 2014 from just 12% in 2008 (Table 9). Whereas the aggregated regional market for coconut oil (crude and refined) has declined, intra-regional trade for refined oil nearly doubled, reflecting the collapse of coconut oil industry in many countries in the region and the progressively rise of Trinidad as a regional player (Table 9). Desiccated coconut has largely remained an extra-regional export commodity although the related export value has since 2008 increased by more than 60%, reaching nearly US\$14 million in 2014 (Table 9).

Table 9: Intra-Regional and Extra-Regional Export of Coconut and Coconut Products, Caribbean Countries, 2008 and 2014

Export Values (US\$000)	2008				Total 2008	2014				Total 2014
	Coconuts	Desiccated	Crude Oil	Refined Oil (including fractions)		Coconuts	Desiccated	Crude Oil	Refined Oil (including fractions)	
Intra-regional	28	--	2,172	1,507	3,707	4,905	58	865	2,821	8,649
Extra-regional	209	8,320	328	192	9,049	1,642	13,481	17	173	15,313
Total	237	8,320	2,500	1,699	12,756	6,547	13,539	882	2,994	23,962
Export Shares (%)										
Intra-regional	12%	0%	87%	89%	29%	75%	--	98%	94%	36%
Extra-regional	88%	100%	13%	11%	71%	25%	100%	2%	6%	64%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
HS Codes	080119	080111	151311	151319		080119	080111	151311	151319	

Source: (UNComtrade, 2015)

The dynamic regional coconut trade has emerged within two distinct regional production networks driven by firms geographically located in the *regional hub* countries of Dominican Republic and Trinidad and Tobago (Figure 11). Firms based in Dominican Republic have largely exported to the U.S. market while increasingly sourced their raw materials from Guyana. Among them, Goya Food Inc. has its own product brands and the wholesale distribution infrastructure in the U.S. (OneSource, 2015). In contrast, the Trinidadian firm manufacturing refined coconut oil and the derivative products has targeted the Caribbean markets for export (Figure 11). Guyana, one of the three *continental Caribbean* countries, has been integrated as the raw material supplier to both of the emerging regional production networks. Alongside the advantageous maritime connectivity, the two *regional hub* countries are home to large processing firms with capabilities in coordinating regional supply chains, undertaking product development, and managing innovative strategies for branding and marketing.

Figure 11: Regional Coconut Value Chain

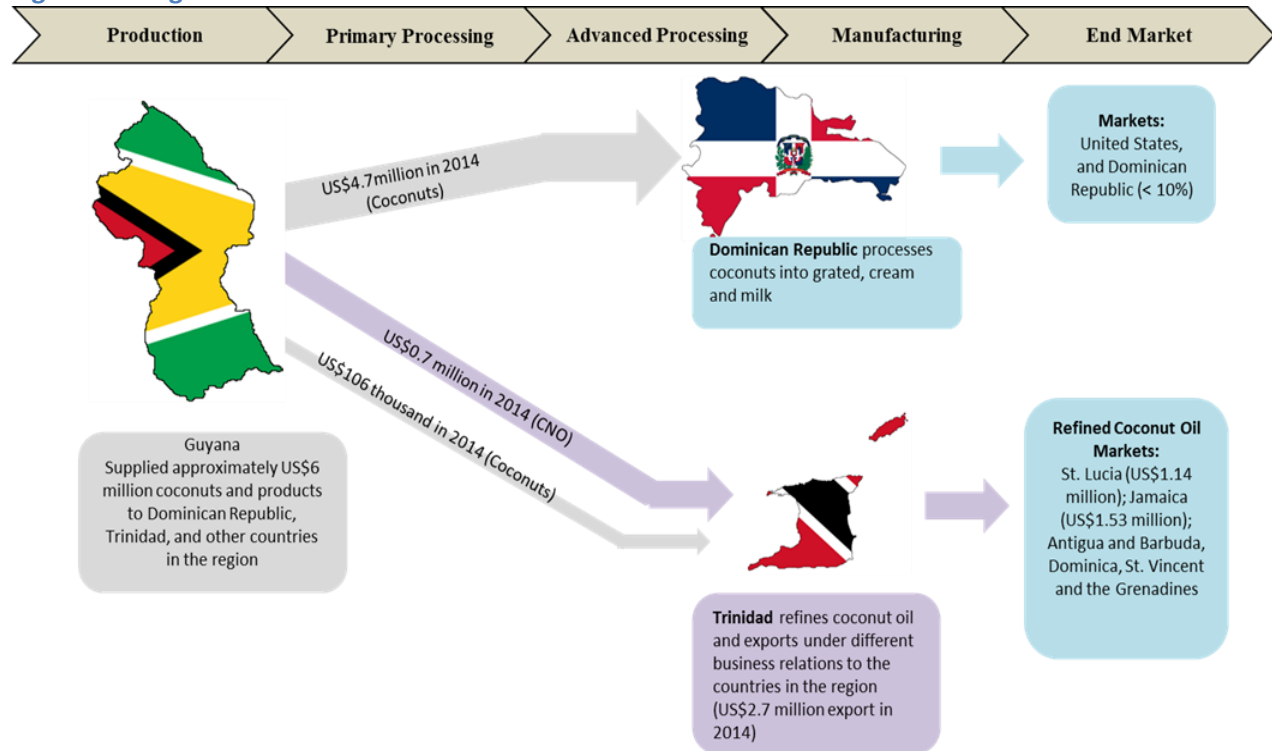


Table 10: Firms Active in the Regional Value Chain

Firms	Annual Revenue (US\$ million)	Value Chain Position			
		Coconut Plantation	Processing	Food Manufacturing	Branding & Marketing
Goya Foods Inc. (Dominican Rep.)	1,190				
Seprod Limited (Jamaica)	133				
Grace Kennedy Foods (Jamaica/Region)	703				
Pomeroon Oil Mills Inc. (Guyana)	N/A				
Tropijugos S.R.L (Dominican Republic)	N/A				
Productos del Tropic SAS (Dominican Rep.)	N/A				
Coconut Grower Associations (Trinidad)	N/A				
Coconut Grower Associations (St. Lucia)	N/A				
Coconut Grower Associations (Dominica)	N/A				

Source: Author

The production network coordinated by processors in Dominican Republic has produced desiccated coconuts, coconut milk and cream for export to the U.S. (Cairo, 2015; Lomba, 2015). Five firms, led by Goya Foods Inc., Productos del Tropic SAS, and Tropijugos SRL, coordinate this production system with a supply chain that spans domestic coconut farmers and traders as well as Guyanese coconut farmers and exporters (Benitez, 2015). Over the last years, approximately 50% of raw materials for these firms have been sourced from Guyana where they have established direct trade relationships with local firms aggregating and exporting coconuts (Cairo, 2015; Mansfield, 2015).

The other production network is coordinated by the Trinidad CGA as the leading regional coconut oil processor headquartered in Trinidad and Tobago. This production network has integrated several of the

Caribbean countries: Guyana as the main upstream supplier of raw materials; Trinidad as the actor leading the processing and packaging activities; and several Caribbean countries, led by St. Lucia and Jamaica, as the downstream consumer markets (Agostini, 2015). As a diversified vegetable oil processor, the Trinidad CGA has produced on average approximately 17-29 metric tons (MT) coconut oil per week (Agostini, 2015). Approximately 60% of its refined coconut oil output has been exported to the countries in the region (Agostini, 2015).

To manage volatility inherent in the coconut oil business, the firm has not only promoted its own brands but also manufactured for private brands owned by the regional retailers and distributors. In 2014, its coconut oil export was US\$2.7 million which was primarily sourced by private brands in Jamaica and St. Lucia but also other Caribbean countries (Agostini, 2015; UNComtrade, 2015). The Trinidad CGA's private-brand clients included "Grace" and "Miracle" owned, respectively, by Grace Kennedy and Seprod, in Jamaica as well as "Magic" owned by the traditional coconut oil processor, Coconut Growers Association in St. Lucia (Agostini, 2015; Demyers, 2015; SEPROD, 2015). Pursuing a diversified business model, and producing refined coconut oil and its fractions including margarine, and personal care products, the Trinidad CGA has been able to successfully consolidate its regional position despite the recent decline and collapse of coconut oil processing industry in the Caribbean (See pp.25-28 for details).

Emerging as the coconuts supply 'basket' of the region, Guyana's export volume of coconuts has sharply increased, approximately by ten-fold in 2009 and since then by 10% on a yearly basis for the subsequent five years, reaching 11,168 MT in 2014 from just 268 MT in 2008 (Sealey-Adams & Hanif, 2015). Dominican Republic accounted for approximately 90% of the total export volume in 2014. This export expansion has led to a sizeable decline of copra supply to the local coconut oil processor, Pomeroon Oil Mills Inc., and the inevitable 'functional downgrading' for the local firm. Local farmgate prices of coconuts, however, have since 2008 tripled, increasing from US\$4 per 100 coconuts in 2008 to US\$12 per 100 coconuts in 2015, benefiting farmers across the country (Sealey-Adams & Hanif, 2015).

These intra-regional trade patterns characterize although at its nascent development stage, the growth of a coconut RVC in the Caribbean. Whereas many of the countries in the region are disadvantaged in terms of international transport costs, lead firms from the *regional hub countries* have successfully spurred market linkages to boost intra-regional trade. This phenomenon brings renewed attention to the centrality and the capability of lead firms in value chains in driving processes of change in respond to market dynamics at the regional and global levels. Although different from their global peers in terms of geographic reach and market position, the strategies pursued by the regional lead firms in the Caribbean have strongly influenced the establishment and growth of coconut RVC. The rise of the production network, coordinated by the oil processor in Trinidad, has actually occurred with the simultaneous "functional downgrading" in coconut oil industries of St. Lucia, Jamaica, and Guyana (Alphonso & Narine, 2015). Marketing capabilities and linkages with downstream market actors are critical determinants of competitiveness and access to high value markets.

The governance structure of the coconut RVC and the distribution of value in the chain will shift as regional markets consolidate. Sustaining the positive growth trend and the development outcome of

market participation for farmers and small enterprises, it is critical to establish and foster public and private partnerships to address upgrading constraints in the value chain; capture the existing external economies of scale; and build productive capabilities of smallholder-dominated segment of the chain (Abdulsamad, Stokes, et al., 2015). The regional level upgrading challenges are discussed in detail in the remaining parts of this section while individual country level analysis presented in the subsequent sections of this report.

3.3. Regional Upgrading Challenges

Lack of planting materials and capabilities to control disease & pests due to inadequate agricultural research and development infrastructure: Access to planting materials and extension services to control common pests and diseases, such as red the palm mite (RPM) and/or lethal yellowing, are the top concerns for actors across the coconut value chain in the region (See pp.42, 56, & 70 for details). Whereas private investors have allocated resources to replant or establish new plantations, unavailability of planting materials has made it infeasible to realize the investment plans (McConnell, 2015).

The constraints are rooted in the dwindling research resources and limited size and scope of R&D activities (Flaherty et al., 2015). Although R&D spending as a share of agricultural GDP and/or per farmer spending is relatively high for the Caribbean countries, the absolute amount is very small (Table 11). Belize and the *small island states*-Dominica, St. Lucia, and St. Vincent and Grenadines--- have in particular been challenged. They account for disproportionately small R&D spending although these small countries have allocated relatively higher share of their agricultural GDP on R&D activities (Table 11). In general, the total public R&D spending, in Purchasing Power Parity (PPP) dollars, for the Caribbean countries has on average been 14% and 5%, respectively, of the average amount spent per country by the Sub-Saharan Africa and Asia-Pacific countries (ASTI, 2015).

Table 11: Agricultural Research Spending, Caribbean Countries, 2012

Country	R&D Spending (million PPP dollars)	R&D Spending (% of Agricultural GDP)	R&D Spending (million PPP dollars per 100,000 farmers)
Belize	2.3	0.7	7.2
Dominica	0.2	0.2	3.1
Dominican Republic	20.3	0.3	4.6
Guyana	N/A	N/A	N/A
Jamaica	11.8	0.9	5.6
Suriname	N/A	N/A	N/A
St. Lucia	0.3	0.6	1.6
St. Vincent and Grenadines	0.7	1.1	6.5
Trinidad and Tobago	18.0	7.8	39.0
Caribbean Per Country	8	1.7%	9.7
Sub-Saharan Africa*	57	0.8%	5.7
Asia-Pacific**	163	0.4%	6.1

*2011 Figures

**Figures for the latest year, 2009-2012. Countries are Bangladesh, Cambodia, Laos, Malaysia, Nepal, Sri Lanka, and Vietnam
Source: (ASTI, 2015)

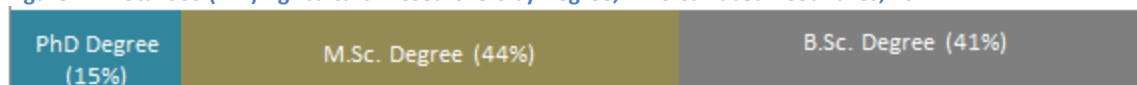
Surprisingly, the Caribbean Agricultural Research & Development Institute (CARDI), which could serve regional collaboration and help mitigate some of the challenges of small scale, has also been losing its regional resource base over the last decade. Approximately 44% of CARDI’s funding in 2012, compared to only 11% in 2007, came from bilateral and multilateral donor funding, which are typically short-term and volatile over time (Flaherty et al., 2015). Despite accounting for a quarter of the region’s total researchers, CARDI’s share of the regional agricultural research spending, including headquarters and country research stations, was only 18% of total regional spending in 2012 (Flaherty et al., 2015).

The differing R&D spending capabilities call for regional collaboration to realize economies of scale. The *regional hub countries*—Dominican Republic, Jamaica and Trinidad and Tobago—have the strongest R&D capabilities in the region. The research departments of Trinidad and Tobago’s Ministry of Agriculture, Land and Fisheries (48 FTEs), Jamaica’s Ministry of Agriculture & Fisheries (42 FTEs), and Dominican Republic’s Ministry of Agriculture (150 FTEs) have maintained the highest level of R&D spending, in absolute value, and have developed research capabilities (see Tables 11 & 12). Overall, most Caribbean countries employed fewer than 15 agricultural researchers, full-time equivalent (FTE), and very few researchers with PhD degrees, approximately 15% of the total 365 (FTE) agricultural researchers in 2012 (Table 12; Figure 12).

Table 12: Number of Researchers by Country and at Regional Institutions, 2012

Country	Regional Institution		National			Total
	CARDI	UWI	Govt.	Higher Education	Nonprofit	
Belize	1.0	--	4.5	0.5	6.6	12.6
Dominica	3.0	--	--	--	--	3.0
Dominican Republic	--	--	150.7	47.4	1.5	199.6
Guyana	--	--	N/A	--	--	N/A
Jamaica	16.0	5.0	41.1	--	--	62.1
Suriname	--	--	N/A	--	--	--
St. Lucia	1.4	--	--	0.8	--	2.2
St. Vincent and Grenadines	0.5	--	2.0	--	--	2.5
Trinidad and Tobago	5.0	29.2	48.2	0.6	--	83.0
Total	26.9	34.2	246.5	49.3	8.1	365

Figure 12: Total 365 (FTE) Agricultural Researchers by Degree, Nine Caribbean Countries, 2012



Source: (ASTI, 2015; Flaherty et al., 2015; Perez et al., 2014)

Among the *regional hubs*, Jamaica is the regional lead. It is the only *regional hub* country that has coconut R&D activities, hosts the largest presence of Caribbean Agricultural Research & Development Institute (CARDI), and is home to one of the three main regional campuses of University of West Indies, a predominant higher education and research institution in the region (Flaherty et al., 2015).

The paradoxical situation is a distinguishing feature of small economies and a reflection of the small agricultural sectors. Despite the R&D and extension needs of the agricultural sector, the ‘small scale’

negatively influences development of research infrastructure and staffing capabilities. Without regional collaboration in realizing economies of scale to strengthen R&D capabilities, access to desired planting materials and extension services in controlling the common pests and diseases, such as red the palm mite (RPM) and/or lethal yellowing, will remain critically constrained.

Absence of a regional quality control system for agricultural health and food safety: Although recognized as a key challenge by the Jagdeo initiative in 2004, lack of a harmonized agricultural health and food safety (AHFS) system, as it relates to testing, certification, and market monitoring and surveillance for standard compliance, still is a major constraint to development of a regional food processing sector and regional agro-food trade (Anderson, 2010; CROSO, 2015). Specific to resuscitation of the coconut industry, compliance with a harmonized AHFS system would also underlie R&D collaboration and risk mitigation in trade of planting materials, considering the prevalence of pest and diseases in the region. Although The CARICOM Regional Organization for Standards and the National Standard Bureaus have collaborated in coordinating development of AFHS standards, compliance with the adopted AFHS standards has remained voluntary (Castillo, 2015; Hall, 2015; Karan, 2015).

The voluntary mechanism has undermined the de facto adoption and development of national capabilities pertaining to food safety regulation. A voluntary compliance system, which has precluded demand for certification services in national and regional markets, has made it financially infeasible to sustain national certification bodies without generating user fees (Scott-Brown, 2015).

For extra-regional exports, Caribbean firms have to seek costly services of international certification agencies in order to meet requirement of buyers in the export markets (R. DeFreaitas & Amrkon, 2015; Lomba, 2015). The recent regulatory changes in the U.S. and EU would make these requirements more stringent. The Economic Partnership Agreement between the European Union and the CARIFORUM Group stipulated explicit provisions related to compliance with, and adoption of, international technical, health, and quality standards pertaining to food safety (Hartwell, 2015). Additionally, the 2011 FSMA in the U.S., the predominant export market for the region, has newly introduced mandatory HACCP certification and traceability system for food exporters to the U.S. (Mosquera et al., 2013).

Whereas the a regional organization, Caribbean Agricultural Health and Food Safety Agency (CAHFSA), now based in Suriname, was approved at the 21st Inter-sessional Meeting of the Conference of Heads of Government in 2010, the has not yet become operational due to resource constraints (CARICOM, 2014). CAHFSA was supposed to support CARICOM member states in coordinating and strengthening their SPS infrastructure, related institutional and human resource capacity development and effective delivery of regional services regarding AHFS standards (OECD, 2014). Establishment of CAHFSA was undermined by resource constraint arising from fiscal restrictions of member states following the global financial crisis (CARICOM, 2014). As of 2015, there was limited information available pertaining to progress and the future of CAHFSA.

Instead, Inter-American Institute for Cooperation on Agriculture (IICA) has begun leading implementation of an EU-funded US\$14.2 million regional initiative, which started in early 2014 and continues for 42 months, focused on strengthening sanitary and phytosanitary regulations in the 15 CARIFORUM countries (IICA, 2014). As the lead executing agency, IICA partners with the CARICOM

Secretariat, the CARDI, the Caribbean Regional Fisheries Mechanism and the Dominican Republic National SPS Committee, among other regional and international agencies.

Inefficiencies in inland transportation and customs management considerably add to trade costs.³

Adding to the inherent connectivity challenges, inefficiencies in custom management and inland transportation have exacerbated the already poor export competitiveness for the Caribbean countries. Caribbean firms face very high non-tariff trade costs across borders compared to firms in the best performing countries, like Singapore, and even similar small Pacific Island States, like Fiji (Figure 13a). All Caribbean countries, even the best performing Guyana (US\$745 per container) had higher export costs across borders than Fiji (US\$635 per container) in 2012 (World Bank, 2015). Ironically, Jamaica, as one of the regional transshipment hubs, stood out as being the most expensive country for exports, at US\$1,500 per container (Figure 13a). This amounts to more than three times the cost from Singapore and more than twice the US\$635 per container when exporting from Fiji (World Bank, 2015). Similarly, for imports, Caribbean countries perform poorly compared to Fiji (Figure 13b). St. Lucia, however, is an outlier with US\$2,675 import costs across borders per container due to its exceptionally high cost of inland transportation which accounts for 44% of the total cost (Figure 13b).

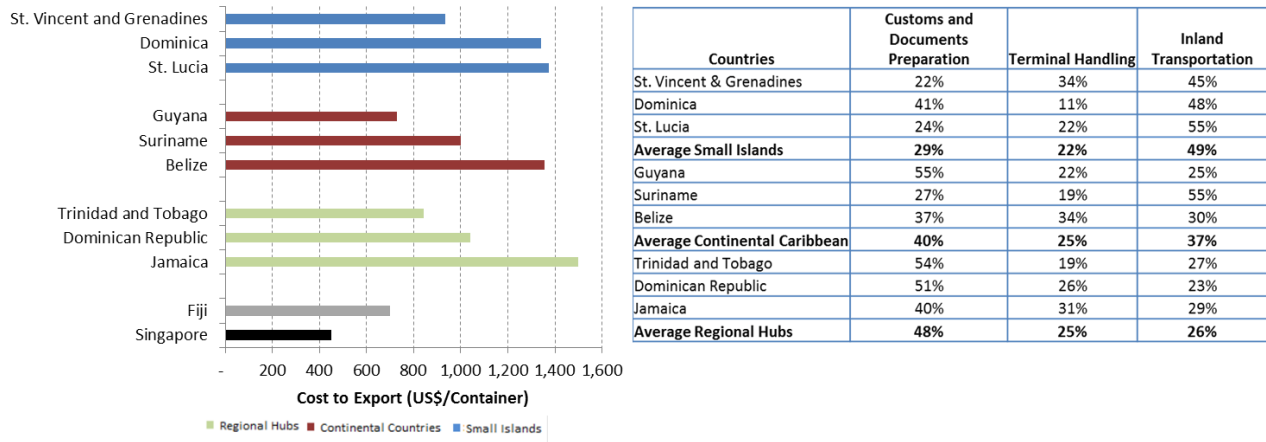
The components of trade cost across borders indicate that ‘customs and document preparation’ charges make nearly one-third to one-half of the total cost for the Caribbean countries. The related cost is particularly high for imports. The average cost of ‘customs and document preparation’ is between 40 and 50% of the total import costs and 30-50% of total export costs across the region (Figure 13b). In contrast, inland transportation cost shows great disparity across the region. It constitutes the major share of total costs for small island states and the least for regional hubs which largely have their processing and manufacturing facilities located in free-trade zones near ports allowing efficient transportation.

Although the underlying determinants of trade costs across borders require specific analysis, previous studies point to the role of customs in public finance. In most of the Caribbean countries, the role of customs has been to collect revenue rather to facilitate trade. Custom and excise taxes account for an average 35% of GDP for Caribbean countries compared to less than 4% of GDP in developed countries (Briceño-Garmendia et al., 2015). This revenue generating role for the customs has created inefficiencies compared to the other countries and regions.

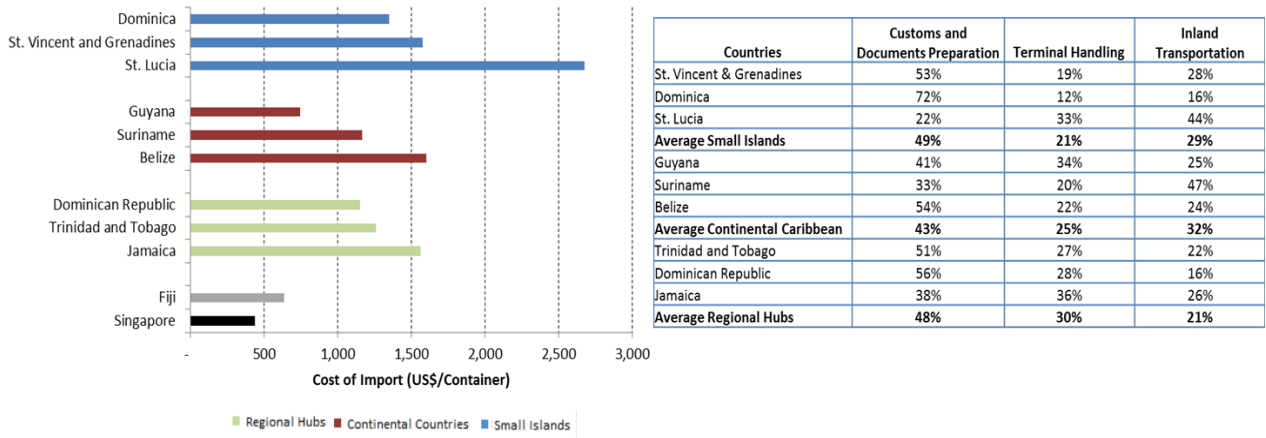
³ All costs are measured per 20-foot container

Figure 13: Trade Costs Across Borders

a) Caribbean Countries Relative Export Costs Across Borders, 2012



b) Caribbean Countries Relative Import Costs Across Borders, 2012



Source: (World Bank, 2015)

3.4. Recommendations for Upgrading

The following action-oriented recommendations focus on a regional perspective and non-country specific upgrading opportunities. These upgrading recommendations may be undertaken to build regional capabilities for AHFS, to facilitate access and adoption of technology, to develop regional mechanisms for cross-border externalities, and to spur PPPs in creating inclusive regional production networks. Country-specific upgrading opportunities are discussed in the sub-subsequent sections of the report.

Table 13: Recommendations for Upgrading at Regional Level

Recommendation	Rationale	Potential Lead Organizations
Develop regional R&D collaboration related to seedling supply, particularly hybrid varieties, as well as control of pests and diseases	The absolute amount of agricultural R&D budget for individual countries is considerably small. Joint investment is needed to capture scale economies in establishing the necessary R&D infrastructure and human capital.	<ul style="list-style-type: none"> • Caribbean Agricultural Research & Development Institute • Jamaica Coconut Industry Board • University of West Indies • Ministries of Agriculture in the respective countries
Establish regional quality control system (infrastructure and institutions) for agricultural health and food safety	<p>Exporters in the region incur both explicit (acquiring certification) and hidden (frequent buyer refusal) costs in meeting food safety standards required by buyers in destination markets.</p> <p>Also, any future regional trade of planting materials would require assurances on cross-border transfer of plants and animals.</p>	<ul style="list-style-type: none"> • Caribbean Agricultural Health and Food Safety Agency • Inter-American Institute for Cooperation on Agriculture • CARICOM Regional Organization for Standards and Quality • Caribbean Agricultural Research & Development Institute • Dominican Republic National SPS Committee
Streamline customs procedures and documentation across countries, piloting with those already engaged in regional coconut RVC	At an aggregate level, ‘document and preparation’ costs for export and import account for a major share of trade across the region. Specifically, the cost and requirements is higher for sensitive materials, i.e. planting material and food products, with implications for public health	<ul style="list-style-type: none"> • International Trade Center • Ministries of Trade and Industry in the respective countries
Develop industry specific ‘regional task-force’, involving public and industry actors, to facilitate inter-regional stakeholder collaboration	<p>A handful of countries in the region, particularly regional hubs, host firms with relatively stronger capabilities in product development, private standards for market access, and trade linkages within and outside the region.</p> <p>Their engagement and collaboration with the public sector and regional bodies is critical to champion development and implementation of a regional upgrading strategy for the coconut industry.</p>	<ul style="list-style-type: none"> • International Trade Center • Caribbean Agricultural Research & Development Institute • Relevant investment promotion agencies • Relevant representatives of national coconut platforms

4. Dominican Republic's Coconut Value Chain

Figure 14 illustrates Dominican Republic's current participation in the coconut value chain. Although Dominican Republic is the only Caribbean country that exports value-added coconut products extra-regionally, particularly to the U.S., the export share of processed products is still trivial. Coconut milk and desiccated coconuts, which are the only processed export products, account for less than 15 and 7%, respectively, of the total export value (Benitez, 2015). Unprocessed or de-husked coconuts, on the other hand, have comprised 80-90% of the export portfolio, hovering about US\$10 million per year (Table 14). De-husked coconuts contain no local value addition beyond peeling or de-husking, however, it is a growing alternative market. Grated coconuts, i.e., desiccated coconuts without dehydration, are also exported in bulk and marketed through brokers in the destination market. Only coconut milk and cream products, which is largely controlled by the regional firm, Goya Foods Inc., involves local branding and packaging activities.

Figure 14: Dominican Republic's Current Participation in Coconut Global Value Chain

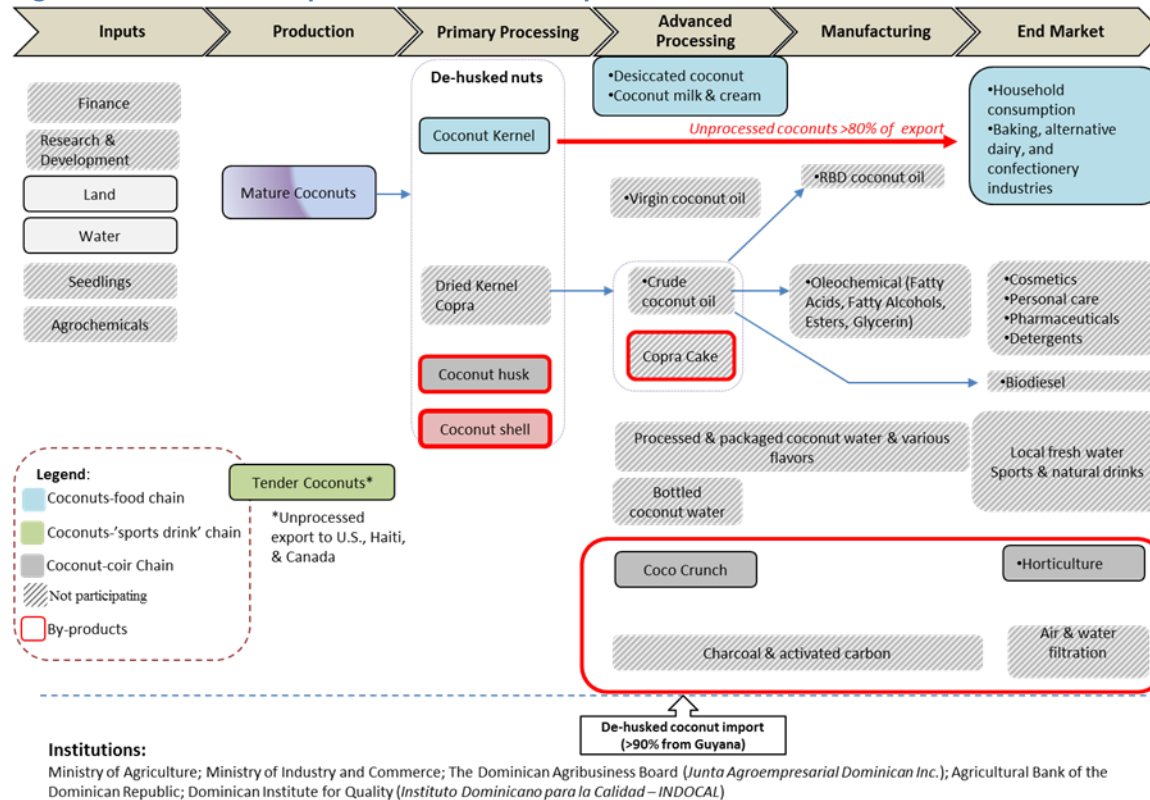


Table 14: Dominican Republic's Export of Coconut Products

Product Category	Export (Current US\$)				Percentage Shares (%)			
	2012	2013	2014	2015*	2012	2013	2014	2015*
De-husked coconuts (mature/dried)	9,324,427	9,438,578	10,327,438	4,677,082	96.0	95.2	95.5	79.8
Grated/Shredded Coconut (Frozen)	373,355	471,931	462,789	200,890	3.8	4.7	4.3	3.4
Grated/Shredded Coconut (De-hydrated)	10,654	82	25,077	183,910	0.1	0.00	0.2	3.1
Green Coconut	1,661	2,332	18,242	39,457	0.02	0.02	0.1	0.7
Coconut Milk & Cream*	N/A	N/A	N/A	758,847	N/A	N/A	N/A	13
Total	9,708,436	9,910,591	10,815,304	5,860,188	100	100	100	100

*Data only available for the period of January- June 2015

Source: (Benitez, 2015)

As for by-products, Dominican Republic also processes and exports coconut husks. The export item, locally called ‘coco crunch’, is exported to markets in Europe and in the U.S. for use by the horticulture industry (Calderon, 2015). Due to the challenges of local supply chain coordination, current export capacity is marginal compared to the existing potential (Calderon, 2015). As of 2015, only two firms processed coconut husk and together operated a total nominal capacity of 14-15 million husks per year (Calderon, 2015). This represents less than 3% of the estimated potential supply of coconut husks, an estimated 490 million coconuts in 2014 (FAOSTAT, 2015; MoA, 2015), and a growing end market uses for coconut husk products. Coconut shells, however, are marketed domestically and is generally used as a source of energy in boilers by agro-food processors (Lomba, 2015; Mansfield, 2015).

According to official trade statistics, export of coconut products and by-products from Dominican Republic is destined to a handful of markets although informal trade with Haiti is unaccounted (Table 15). In 2014, the three leading export destinations represented 90% of the total export value (Table 15). Over 2012-14, more than two-thirds of exports value, including almost all of the grated coconut exports, were accounted by the United States and Haiti. Geographic proximity, large market size, growing Latino population, and the preferential market access through the ‘Dominican Republic – Central America Free Trade Agreement’ are some of the major factors that have made the United States an attractive market destination for coconut exports from Dominican Republic (Alphonso & Narine, 2015; Cairo, 2015; Flaquer, 2015).

Table 15: Major Export Markets by Product Category, 2014 & 2015 (Current US\$ 1,000)

Country	Tender Coconuts		De-husked Coconuts		Grated Coconut (Frozen)		Grated Coconuts (De-hydrated)		Coconut Milk & Cream		Total	
	Value	Share	Value	Share	Value	Share	Value	Share	Value	Share	Value	Share
2014 Total	18		10,327		463		25		N/A		10,815	
United States	9.6	53%	4,982	48%	463	100%					5,455	50%
Haiti			3,394	33%							3,394	31%
Canada	5	28%	1,053	10%							1,058	10%
Cuba							24.4	97%			24	0.23%
Turks and Caicos Islands	2.7	15%									2.7	0.02%
2014 Top Three	17.3	96%	9,429	91%	463	100%	24.4	97%	N/A	N/A	9,934	92%
2015 Total	40		4,677		201		184		759		5,860	
United States			2,312	49%	201	100%	168	91%	220	29%	2,901	50%
Haiti	33	84%	1,334	28%							1,367	23%
Canada	3.7	9%	533	11%							537	9%
Guadalupe									221	29%	221	4%
Martinique									104	14%	104	2%
Puerto Rico							13	7%			13	0.22%
2015 Top Three	36.7	93%	4,179	88%	201	100%	181	98%	545	72%	5,143	88%

Note: Shaded cells denote absence of the country among the top three export destinations for the respective products

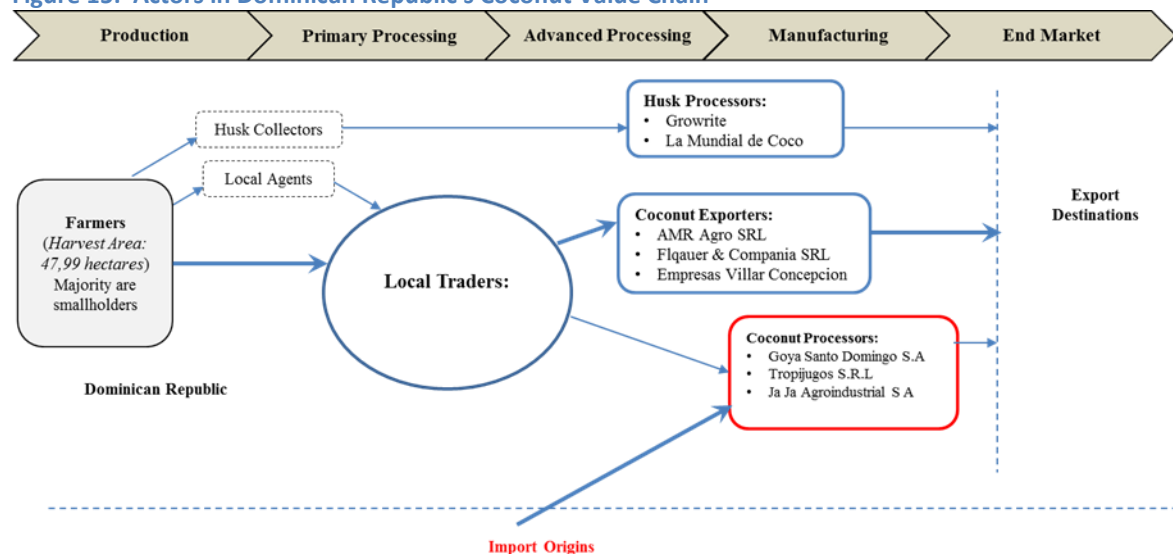
Source:(Benitez, 2015)

4.1. Lead Actors and Governance

Local lead firms, processors and exporters, are key actors in coordinating local coconut sourcing channels, controlling terms of participation, and creating market linkages with downstream buyers in the export markets. Through their value chain operations, they remain key driver local demand and output growth for coconut industry. Upstream in the value chain, lead firms have established national and regional trade relationships with supply chain aggregators, the key intermediary firms that provide financial, transport, aggregation, sorting and grading services.

Identifying the lead actors, understanding the nature of their relationships with upstream value chain operators, and assessing the extent to which they influence and coordinate the local value chain activities are critical determinants of success for effective external facilitation to develop partnerships and drive inclusive and sustainable upgrading in the value chain. Figure 15 illustrates the lead actors and their relationships in Dominican Republic’s coconut value chain.

Figure 15: Actors in Dominican Republic's Coconut Value Chain



Source: Author

4.1.1. Coconut Processors

These companies transform coconuts into intermediary or final consumer products, coordinate local/regional supply chains including management of cold chain infrastructure, and create market linkages with buyers in export markets. Processor firms typically work with intermediaries, locally referred to as “traders.” Whether they source locally in Dominican Republic or import from Guyana, processors transact with the aggregator firms and are not sourcing directly from farmers. Having multiple sourcing options, processor firms, who also maintain local agents reporting about the farmgate transactions between intermediaries and farmers, have strong price bargaining power (Abreu, 2015; Luna, 2015; Siri, 2015). Additionally, their business models strongly influence operations upstream in the

value chain. To synchronize their production planning with the required delivery schedule of buyers in export markets, processors control the activities of upstream value chain operators in terms of delivery schedules, selection of suppliers, deciding on the origin-- local sourcing or import.

Product standards they require simply focus on physical characteristics through visual inspection related to freshness, dimensions, and degree of maturity (Cairo, 2015; Siri, 2015). In the export markets, however, processors have to meet strict quality requirements which include public mandatory food safety and private voluntary standards allowing entry into niche high value markets. Mandatory food safety certification, based on HACCP, is common in the downstream markets, particularly, in the U.S. (Cairo, 2015; Lomba, 2015). Although voluntary, processors in Dominican Republic have mostly adopted the certification for Business Alliance for Secure Commerce, which is an industry certification focused on addressing the problem of concealed contraband in global trade. Depending on the processor firms' business portfolio, which in some cases encompass multiple food and beverage products, the other voluntary private certification adopted by local firms include Kosher, ISO9000, ISO22000, and Organic (Cairo, 2015; Lomba, 2015).

Although 13 companies processed and exported coconut products, the processing segments remained highly consolidated (Table 16). The top five firms accounted for 97% of coconut milk and cream segment while the largest firm alone accounted for 28%; similarly, the largest top firm literally controlled the segments for desiccated coconuts, frozen and de-hydrated (Table 16). Except Goya Foods Inc., the processor firms lack branding and marketing capabilities and export in bulk through brokers or agents as they are unable to meet the volume and delivery schedule of large buyers in concentrated export markets (Mansfield, 2015 ; Siri, 2015).

Table 16: Industry Structure for Coconut Products, 2015

Product Category	Number of Exporters	Top firm's share (%)
Coconut Milk & Cream	13	28%
Grated Coconuts (Frozen)	2	87%
Grated Coconuts (De-hydrated)	4	99%

Source:(Benitez, 2015)

Driven by the recent market dynamics, the structure of local coconut value chain, however, has been transforming. Firm level interviews in Santo Domingo confirmed a series of new investments (realized/in the pipeline) focused on market entry, backward integration into coconut plantations, and/or upgrading into higher value processing segments. These new dynamics offer opportunities to influence sourcing strategies of firms through potential partnerships to drive 'inclusive' upgrading. For this purpose, an overview is presented below for the different types of firms that are distinguished in terms of their product portfolio, global presence, business model, and export markets.

- **Foreign firms:** As the only firm in this category, Goya Foods Inc. has capabilities that encompass global supply chain management and brand food manufacturing. Although these capabilities offer the opportunity to help learning and innovation with spillover effects for the entire local coconut industry, Goya's commitment to develop backward local linkages is limited. It has no plans to establish integrated plantation (Cairo, 2015). Leveraging its GVC capabilities, it has

instead opted for imports to manage risk of local raw material supply. Since 2009, Goya Foods has increasingly imported from Guyana, with import levels accounting for approximately 50% of its annual coconut consumption in 2015 (Cairo, 2015). Also, it has continued to import coconut water from local contract manufacturers in East Asia while suspending its frozen grated coconut imports (Cairo, 2015). Leveraging its geographic reach and value chain presence in manufacturing and wholesale distribution of regional food specialties and beverages, the firm sources raw materials, processes, and packages coconut products regionally and extra-regionally, wherever it is most competitively possible (Cairo, 2015). Goya Foods Inc. operates in the United States, Spain, Puerto Rico and Dominican Republic and is active in multiple food and beverage products (OneSource, 2015).

- **Local Processors:** The existing firms in this category have specialized in processing and export of fruit pulp and juice products. Their presence in coconut value chain has concentrated on processing and export of grated coconuts in bulk. Although these firms have also sourced raw material regionally since 2009, their processing operation has entirely been located in Dominican Republic and some of them have investment plans in the pipeline to establish integrated plantations (Lomba, 2015; Mansfield, 2015). Because these firms are relatively small and lack capabilities in branding and marketing, they offer potential partnership opportunities. For instance, helping them with market promotion activities could be leveraged to support inclusive growth through collaborative value chain alliances with upstream actors in coconut plantations.
- **Vertically-Integrated Processors:** An emerging trend has been investment in backward integration to ensure security of raw material supply. According to our firm level interviews in July 2015, several processors were establishing vertically-integrated plantations. These firms can potentially emerge as strong sources of market-driven coconut farming knowledge and advisory service, planting material, and/or market linkage through direct trade relationship in ‘inclusive’ outgrower schemes. They offer strong partnership opportunities to extensively support upgrading in farm level activities, including intercropping potentials.

4.1.2. Coconut Exporters

These companies manage the logistics and cross-border trade activities related to de-husked or unprocessed coconuts. They work with brokers and/or directly deliver coconuts to the warehouse of the downstream buyers, including in-land transportation in the U.S. market (Flaquer, 2015). Similar to the processors, exporters have been required to meet certain standards depending on the buyer in export markets. In the retail food segment, HACCP based food safety standards for exports to the U.S. and GlobalG.A.P for export to the European countries were demanded by the buyers (Flaquer, 2015). Local firms exporting to organic markets also maintained organic certification. As for the regional exports, no particular standard has been required.

Exporters also work with local traders who are sort and grade coconuts mostly per physical characteristics required. These physical attributes include: freshness, no germination, no cracks, degree

of maturation, and size (Flaquer, 2015). The highest quality coconuts are actually exported de-husked. The smaller size and lower quality grade are marketed to the processing industry.

4.1.3. Local Traders

Local traders are the key intermediary actors providing financial, transport, aggregation, sorting and grading services to the coconut value chain. They manage collection centers close to the main coconut growing areas. Sourcing coconuts through their network of local agents, they supply graded coconuts to exporters, processors, and local consumer markets. Local traders commonly make advance payment to farmers without support from their downstream trade partners (Siri, 2015). A considerably high risk business activity, this practice requires considerable social and financial capital, creating high barriers to entry in this segment. The market is highly concentrated, approximately 10 local traders, with the top two traders consolidating the market, some of whom trading around 200,000 coconuts per day (Siri, 2015). Under the current value chain configuration, local traders are the gateway to market for farmers. Unless alternative mechanics to delivery of services related to finance, aggregation, grading and transport are developed, these actors will be inevitable partners to future development of the coconut industry in Dominican Republic.

4.1.4. Coconut Husk Processors

Two foreign companies, Growrite and La Mundial de Coco, process coconut husk to produce a product called, “Coco Crunch,” for export (Calderon, 2015). They typically operate in isolation from the other major actors in the coconut value chain and have the least leverage in the value chain. These firms coordinate a network of local collectors who source coconut husks from farmers and transport to the processing plants. Growrite also operates in Sri Lanka, Philippines and India where the company produces similar and higher value-added products primarily for use by the horticultural sector (Calderon, 2015). Partnership with these firms offers two value addition opportunities. First, marketing the by-product offers additional revenue to farmers. Second, it generates both economic and environmental value at the industry level by transforming husks that are generally wasted, into commercial products for export.

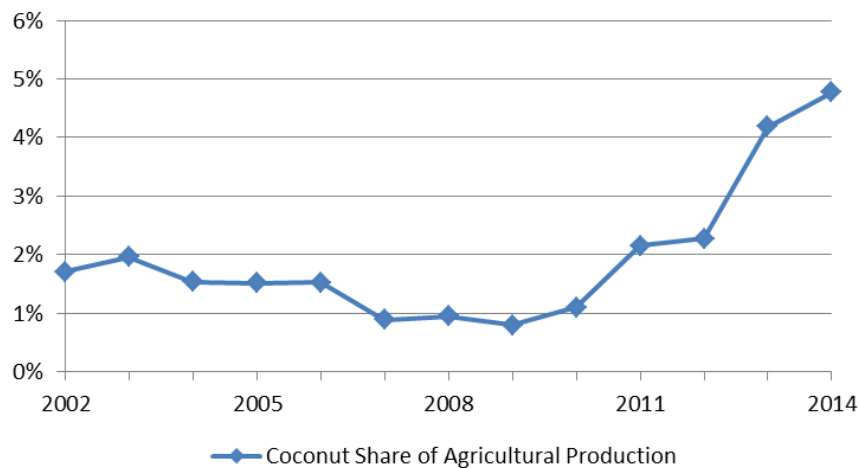
4.2. Key Trends

Driven by the rising demand in global markets, the local coconut value chain has experienced strong growth in output and local prices. Although some of the leading processors began importing coconuts from Guyana, the industry growth trends have also attracted new investors and created the impetus for establishment of integrated commercial plantations. Some of the local processor firms are investing in integrated plantations to manage risk of raw material supply. An overview of key recent trends is summarized below.

- **The coconut industry is repositioning itself in the local agricultural economy.** Over the last decade, particularly since 2009, transformation in global coconut markets has revived local coconut value chain. In 2014, coconut production reached nearly 5% of the gross value of agricultural output in Dominican Republic (Figure 16). The output share in 2014 was more than double the annual average for 2002-2010 during which coconut industry contributed less than 2% to the agricultural output.

Increase in both coconut prices and production volume is responsible for the rapid growth. Whereas coconut plantations are less responsive to demand signals because of the distinctive economic profile of coconut trees, farmers often respond to market forces by adjustment in harvesting. The positive market outlook, particularly since 2010, has resulted in an extensive expansion of harvested area in Dominican Republic. Although 2,450 hectares were newly planted during 2002-14, of which even a smaller area would be bearing fruit by 2014, the harvested area in the country has grown by 10,726 hectares, from 37,194 ha in 2002 to 47,920 ha in 2014, indicating a 30% expansion (MoA, 2015).

Figure 16: Coconut Share of Gross Value of Agricultural* in Dominican Republic, 2002-14

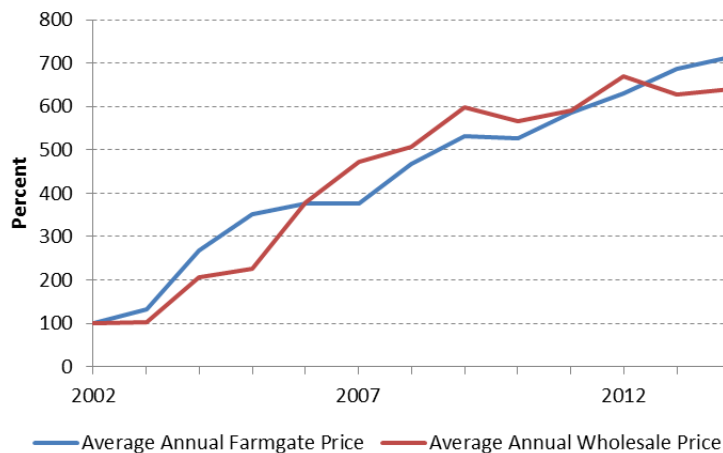


*Gross agricultural value includes all crops but not livestock. It was estimated US\$2.17 billion in 2014.

Source: (MoA, 2015)

- Local coconut prices have grown exponentially.** Average annual prices of coconuts at the farmgate and wholesale levels have increased by nearly 600% between 2002 and 2014 (Figure 17). The rise of farmgate prices has continued, peaking at US\$34.4 per 100 coconuts in July 2015 (MoA, 2015). This local market transformation has been driven by the global market trends and the subsequent surge in local demand by processors and exporters.

Figure 17: Dominican Republic’s Index of Farmgate and Wholesale Coconut Prices, 2002 = 100



Source: (MoA, 2015)

- Large processors have developed alternative sourcing strategies to secure raw material supply.** Local industry faces short of raw material supplies. Whereas some processors had occasionally imported frozen coconut meat and/or coconut water from Southeast Asian countries since the early 2000s, regular and large scale import of coconuts from Guyana actually started in 2009 (Cairo, 2015). This trend has exposed local farmers to regional competition. According to interviews with local stakeholders, processors have since benchmarked local sourcing prices in reference to Guyana’s imports (Luna, 2015; Siri, 2015). Some of the largest coconut processors in Dominican Republic now import nearly 50% of their annual consumption from Guyana (Cairo, 2015).
- New investors are targeting VCO and coconut water production in the Dominican Republic.** These downstream investment initiatives are going to further intensify competition over local coconut supplies. Two of the largest coconut exporters have indicated they were in the process of setting up a VCO processing plant in the country (Flaquer, 2015). A similar investment plan was shared by a major fruit processor that currently runs vertically-integrated fruit juice and pulp operations in Dominican Republic (Lomba, 2015). A key competitive advantage of these local companies is their local value chain linkages and knowledge of the downstream market requirements.
- Relative margins for export of de-husked coconuts to the U.S. are in decline.** Exporters view investment in VCO and coconut water business more profitable. The profitability of de-husked coconut exports has shrunk both due to the rising domestic prices in Dominican Republic and the growing competition in the U.S. market (Flaquer, 2015). Although the processing and export segments are not directly competing because they consume different coconut grades, the rapidly rising demand has shifted prices for the entire market.
- Unavailability of planting materials has constrained investment in replanting or establishing new coconut plantations.** Local seedling supply is unpredictable while import of seedlings is constrained by the absence of supportive policy and regulatory measures. Besides new investment initiatives,

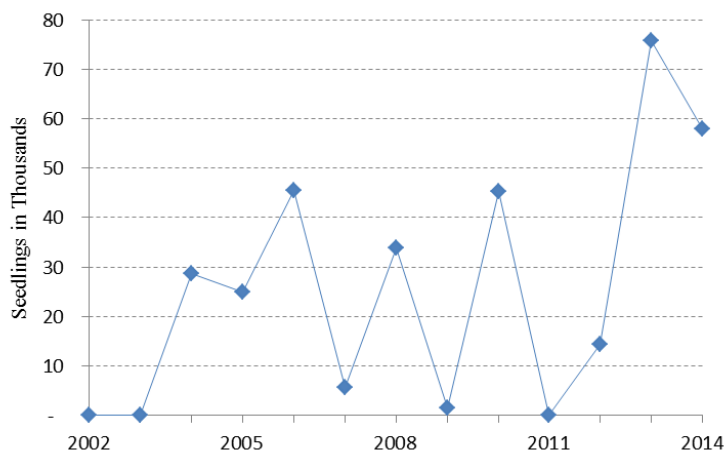
the existing plantations are largely characterized as aging and unproductive, mostly over 50 years old (Landell Mills, 2013).

4.3. Upgrading Challenges

Whereas the trends indicate a growing market and investment commitments by private business, upgrading and industry growth are challenged by supply side constraints. The underlying challenges are discussed below:

Lack of seedling production and technical services: Despite a resurgence of private investors’ interest in replanting and/or expanding coconut plantations, reliable supply sources of seedlings are nonexistent. Private sector itself lacks the required technical capabilities, especially, related to high quality dwarf and hybrid varieties (Alvarado, 2015; Landell Mills, 2013; Luna, 2015). The government seedling distribution program, run by the Ministry of Agriculture, has been nonresponsive to the current needs as well. Although a steady demand exists, seeding distribution by the program has been marginal and marked with high volatility of supply (Figure 18).

Figure 18: Coconut Seedlings Distributed by the Ministry of Agriculture, 2002-14



Source:(MoA, 2015)

Over 2002-2014, the program distributed only 330,000 seedlings in the country (MoA, 2015). This number renders the replanting rate trivially marginal. Over the last decade, the seedling distribution program only supplied for a newly replanting area which is under 5% of the reported 2014 harvest area at 47,920 hectares (MoA, 2015). While supply capability of domestic sources is insufficient, seedling import is not practiced and it has been controversial due to absence of supporting policy and regulatory infrastructure (Lomba, 2015). The culminating effect is low productivity at farm level if the current rate of replanting and unavailability of desired varieties continue. According to previous studies and stakeholder interviews in July 2015, the existing plantations are predominantly over 50 years old (Landell Mills, 2013; Lomba, 2015; Luna, 2015).

Absence of ‘tailored’ financial services: Coconut farming needs long-term affordable loans sensitive to the revenue generation profile of coconut plantations, three- to five-year gap. Access to affordable

finance is a challenge facing both coconut farmers and agribusinesses. The current loan portfolio of Agricultural Bank, a major source of finance to the agricultural sector in the country (Table 17), also shows a disproportionately biased distribution. While the share of loans targeting⁴ crops and disbursed to cocoa (7%) or the exceptionally high rate for rice (47%) shows the wide range, coconut industry is at the far lower end of the distribution (MoA, 2015). Over 2010-2014, the total amount of loans coconut industry received from the Agricultural Bank was approximately 0.2% of the portfolio, or on average US\$320,000 per year (crops sector of total) (MoA, 2015).

Alternative sources are practically nonexistent. Alongside the Agricultural Bank, commercial banks and associations are the other two common sources of finance. The former typically requires collateral and charges high interest rates, 18% or more (Paulino, 2015). Unlike the other industries, e.g., cocoa or coffee, the country's coconut industry also lacks saving and credit associations due to its poor organization and the long-term neglect the industry suffered subsequent to market collapse of copra oil in the 1970s (Paulino, 2015).

Table 17: Total Value of Loans Disbursed to the Agricultural Sector by Major Financial Institutions, 2002-14

Year	Agricultural Bank (<i>Banco Agrícola</i>)	Saving and Credit Associations (<i>Asociaciones de Ahorros y Préstamos</i>)	Bank of Saving and Credit (<i>Bancos de Ahorro y Crédito</i>)	Others (<i>Múltiples</i>)	Total
2002	175.59	38.45	0.00	237.63	451.67
2003	111.82	41.75	0.00	184.80	338.37
2004	81.00	26.52	0.00	141.07	248.59
2005	136.20	3.95	0.00	220.44	360.59
2006	147.66	4.05	2.17	150.86	304.74
2007	172.52	5.75	6.24	182.75	367.27
2008	221.88	8.23	10.59	197.56	438.25
2009	217.35	18.09	13.87	210.81	460.11
2010	204.23	19.30	21.95	326.53	572.02
2011	191.13	5.09	34.48	426.97	657.67
2012	173.63	10.51	37.62	481.82	703.58
2013	278.41	8.06	9.26	411.18	706.91
2014	364.02	8.62	8.49	355.99	737.12

Note: All figures in current US\$ million

Source:(MoA, 2015)

Lack of targeted market promotion activities: Coconut GVC has developed into a complex and dynamic end-market system. It offers multiple market channels and opportunities for value addition and product developments, particularly, in non-traditional markets. Although the Dominican Agribusiness Board (*Junta Agroempresarial Dominicana Inc.*) (JAD) biannually organizes agribusiness fairs that provide business match-making opportunities with foreign firms; the event does not target specific promotion

⁴ In 2014, the total portfolio of loans disbursed by the Agricultural Bank was divided by crop sector (65%), livestock (20%) and others (15%). The crop sector has consistently received over 65% of the portfolio over the last decade.

activities for coconut products. Limited market knowledge of these opportunities, particularly of the buyer requirements, has prevented market entry of local firms, predominantly small players, even if they invested in building productive capabilities including cold chain infrastructure (Siri, 2015).

Absence of value chain leadership and coordination: Weak industrial organization has undermined investment and caused a disproportionately high negative impact on upstream actors in the country's coconut value chain. The predominantly smallholder and fragmented farming structure in Dominican Republic prevents realization of scale economies in delivery of key services –market information, technical extension, and finance—and undermines upgrading due to high transaction costs in the value chain. Although the problem is pervasive upstream, this challenge is replicated along the chain. Due to the risk and high transaction costs involved, processors avoid to directly work with small farmers who typically lack any forms of organization to allow realizing scale economies. Field interviews indicated that processors preferred suppliers able to regularly deliver at least of 60,000 coconuts per week (Mansfield, 2015).

Under the current chain organization, intermediaries or local traders sourcing in a captive relation from farmers are the substitute in facilitating market linkages. In remote locations, individual farmers have to sell to a second tier of intermediaries (local collectors) who then sell to local traders (Siri, 2015). The fragmented upstream operations and local markets controlled by a few traders have rendered processors to develop alternative strategies to manage supply chain risk. The alternative strategies are both imports from Guyana and investment in integrated plantations.

Legacy of the 'copra oil' era and lack of industry statistics: Since the collapse of the coconut oil market in the 1970s, and the subsequent withdrawal of policy and institutional support, local coconut industry has spiraled into an extended period of decline and neglect (Landell Mills, 2013; Luna, 2015). The dilapidation is the source of several underlying challenges. First, lack of reliable industry statistics is a major source of investment risk for both farmers and processors in the country. Second, the current market demands are not compatible with the 'copra oil' era configuration of the industry either. The processing industry no longer consumes 'copra', a light-weight product, which could have been produced at the farm level and easily transported to processing plants at a reasonable cost. Competitive entry into coconut water or VCO export markets requires appropriate industrial organization so as to allow increased value addition and capability building upstream the chain. An important but less explored factor is also the growth in opportunity cost of land in the coastal beachfronts, the traditional plantation areas, due to the rise of tourism sector over the last two decades (Landell Mills, 2013; Lomba, 2015). These challenges and uncertainties require PPPs to secure Dominican Republic's coconut industry from the legacy of the 'copra oil' era.

4.4. Potential Upgrading Opportunities

4.4.1. Process upgrading

Improve productivity at the farm level by replanting aging trees, introducing high yielding varieties, and promoting intercropping. Strong market demand has spurred investment interest in coconut plantations both to increase productivity and expand plantation area. For smallholder farmers, that

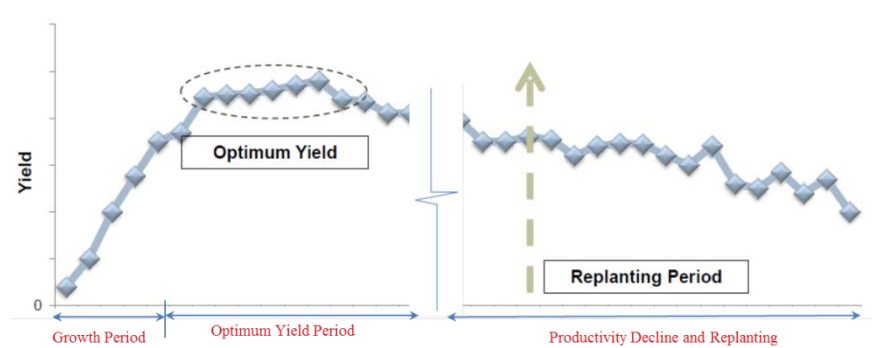
dominate the farming structure in the country, however, investment depends on whether they are embedded in a functioning support system, which includes supply of seedlings, financial services, and market linkages to ensure revenue flow.

Given the aging plantations in Dominican Republic, access to planting material is critical for process upgrading at farm level. The tissue culture technology has so far failed to support large-scale propagation of coconut seedlings (Nguyen et al., 2015). Supply of seedlings will, thus, inevitably come from nurseries and could be a particular domain for public and private collaboration. Private sector involvement is required to bolster the existing program run by the Ministry of Agriculture, develop mechanism for regional collaboration, and assess opportunities to import seedlings.

For a national replanting program, private sector actors can both establish certified nurseries to increase domestic supply and also import seedlings in particular of hybrid and dwarf varieties that cannot be locally produced in the short-term. The latter requires clarity on regulatory and quality control infrastructure to safeguard against plant disease transfer.

As coconut trees have a long-term economic life, large-scale national replanting programs should involve a rigorous ‘GVC-based’ cost-benefit analysis of the alternatives for variety selection and intercropping strategies. In general, revenue of coconut trees considerably varies at three critical phases of the tree life (Figure 19). Incorporating coconut trees as unit of analyses allows comparison between available varieties and supports timely business decisions about the replanting, interplanting⁵ and intercropping.

Figure 19: Economic Life of Coconut Trees: Three Distinct Phase of Productivity



Source: Author

By comparing the potential market channel alternatives, a GVC-cost-benefit analysis enables estimating the non-traditional cost and risk factors arising from buyer requirements in terms of standards, certifications, packaging, and also power asymmetry and price negotiation positions. This type of analysis can help identify potential opportunities for partnerships with the sustainability programs of global lead firms. As an example, Dominican Republic could seek partnership with the “Cocoa Life”

⁵ Inter-planting refers to timely replanting of coconut trees in aging coconut plantations to prevent the usual 3-5 years harvest wait period in coconut plantations

program of Mondelez International to raise funding and technical support for cocoa intercropping in the context of its national coconut replanting program (Box 1).

Box 1: "Cocoa Life" Program by Mondelez International

Cocoa Life Program, a US\$400 million program, launched in 2012, is a ten-year commitment by Mondelez International, the world's largest brand chocolate manufacturer, and finances sustainability partnerships in six major cocoa producing countries, including Dominican Republic (CocoaLife, 2014). The program aims to promote productivity through better cocoa farming practices and better access to cocoa planting materials where as its progress will be verified by third-party monitors (Mondelez International, 2014). In India, "Cocoa Life" has supported 100,000 farmers in four states. In three of the four states, the program is helping coconut farmers to plant cocoa as an intercrop in their plantations (Mondelez International, 2015).

Although cocoa, as an intercrop, offers remarkable productivity enhancement potential, the choice of potential intercrop(s) would commonly depend on agronomical feasibility, market opportunities, size of plantation and the socio-economic conditions of farmers. These characteristics vary for different provinces in the country. Organizing smallholders, however, in specific regions of the country to consolidate intercropping initiatives will help achieve economies of scale in delivery of services for production, post-harvest handling and marketing activities.

4.4.2. Product Upgrading

Build capabilities in new product development and inter-firm cooperation for marketing and quality control. As one the three regional hub counties in the region, with an already established position in RVC, product upgrading for Dominican Republic is possible through better packaging and contract manufacturing for private brands. Currently, Dominican Republic is the leading exporter of coconut milk and grated coconuts from the Caribbean region to the U.S. The aggregate amount of export of the processed products, however, is small and in bulk commodity form. Besides, upgrading into VCO production and export to regional and extra-regional markets is also feasible. Production of coconut water products would require longer time so the country has established an adequate supply base of dwarf and/or hybrid bearing plantations. For coconut water, lead partners could be firms from the country's fruit juice and pulp industry.

Whereas firms have already started undertaking upgrading investment, industry level upgrading demands policy and institutional support. Dominican Republic's weak end-market presence of mostly small firms limits flow of consumer market information to the local industry stakeholders. Institutional support in marketing and promotion is critical to understanding and leveraging marketing opportunities. Beyond JAD's biannual agribusiness fairs, which pursue a blunt approach, a well-targeted and product-specific market promotional approach is essential to create and sustain downstream market-linkages.

In addition, policy support may be directed in the form low-interest credit and tax incentives for capital investment, staff training, and the necessary certifications. For many of the local firms, which are predominately small and medium enterprises, entry and continued insertion in the high value markets require policy support and efficient institutional services related to standards and certifications (Siri, 2015).

Besides the main or coconut-kernel-based products, Dominican Republic also has opportunity to upgrade coconut husk products. Although currently a very small share of coconut husks is processed, the country expand 'coconut crunch' export and upgrade into higher value added products, working collaboratively with the existing firms, Growrite and La Mundial de Coco, and potential new entrants. Industry stakeholders in Dominican Republic are doubtful about investment in activated carbon industry due to scale requirements. Timber products, however, also offer commercial opportunity if a large-scale replanting program is launched to replace the aging trees in the country.

4.4.3. Organizational Upgrading

Strengthen value chain organization to achieve economies of scale in delivery of key services and enhance inter-firm (-segment) linkages. In Dominican Republic, value chain actors currently face high transaction costs rooted in fragmented farming structure, farm-to-market transport, and buyer sourcing costs in aggregating the output of small and dispersed suppliers. Market linkages could be enhanced through establishment of farmer groups or associations. Such an organizational upgrading would not only reduce transaction costs in marketing coconuts but also help realize economies of scale in delivery of services including innovative financial services.

Alliances of 'firms-farmers' are essential to sustain the current wave of investment incentives at the farm level. For export products, processor firms, that particularly coordinate the buyer-driven coconut value chains, are ideal partners to coordinate the upgrading initiatives. They control critical functions in the chain as discussed early in Section 4.1.1. Such a market-driven alliance would help sustain a reliable demand which is essential parallel to farm-level productivity enhancement initiatives.

Organization upgrading strategies should leverage the committed private investments that aim to establish integrated plantations. These initiatives offer the opportunity to promote outgrower schemes. A particular advantage of such schemes is inflow of private resources in farming technology and extension services that can fill the existing gap. The disadvantage, however, is power asymmetry in outgrower schemes. Alliance partners do not necessarily perceive the same hazard as predominant and may have different preferences for how the alliance is structured. Whereas the predominant hazards for the processor firms arise from uncertainty about the timelines, quality, and volume of coconuts supplied by smallholder producers, the predominant hazards for smallholder farmers are production risks, timely payment and price controls by a consolidated processing segment.

Under such circumstances, the GVC governance concepts can help identify intervention space, partners, and the catalytic interventions that may often involve buyers in the international markets as well (Abdulsamad, Stokes, et al., 2015; Gereffi et al., 2005). International agencies can play a remarkably useful role in facilitating cross-border alliances. They can convene and foster stakeholder platforms, involving agribusinesses, farmers, and relevant public agencies at the national level, and lead firms at the regional and global levels. Such platforms can create the necessary institutional environment to address the negative influence of power asymmetries at a particular node in the value chain, e.g., involving 'farmer-processor' alliances. Depending on commercial interests of global firms, international agencies can engage the sustainability programs of lead firms to mobilize financial and technical resources in support of catalytic interventions. Effectiveness of these alliances in promoting inclusive

growth at scale, however, depends on long-term commitments of partners and embeddedness into a national upgrading strategy with high level policy support.

Table 18: Recommendations for Upgrading

Recommendation	Rationale	Potential Lead Organizations	Stakeholders Workshop's Prioritized Strategy Objectives
Facilitate public-private partnerships aimed at planning and implementing a national upgrading strategy	<p>Public-private partnership is essential to champion private investment and policy action in support of inclusive industry growth.</p> <p>Partnerships also underlie improved value chain leadership and organization which are critical to promoting investment in product and/or process upgrading by individual participants.</p>	<ul style="list-style-type: none"> • Dominican Agribusiness Board • Ministry of Agriculture • Farmer groups • Processors • The Dominican Institute for Quality • Agricultural Bank • National Competitiveness Council • Export and Investment Center of the Dominican Republic • International Trade Center 	<p>Strategic Objective 2 - Establish a productive public-private partnership to promote links in the chain of value and income to the producer</p> <p>Strategic Objective 1.2 - Develop a business plan for the sector and profitability studies</p>
Develop an information system to determine the stock of coconut plantations and local supply of coconut varieties	<p>Information on local supply of coconuts is essential to drive investment in the processing sector.</p> <p>A database of plantations will also help meet traceability requirements by the upcoming <i>Food Safety Modernization Act</i> for the U.S. market</p>	<ul style="list-style-type: none"> • Ministry of Agriculture • Dominican Agribusiness Board • International Trade Center 	
Increase local seedling supply through engagement of private sector in nursery management and regulated import of seedlings (See pp29-34 for regional details)	<p>The existing public seedling program is unpredictable and insignificant compared to local needs. Particularly, highly demanded varieties are not grown or supplied by the current nursery program.</p>	<ul style="list-style-type: none"> • Ministry of Agriculture • Dominican Agribusiness Board • The Dominican Institute for Quality • Inter-American Institute for Cooperation in Agriculture 	<p>Strategic Objective 3- Improve and increase coconut production - Crop management, research and nurseries</p>
Assess cost-benefit of intercropping products and the opportunities to	<p>Intercropping is not currently practiced in Dominican Republic.</p>	<ul style="list-style-type: none"> • Ministry of Agriculture • Dominican Agribusiness Board 	<p>Strategic Objective 3- Improve and increase coconut production - Crop</p>

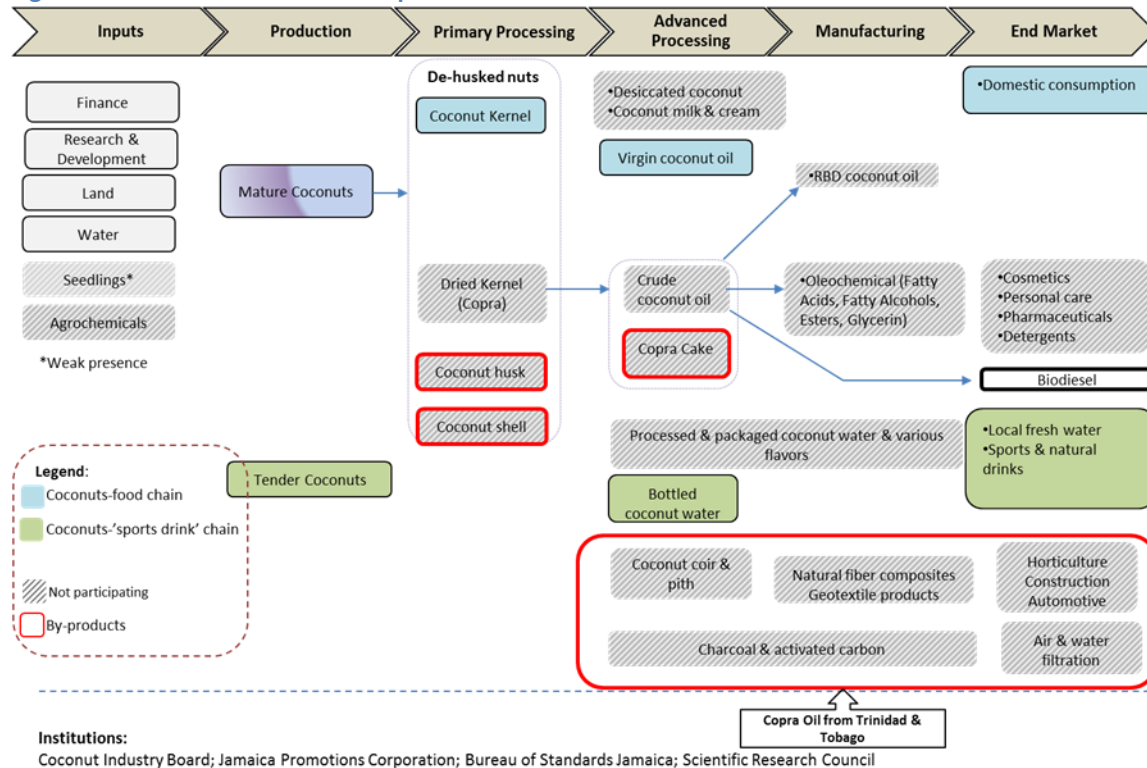
leverage sustainability programs of lead firms	Coconuts' intercropping with established products, such as cocoa, offers significant opportunities for productivity enhancement	<ul style="list-style-type: none"> • International Trade Center 	management, research and nurseries
<p>Better target market promotion efforts to develop/enhance trade linkages with end-market actors.</p> <p>Downstream actors with private brands should be identified and targeted for export promotion and product upgrading strategies.</p>	<p>Cost of market promotion is beyond the capacity of small firms, and the current program organized by the Dominican Agribusiness Board is very broad.</p> <p>Entry into export markets requires a marketing approach that targets specific downstream actors in the industry.</p>	<ul style="list-style-type: none"> • Dominican Agribusiness Board • Export and Investment Center of the Dominican Republic • National Competitiveness Council • Ministry of Agriculture • International Trade Center 	Strategic Objective 4. Integrated processing and improving the efficiency of the industry and upgrade towards commercialization of value-added products.
<p>Develop new financing models to support small actors.</p> <p>Pilot financing models like Fundagro, developed by the Dominican Agribusiness Board and Nestle in dairy sectors, allow value chain finance. Such models could be adapted and 'scaled' to improve access to credit for coconut farmers</p>	<p>While coconut production has increased to reach 5% of agricultural GDP, it receives only 0.2% of the Agricultural Bank's portfolio. Collateral requirements, short terms, and high interest rates restrict access to finance for coconut farmers.</p>	<ul style="list-style-type: none"> • Dominican Agribusiness Board • Agricultural Bank • Ministry of Agriculture 	Strategic Objective 1.2 Access to finance and investment profiles
Strengthen the national quality control mechanism to assure food safety and quality of coconut products (See p.31 for regional details)	The country lacks local certification capabilities; enforcement of adopted local standards is also challenged by the absence of regulatory measures, public or private.	<ul style="list-style-type: none"> • The Dominican Institute for Quality (INDOCAL) • International Regional Organization for Agricultural Health (OIRSA) • Inter-American Institute for Cooperation in Agriculture • Ministry of Agriculture 	Strategic Objective 5 - Improve compliance to standards good management practices for coconut processors
Promote private investment in expanding the current level of processing and export of by-products (focusing on coconut husk)	Dominican Republic is already exporting 'coconut crunch' product from coconut husk. It has low value content but also accounts for less than 3% of the potential	<ul style="list-style-type: none"> • Dominican Agribusiness Board • Processors (Growrite and La Mundial de Coco) and potential new investors • International Trade Center 	Strategic Objective 4. Integrated processing and improving the efficiency of the industry and upgrade towards commercialization of value-added products.

5. Jamaica's Coconut Value Chain

Figure 20 present Jamaica's participation in coconut value chain. Although a leading coconut producer country in the region, Jamaica exceptionally engages in limited regional or extra-regional coconut trade. In 2013, production reached 97 million coconuts, valued US\$34 million, but only 21,000 seed coconuts with an estimated value of US\$64,600 were exported to Florida in the U.S. (Myrie, 2015). As the only regular export item, seed coconuts are intended for landscaping purposes and have on average generated less than US\$100,000 export revenue during 2010-13 (CIB, 2013). Yet, export of bottled coconut water, which was small-scale and targeted the diaspora community in Florida, was discontinued since 2012 after the exporting firm opted to switch to production of VCO for export (Black, 2015; Myrie, 2015). But, Jamaica is a net importer of coconut oil. The country has consistently imported 400-600 ton copra oil from Trinidad and Tobago over the last 10 years (FAOSTAT, 2015).

Local bottling industry is the main consumer coconuts in the country. As the major commercial segment, the fragmented bottling industry only consumes 2-3% of the reported annual coconut production.

Figure 20: Jamaica's Current Participation in Coconut Global Value Chain



Source: Author

In the Caribbean, Jamaica is the only country that has well-developed coconut R&D capabilities. The country managed to develop local hybrid varieties, such as Maypan, and has started breeding new hybrid varieties (Myrie, 2015). The local breeding capability has helped create a relatively strong replanting program, particularly, to restock the areas affected by lethal yellowing disease (LYD) (CIB, 2013). It has mitigated the LYD loss and obviously stabilized production in recent years. According to

Jamaica's Coconut Industry Board (CIB), annual production volumes have little changed since 2005, hovering around 96 million coconuts, although LYD has continued to devastate farms (CIB, 2013).

5.1. Lead Actors and Governance

Coconut value chain in Jamaica is highly fragmented. As the leading commercial actor, CIB annually consumes around one million coconuts, representing approximately one percent of the total production (CIB, 2013). The bottling industry is otherwise dominated by a large number of small enterprises directly transacting with smallholder farmers, estimated around 8,000 (Myrie, 2015). Low entry barriers have resulted in a burgeoning number of small-scale bottlers, including a large number of informal actors who are underinvested and lack capabilities in standard compliance and quality packaging. The market structure also spurs fierce localized competition. Many bottlers face an apparent shortage of supply because they lack the capability to coordinate large supply chains and/or run large-scale operations due to lack of cold storage capabilities. VCO is an emerging new export product category. While there are big local/regional consumer brands and oil processors, e.g. Seprod, they have currently no backward linkages with the coconut industry. The rest of this section provides an overview of these dynamics, maps the actors and their role in governing the value chain.

Coconut Industry Board

CIB has a multifunctional responsibility with respect to coconut industry. It is responsible for regulating the production and trade of coconuts and coconut products. It also is the only source to supply planting material and extension services as well as advise the government of Jamaica on policy decisions related to the coconut industry. In an environment where LYD still annually destroys thousands of trees, and demand for coconut seedlings is surging across the region, the most important function of CIB obviously is its influence over access to seedlings. It exclusively manages four nurseries with total capacity of 400,000 seedlings in a year (Fraser, 2015; Myrie, 2015).

CIB's regulatory authority spans across the value chain and covers import of planting materials, coconut production, processing, and trade. Local enforcement of regulatory measures has, however, been problematic. Informal and fragmented bottling industry has added to challenge. While CIB lacks any incentive measure to offer bottlers—no product development program—compliance to local standards is not mandatory either. Although CIB collaborated in early 2000s with the Scientific Research Council, a public agency managing government's product R&D programs in the agribusiness sector, the two obviously do not have regular inter-institutional collaboration (Riley, 2015). Consequently, unregistered coconut water bottlers comprise a sizeable segment of the industry.

Parallel to its regulatory authority, CIB is an active commercial player in coconut industry. It directly sources coconuts from farmers; it also processes and markets value added products through its retail outlet, locally known as the Coconut Shop, located at the CIB's premises (Myrie, 2015). Value-added products include packaged coconut kernel, and a variety of coconut confectionaries. Yet, bottled water dominates the portfolio. It accounted for approximately 90% of the total 1.13 million coconuts processed/ marketed through CIB in 2013 (CIB, 2013).

Water bottlers (Private Enterprises)

Predominantly small businesses, water bottlers directly source coconuts from farmers and manage small bottling plants equipped with cold storage. Because bottling is not performed under a contract relationship, they also engage in marketing activities that target local supermarkets, stores, and food service outlets. Transactions are generally in arm's length relationships with both upstream coconut farmers and downstream buyers although bottlers provide on-demand farm-to-plant transportation service to farmers.

As predominantly small actors, bottlers don't have any coordination or governance power in the chain. Due to the lack of supply chain coordination capability and irregular supplies, majority of the bottlers had to periodically shut-down operations. They face no asset specificity because the bottling plants, which only require refrigeration equipment and plastic bottles, can also be run at a small scale and on a pretty low-cost and rudimentary technology.

Further, they do not engage in product differentiation. Locally, bottled water does not contain any additives and is typically fresh coconut water packaged in 350ml bottles (Myrie, 2015). Accordingly, bottlers face very high risk of competitor entry, typically informal actors, whose number even has a seasonal dimension--more bottlers present in the market during the hot weather months (Sutterland, 2015). Mobile operators during summer months drive truck-mounted bottling units and bottle water at farmgate simply to secure coconut supplies. Even for the three largest local brands, Spring Gardens, Free Hill Products, and Portland Splash (Freehill, 2015; Hosang, 2015), almost 90% of coconut supplies come from smallholder farmers and they have to compete to keep bottling plants operational (Freehill, 2015).

A comprehensive census of the bottling businesses and their capacity is unavailable because it is not uncommon for many agents to operate unregistered. According to Jamaica's Bureau of Standards, at least 11 of the 25 local brands operated unregistered in 2012 (BSJ, 2015). Informality and a fragmented structure have constrained investment in processing and packaging capabilities which are essential to extend shelf-life of coconut water and enter export markets.

The downstream market also remains fragmented. None of the bottlers, except Free Hill Products, that supplies a local supermarket, called PriceMart, has any supply contract with downstream buyers (Freehill, 2015). In the absence of effective market demand for quality and mandatory public regulation, the local bottling segment faces no regulatory pressure, public or private, to invest in product upgrading. Although the Bureau of Standards has recommended that all bottlers should register and comply with the national standards for packaging, labeling, and food processing, a fragmented market structure has created conditions where many bottlers operate informally, making monitoring and regulatory compliance very difficult (Hall, 2015).

Coconut Oil Processors

As of August 2015, only two processors, JamOrganix and Michael Black Farm Ltd, locally produced VCO (Myrie, 2015). The two companies manage integrated plantations, operate cold-pressed VCO plants, package under own or buyer brands, and manage post-production market logistics. Weak presence in the segment is partly because farmers do not produce mature coconuts and VCO processors have to rely

on alternative sources of supply. JamOrganix maintains harvesting rights in Greencastle Estate while Michael Black Farms Ltd owns a 156 hectare coconut plantation, producing nearly 3.5 million coconuts annually (Black, 2015).

Vertical-integration is, thus, a necessary condition currently for oil processors in Jamaica. Farmers prefer not to produce mature coconuts for two specific reasons. First, varietal quality and shorter harvest time influences market choice. Local varieties, largely Dwarf and Maypan, produce high quality tender coconuts suitable for coconut water market. Also, tender coconuts are harvested five-to-seven months after flowering, which contrasts a much longer growth period, nearly 12-month, needed for mature coconuts. Second, farmers tend to avoid falling prey to praedial larceny. In Jamaica, farmers face heightened risk when coconuts become a marketable commodity. Waiting another five months to produce mature coconuts, farmers have to bear a costly risk management strategy and they generally avoid it.

In the export market, processors face buyers that demand strict requirements, very different from the local market, for packaging and product standards. Although Michael Black Farm Ltd supplies local retailers under its own brand, “Miss Dawn,” and also packages for the local private brand, “Grace,” owned by GraceKennedy Ltd, the company has not received additional supply orders because the local market is already saturated (Black, 2015). To enter export market, the company, however, still has to build its quality control system, requiring certification for HACCP-based food safety measures. In domestic markets, even RBD oil faces stiff competition from the much cheaper soybean oil, available at US\$2.7 per liter lower price in the local market (SEPROD, 2015).

The traditional coconut oil processor, Seprod Ltd, had to exit local processing industry. Seprod Ltd, which still dominates vegetable oil processing sector in Jamaica, operating a 5,000 lit/day processing plant, and maintains its local RBD coconut oil brand, had to suspend its coconut business in 2013 (SEPROD, 2015). It now imports refined RBD oil from Trinidad and distributes it locally in Jamaica. The company could not sustain the processing business built upon importing crude coconut oil and local refinement and packaging for domestic market. Stable and predictable up- and downstream market linkages were unfulfilled prerequisites under current market conditions characterized by high price volatility. Furthermore, the RBD technology is capital intensive and unlike the VCO processing plants does not offer operational flexibility in capacity utilization (Bawalan, 2011; O'Brien, 2009). Processing, therefore, has to be large scale and under long-term fix-priced contracts with downstream buyers.

5.2. Key Trends

Although Jamaica’ coconut value chain has exclusively focused on domestic market, new entrants, especially large investors, are targeting exports. The new investments concentrate in developing VCO and coconut water processing plants involving vertically-integrated business models and large plantations. Whereas Jamaica can potentially rise to a leading regional exporter of coconut water, the country has not yet been able to adequately leverage its extensive supply of dwarf and hybrid coconut supplies. In a fragmented bottling industry, absence of chain leadership and underinvestment in

processing, packaging remain as major export obstacles for Jamaica. An overview of key recent trends is summarized below.

- **Water bottlers face an apparent shortage of coconut supply.** According to field interviews with the leading coconut water bottlers, periodic shutdowns are common due to irregular supplies of tender coconuts. Droughts, recent episode experienced in 2015, further heightens supply shortage in inland areas (Fraser, 2015; Freehill, 2015). Despite LYD challenges, coconut production volume has largely remained stable approximately around 96 million coconuts on average since 2005, reaching 98 million coconuts in 2014 (Myrie, 2015). Yet, value chain fragmentation and poor capability of bottling firms in supply chain coordination is obviously the main driver of supply shocks. Although the number of water bottlers has multiplied, many of them manage small operations and have limited sourcing reach. Annual consumption of coconuts by Jamaica’s bottling industry, represented by the three leading brands and CIB, is only between two to three million coconuts that is actually less than 3% of the reported annual production volume (Black, 2015; CIB, 2013; Freehill, 2015; Hosang, 2015).
- **VCO is attracting new investments but only under a vertically-integrated business model.** New investments target expanding plantation and integrated processing capabilities. Michael Black Farms Ltd, a leading plantation owner, has established an integrated cold pressed VCO plant with a production capacity of 200 gallons per day (Black, 2015).⁶ Another major vertically-integrated agribusiness, JP Tropical Foods Ltd, has also launched its investment plan focused on VCO production. Currently, JP Tropical Foods Ltd manages a plantation area of 57 hectares with annual produces 720 thousand coconuts supplied entirely to CIB (Graham, 2015). JP Tropical Foods Ltd plans to expand its plantation to 80 hectares by 2018, and then 160 hectares by 2020 (Graham, 2015). The new investors target export markets. Quality control is a key pillar the planned business growth. JP Tropical Foods Ltd, for instance, has already developed and staffed an integrated quality control unit, modeled after the company’s banana business.
- **Non-traditional lead agribusinesses are attracted to invest in coconut industry.** Inspired by the growing global market for coconut-flavored fruit juices, Trade Winds Citrus Ltd, the largest citrus grower and juice producer in Jamaica, has initiated its investment plan to establish integrated coconut plantation, processing and packaging plant. The investment plan supports a ‘Tetra Pak’ packaging line that should allow local pasteurization and packaging of coconut water (McConnell, 2015). Already owning four brands in fruit juice, and using ‘chilled aseptic’ Tetra Pak technology for its existing citrus brands, including the popular Tru-juice, the company has the technical capability and experience of managing advanced packaging technologies (McConnell, 2015). Additionally, the company has since 2011 been working to establish a coconut plantation in an area of nearly 85 hectares out of its 1,000 total land ownership (McConnell, 2015). Trade Winds Citrus Ltd, similar to JP Tropical Foods Ltd, and also Michael Black Farms Ltd, has established capabilities in product development, logistics, and downstream export market linkages.

⁶ 100 coconuts approximately yield a gallon of cold pressed VCO.

5.3. Upgrading Challenges

Although private investment is growing in the sector, growth and upgrading are constrained by a number of challenges. The key challenges are: supply of seedlings, poor financial services, unavailability of reliable industry statistics, access to market information and absence of industry leadership and value chain coordination.

- **Poor access to seedlings:** Whereas CIB is strong resource in growing and distribution of seedlings, the nursery system it manages is inefficient and incapable to respond to the emerging needs of the industry. Applicant farmers had to wait long periods before they receive seedlings. For large scale new investments, the wait time is several years. For instance, over a period of three years, Trade Winds Citrus Ltd have only been able to receive seedlings enough to plant seven hectares out of the 85 hectares the company allocated for its plantation (McConnell, 2015).

In many respects, the seedling distribution program has not kept pace with the industry dynamics. It has so far primarily remained a program to support LYD affected farms for restocking while investment momentum has been built with regional and global market resurgence. There is clearly now a market segment that illustrated willingness to pay for timely delivery of quality seedlings. However, CIB has continued to supply seedlings at no cost to all and even with a complementary package of fertilizer and a grant for weeding control (CIB, 2013). With the emerging circumstances, CIB may need to revisit its seedling growing and distribution program to meet the new realities of coconut industry in Jamaica, and the region.

The scale of the program has also unchanged in response to the growing demand. The existing four nurseries cannot meet current demands for seedling in the country. Besides demand for large scale plantations, Jamaica has still been rapidly losing its stock of coconut trees due to the prevalence of LYD, particularly, in coastal areas. In plantations across the country, the “cut and burn” method advised by the Michael Black Approach, has nominally been the control strategy, enforced by CIB advisors (Fraser, 2015).

The nursery program has not been expanded although the coconut seedling propagation is inherently inefficient. Each coconut has the utility of just one seed unlike other plantation crops, for instance, cocoa, for which several seeds could be extracted from a cocoa-pod (Myrie, 2015). In addition, coconut nurseries in Jamaica has a low germination rate, 30% of capacity, and only to 45-50% in a good year (Myrie, 2015). Although CIB’s four nurseries have a nominal capacity of 400,000 seedlings, the de facto annual supply has on average been much lower, 80-112 thousands during 2012-13 (CIB, 2013).

- **Multiple under-resourced and uncoordinated channels of technical service delivery:** Several agencies deliver extension services often in overlapping geographies and to the same farming community. Jamaica Agricultural Society, Rural Agricultural Development Authority and the respective industry boards for coconuts, coffee, and cocoa all provide extension services to farmers, the system, however, has been fragmented and functioned in ‘silos’. There is limited or no coordination between the different extension service provider agencies. CIB’s team of five extension officers, also constrained by transport limitations, is mandated to work with 8,000 coconut farmers across the country (Greene, 2015; Richard, 2015). For CIB extension offices, resource constraints have actually been an underlying obstacle in building farmer skills and monitoring implementation of the ‘Michael Black Approach’ in the country. The relentless spread of the LYD throughout the coconut growing areas, particularly in traditional coastal fronts, has decimated many coconut farms and inflicted a serious economic impact on many farming communities.
- **Uncertain future for the CIB:** An important source of uncertainty in the near future is the pending restructuring of CIB’s functions, which was expected to be completed by March 31, 2016 (IMF, 2015). The restructuring also involves other commodity boards besides CIB and is intended to induce efficiency, quality and cost effectiveness in delivery of public services. The plan is to amalgamate the regulatory functions of the existing several agricultural boards—the coconut, cocoa, coffee boards and the Export Division of Ministry Agriculture-- under the authority of a new public body, called ‘Jamaica Agricultural Commodities Regulatory Authority’ (IMF, 2015). Uncertainty about the future technical and commercial role of CIB is going to be a major source of concern and risk, primarily, for actors in the plantation segment.
- **Lack of industry statistics:** Unavailability of reliable industry statistics is a major risk and constraint to investment and growth. Investors, particularly foreign firms that approached JAMBRO, had to withdraw investment decisions due to supply constraints. They conditioned investment in coconut water businesses to availability of a certain threshold of raw material supply (Straw, 2015). While the existing industry players in coconut water only account for two to three percent of the reported annual supply, little is known about the potential to increase commercial supply of coconuts and support large scale processing plants. Absence of the industry level relevant has also been a major obstacle to setting policy priorities for public and private collaboration in promoting seedling supply and promoting exports.
- **Weak market intelligence and export promotion:** The problem in Jamaica arises from a perceived irrelevance of export promotion. Stakeholders point to coconut supply shortages. Jamaica’s coconut industry is focused on domestic market. CIB currently does not fulfill any functions related to market research, promotion, and product development. Firms, such as Michael Black Farms, who try to target export markets have little institutional support in market promotion and information related to standards and buyer requirements. Weak end-market linkage has constrained understanding of customer needs, even in the large domestic tourist market, resulting in missed opportunities for product development, value-addition, and branding and market development.

- Absence of regulatory efforts for standardization and certification:** Jamaica has an accredited certification body, the National Certification Body of Jamaica (NCBJ), Bureau of Standards, that has developed local food safety standards, but compliance to the standards is voluntary (Scott-Brown, 2015). Absence of a mandatory public enforcement mechanism has had the dual negative effects. It discouraged investment in private sector capabilities that could have eased transition and entry into export markets with more restrictive standards. Secondly, it deprived NCBJ of user fees and undermined development of national certification institutions. Whereas NCBJ has been accredited by ANSI-ASQ National Accreditation Board for ISO 9001 and ISO14001, it had to suspend the latter due to low demand in the local market for ISO14001 certification (Scott-Brown, 2015). NCBJ is planning to acquire accreditation for ISO22000, an important capability related to food safety, to certify local businesses (Scott-Brown, 2015). It is not clear how this would impact local food and beverage industry unless processors and retailers supplying domestic market are mandated to comply with the adopted local food safety standards.
- Risk of praedial larceny:** Coconut farmers have to bear additional production cost to prevent larceny. It is a common challenge to all farming communities and it has recently instigated a national level response. In early 2015, a Praedial Larceny Prevention Unit, institutionally housed at the Ministry of Agriculture and Fisheries, was established to address larceny in farms (Jamaica Observer, 2015). The challenge continues to threaten coconut farms although developing good rapport with the surrounding communities in some cases has helped identify and arrest perpetrators. The whole harvest could swiftly be lost according to interviews with several farmers (Freehill, 2015; Graham, 2015; Richard, 2015). Fearing loss of harvest to larceny, farmers tend to reap their plantations immediately after coconuts become a marketable commodity. With over 90% of coconut farms comprised of smallholders and praedial larceny a discouraging factor for them to produce mature coconuts, vertical-integration has become an inevitable business model to start producing VCO in the country.

5.4. Potential Upgrading Opportunities

5.4.1. Organizational upgrading

Facilitate value chain partnership to reduce transaction costs and organize the production system. The fragmented value chain structure renders the relevant actors to bear high transaction costs in outsourced models of coconut production. Firms' propensity for investment, triggered by the recent market momentum, has opened a window of opportunity for value chain collaboration. However, investment by individual firms, mostly small actors, is insufficient by its own to drive upgrading in the industry value chain. The entrepreneurial resources are currently devoted to keep individual water bottling businesses afloat in domestic market. These small firms are devoid of necessary capabilities to coordinate supply chains, engage in processing and packaging to extend shelf-life, and invest in quality control and marketing strategies to enter high value tourist and/or export markets.

Competitive growth of the industry, therefore, is as much a function of the internal capabilities and performance of individual firms as it is of the nature of transactional relationships between interdependent groups of actors across the value chain. External facilitation is essential because the

upcoming large investors have opted for integrated plantations due to the relatively high transaction cost of working with smallholders.

Without competitive integration of smallholder producers, the committed large-scale investments by agribusiness firms, such as Trade Winds Citrus Ltd, and JP Tropical Foods Ltd, will not drive industry growth either. The production structure is dominated by smallholders. Value chain partnerships or alliances are, therefore, needed to bridge and develop inter-actor linkages among the leading agribusinesses, public institutions, and producer groups. These alliances should focus to not only strengthen productive capabilities of value chain operators but also develop workable solutions, e.g., forward contracting, to reduce transaction costs along the value chain. CIB is best positioned to facilitate the process by leveraging its technical capabilities, particularly, in seedling production. Specifically, institutional support and catalytic interventions are required to build consensus in forming alliances and safeguarding against the unintended consequences of asymmetric power relationships in the chain (Abdulsamad, Stokes, et al., 2015).

5.4.2. Process Upgrading

Improve productivity in coconut plantations. Although intercropping is a common practice among coconut farmers in Jamaica, poor farm management practices and the resulting frequent loss of trees to LYD negatively impact farm productivity. Experimental approaches in Jamaica have illustrated that appropriate management of farms is as effective or even more so in controlling LYD as application of chemicals, tetracycline, which may also lead to chemical residues in coconuts (Myrie, 2015). The Michael Black Approach has successfully curtailed the disease in farms where it was appropriately implemented. The approach essentially involves a four-step integrated farm management practice (Black, 2015): 1) timely identification of infected trees through regular surveillance and monitoring; 2) immediate removal and destruction, usually, burning of infected trees; 3) replanting healthy coconut trees; and 4) weed control and proper fertilization.

Control measures are ineffective unless they are prevalent practice in all farms. Whereas the handful of large farms maintains internal control capabilities, smallholders largely don't practice. Technical knowledge is required to timely identify the infected trees, immediately fell and burn them in order to prevent spread of the disease. Proximity of plantations and the negative externality of infected farms have so far undermined proper control of the disease.

Farm management has actually proven more effective than development of new resistant varieties. Since 1970s, the once perceived resistant varieties, such as Malayan Dwarf and then Maypan, have shown growing vulnerability to LYD infection (Myrie, 2015). Experience has illustrated that genetic disease resistance may only persist for up to 15 years (Johnson & Bourdeix, 2014). Consistently, coconut plantations of mix varieties are more resistant to LYD spread according to Michael Black Approach compared to a single resistant variety (Black, 2015). Although research is essential to introduce new varieties focusing on yield and quality of coconuts, LYD control is fundamental to improving productivity in coconut plantations and is dependent on appropriate management practices.

5.4.3. Product upgrading

Improve packaging and quality and standard compliance in the coconut water industry. As a regional hub country, home to relatively large population of Dwarf and Maypan tree varieties, and hosting a capable local fruit juice industry, Jamaica has the potential to become the leading regional producer and exporter of coconut water. So far, the local industry has, however, exclusively supplied chilled plastic-bottled water for domestic market. Upgrading to processing and packaging, including Tetra Pak packaging, is essential to enter export markets. Product shelf-life and compliance with the safety standard are critical requirements which are currently lacking.

In global markets, product upgrading has been pervasive, with new product launches registering more than 540% increase between 2008 and 2012 (Beverage Industry, 2013). In addition to pure coconut water, new products include blends of coconut water with pineapple, mango, orange, tea and coffee – fruits products commonly grown and processed in Jamaica (Graham, 2015; McConnell, 2015). Local firms, such as JP Tropical Foods Ltd, Trade Winds Citrus Ltd, that currently manage industrial scale fruit production and processing operations in Jamaica, have committed investment in coconut industries. Realization of these investments offers the potential to drive coconut water exports and industry growth.

Although fresh coconut water might continue to dominate domestic market, packaged products have grown to establish a loyal global customer base in export markets, particularly, in the U.S. which is the largest export market for Jamaica. Nearly 30% of U.S. household's consume coconut water and sport drink customers prefer to see more products with coconut water (Mintel, 2014).

Market linkages, preferably partnerships with private brands in export destinations, are essential and common to establish sustained trade relationships in food and beverages industry. Partnership with retailers and private brands, even for established manufacturers such as Vita Coco, appears essential for marketing and promotion. In 2014, Vita Coco launched its Vita Coco Sport as part of its "Made to Matter" distribution deal with Target which partnered with 17 brands to expand natural, organic, and sustainable offerings (Mintel, 2015). In the U.S., private brands generally target the market segment that also comprises the major consumer group for coconut water. Approximately 48% of customers aged 18-34, the key target of private brands according to Mintel, purchases coconut water against 32% and 9%, respectively, for 35-54 and over-55 age groups (Mintel, 2014). According to Mintel market research, respondents who purchase private brands also are interested in products that are shelf-stable, suitable for on-the-go usage, and are sold in environmentally friendly or recyclable packaging (Mintel, 2014). In summary, market relationships negotiated with retailers and distributors and upgrading in packaging and standard compliance are key determinants of Jamaica's entry in high value coconut water export markets.

Table 19: Recommendations for Upgrading

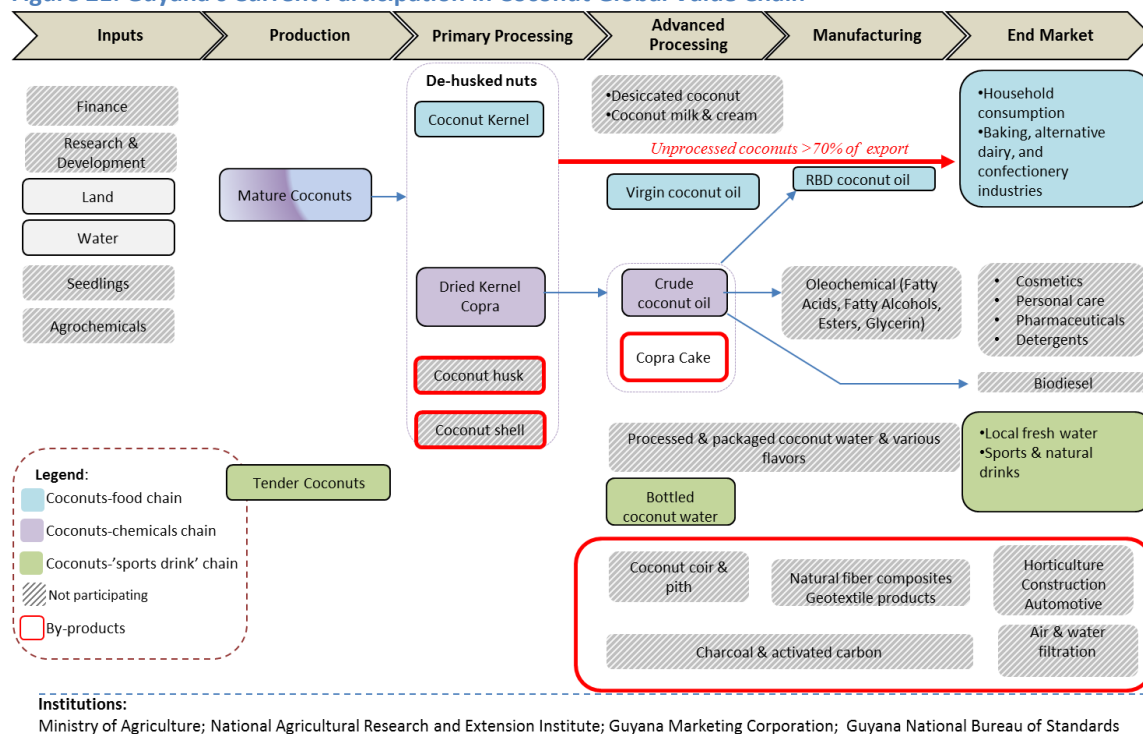
Recommendation	Rationale	Potential Lead Organizations	Stakeholders Workshop's Prioritized Strategy Objectives
Facilitate public-private partnerships to develop and implement a national upgrading strategy	A public-private partnership approach focused on national level objectives is essential to 'unlock' seedling supply and export-oriented private investment in the industry.	<ul style="list-style-type: none"> • Coconut Industry Board • Ministry of Agriculture • Farmer groups • Processors • Water bottlers • Fruit Juice producers (e.g., Trade Winds Citrus Ltd) • Jamaica Promotions Corporation • Bureau of Standards Jamaica • Scientific Research Council • Caribbean Agricultural Research & Development Institute • International Trade Center 	Strategic Objective 1 - Develop a business model for the industry and support commercially driven development (including market intelligence).
Develop a database of coconut plantations as well as estimated local supply and use of coconuts	<p>Despite an apparent supply shortage of coconuts, the bottling/processing sector currently accounts for a very small share of total production.</p> <p>Information on the potential supply and flow of coconuts helps:</p> <ol style="list-style-type: none"> a) drive investment decisions by the processing sector b) establish a national traceability system as an important tool to control praedial larceny and also prepare for the traceability requirements in high value markets 	<ul style="list-style-type: none"> • Coconut Industry Board • Ministry of Agriculture • Caribbean Agricultural Research & Development Institute • Farmers/Farmer Groups 	
Strengthen and expand the current	Jamaica's strong technical	<ul style="list-style-type: none"> • Coconut Industry Board 	Strategic Objective 3- Increase

<p>program of seedling distribution and advisory services to farmers (See pp.29-34 for regional details)</p>	<p>capabilities are currently underutilized.</p> <p>CIB experience can critically support regional R&D collaboration.</p> <p>A robust system of extension services is needed to implement Michael Black Approach in controlling LYD</p>	<ul style="list-style-type: none"> • Ministry of Agriculture • Caribbean Agricultural Research & Development Institute 	<p>availability of high quality seedlings (disease resistant) and develop rapid multiplication systems for increase in production</p> <p>SO1.1 Review the support role of CIB Improve market intelligence and commercially driven development of the sector</p>
<p>Incentivize export-oriented investment and market linkages, including the tourism markets in the Caribbean, for coconut water products</p>	<p>An almost exclusive focus on domestic market and weak linkages with end-markets undermine knowledge of customer needs in high value markets.</p> <p>Understanding dynamics of the coconut markets is necessary to enduring trade relationships with the high-value tourism or export markets</p>	<ul style="list-style-type: none"> • Jamaica Promotions Corporation • Processors • Fruit Juice producers (e.g., Trade Winds Citrus Ltd) • International Trade Center 	
<p>Establish a quality control mechanism to assure quality of coconut products for domestic and export markets (See p.31 for regional details).</p>	<p>The unregulated food and drink product market is not only a risk to public health but also to investment and growth.</p> <p>Adoption of food safety standards is currently voluntary in local markets.</p>	<ul style="list-style-type: none"> • Processors • Bureau of Standards Jamaica • Coconut Industry Board • Scientific Research Council • Inter-American Institute for Cooperation in Agriculture • CARICOM Regional Organization for Standards and Quality 	<p>Strategic Objective 5- Improve compliance to standards good management practices for coconut processors</p>

6. Guyana’s Coconut Value Chain

Guyana has emerged as the regional supply basket of coconuts over the last five years. The country exports a range of coconut products with an estimated total export value of US\$4.35 million in 2013 (Sealey-Adams & Hanif, 2015). Ranked by shares of export value, the top export product is de-husked coconuts, accounting for approximately 70% of total export in 2013 (Table 20). A distant second is copra, or dried coconut kernel, followed by crude coconut oil, each, respectively, accounting for just 15% and 9% of total export value in 2013 (Sealey-Adams & Hanif, 2015). The share of non-traditional export products—primarily coconut water-- still remains small, just about 2% of total export in 2013 (Table 20). Figure 21 illustrates Guyana’s participation in coconut GVC.

Figure 21: Guyana's Current Participation in Coconut Global Value Chain



Source: Author

Over the last five years, coconut value chain in Guyana has undergone a profound structural transformation. Driven by the regional and global markets, alternative products to copra, and copra oil, have experienced burgeoning local and regional markets. Particularly, de-husked coconuts have since 2009 become a highly-demanded export product in regional markets. The segment export volume has sharply increased, approximately by ten-fold in 2009 and since then by 10% on a yearly basis for the subsequent four years, reaching 10,213 MT in 2013 from just 268 MT in 2008 (Sealey-Adams & Hanif, 2015). Simultaneously, new market channels have also emerged for the non-traditional products, such as coconut water and VCO that supply domestic and export markets.

The cumulative outcome of these market developments has since been shortage of copra supplies to the local copra oil mills, culminating to their forced closure or far below capacity operations. Between

2009 and 2014, export of crude coconut oil has consequently declined on average by 15% per year (Sealey-Adams & Hanif, 2015). Whereas the coconut value chain in Guyana had to undergo a functional downgrading-- a shift from coconut oil to unprocessed coconut exports-- the farming communities have gained from the rising farmgate prices that more than tripled over the period.

Guyana's export market is still extremely concentrated. Only Dominican Republic and Trinidad & Tobago together accounted for over 80% of the total export value in 2013 (Table 20). The former is the main export destination for de-husked coconuts (Table 20). In contrast, export to Trinidad & Tobago is diversified. Low-cost and regular boat transportation -- directly linking Pomeroon region, the main coconut producing region in Guyana with Trinidad & Tobago—is a factor for increasingly diversified coconut trade. Although Guyana has started to directly export coconuts to the U.S. and Canada, these markets continue to account for relatively small shares of the total export value.

Table 20: Major Export Markets by Product Category, 2013 (Current US\$ 1,000)

Country	De-husked Coconuts		Copra		Crude Coconut Oil		Coconut Water		Copra Meal		Total	
	Value	Share	Value	Share	Value	Share	Value	Share	Value	Share	Value	Share
2013 Total	3,004		655		390		104		98		4,251	100%
Dominican Republic	2,549	84.9%									2,549	60%
Trinidad & Tobago	81.5	2.7%	603	92.0%	120	31.0%	104	100%			909	21%
Dominica	88.5	2.9%			270	69.0%					359	8%
Barbados	18	0.6%	52	8.0%					98	100%	168	4%
Canada	151	5.0%									151	4%
United States	116	3.9%									116	3%

Note: Shaded cells denote absence of the country among the top three export destinations for the respective products
Source:(Sealey-Adams & Hanif, 2015)

6.1. Lead Actors and Governance

Coconut is a versatile produce with multiple end markets. Coconut producers, therefore, face alternative local market channels and buyers that directly source from farmers. The different types of local firms constantly contend for a lead role in coordinating and influencing the local supply chain. The traditional governance structure has been reshaped by the rise of alternative markets driven by dynamics at the regional and global levels. The change has brought to bear significant implications for potential upgrading strategies and affect smallholder producers in significant ways. The remainder of this section provides an overview of the recent trends in local market structure and examines key actors and their role in governing the local value chain.

Coconut Exporters

Since 2009, coconut exporters have emerged as the new lead actors coordinating the local coconut value chain. They source de-husked coconuts in large volumes, aggregate, and arrange for container shipments from Guyana to destination markets, primarily Dominican Republic. Exporters source coconuts either directly or through their network of local agents whose activities they finance. Buying

power in a consolidated market segment, where five large firms control exports, has enabled exporters to influence local farmgate prices.

Local market trends are also influenced by the requirements set by the buyers in destination markets. In a typical buyer-driven chain, exporters manage local sourcing decisions according to the delivery schedules, quality standards and shipment mode demanded by the buyers. Buyers in Dominican Republic, who are processors and demand low grade coconuts, require shipments in dry containers, costing US\$1,700 per container (Ali, 2015). Although this shipment mode considerably reduces transportation costs, by nearly 40% compared to refrigerated containers, the heat usually causes 10-15% spoilage in containers, each carrying 55,000 to 60,000 coconuts (Ali, 2015; Alphonso & Narine, 2015). The loss is equally born by the exporter and buyer despite a Free on Board (FOB) transaction, which illustrates the negotiating power of buyers. In contrast, buyers in the U.S. and Canada demand refrigerated containers, and higher grade coconuts for fresh consumption. Shipments to these markets are also supposed to meet specific quality standards, including requirements for food safety and upcoming traceability requirements under the FSMA.

Buyer power has also engendered significant implications for competition and distribution of value along the chain. Reallocation of their sourcing contracts among a growing number of exporters not only spurred intense local farmgate competition but also suppressed export prices. Over the course of the last two years, the sourcing strategy of buyers in Dominican Republic has effectively increased the number of exporters from one to 10 firms before some of them were forced out of business due to cut-throat competition over supply contracts; the number of exporters effectively declined to five firms in 2015 (Alphonso & Narine, 2015). As a consequence, despite the growing farmgate prices, export prices have declined by US\$0.04 per coconuts, lowering the export margin of a container by US\$2,200 (55,000 coconuts per container on average) (Ali, 2015). In general, the rise of exporters as the new powerful group of actors has challenged the traditional system, dominated by local oil processing industry.

Coconut Processors

Coconut processors include firms in both industrial scale copra oil and the small but growing VCO industries. Although local copra market has significantly declined since 2009, the processor firm continues to internally produce and also source copra from farmers, process copra into crude coconut oil, and then refine and package it for distribution in the local market or alternatively export crude oil to countries in the region, predominantly Trinidad and Tobago. Oil processing business embodies relatively large asset-specificity costs with respect to investment in processing plant and development of local brand(s).

Traditionally, industrial scale processors had a leading governance role in the local value chain. In local monopsonistic markets, processors coordinated local market prices and defined quality attributes, such as moisture content and fungal infection, for dried coconut kernel or copra (A. DeFreitas, 2015). As of 2015, from the two industrial scale operators in Guyana, only Pomeroon Oil Mills Inc. remained operational at nearly 25% capacity for which raw material was supplied mainly from its integrated coconut plantation (Alphonso & Narine, 2015). The other processor, Maharaja Oil Mills on the East Coast, has operated periodically, depending on the length of time it had to wait to accumulate the

needed volume of copra. Besides exporting crude oil to the region, Pomeroun Oil Mills has also refined coconut oil and locally marketed the product under its brand ‘Golden Brook.’

Although Guyana’s VCO industry is still nascent and currently has insignificant role in coordinating the value chain, it is heading for a rapid growth. As of August 2015, five small entrepreneurs locally produced VCO , but the production volume was small and inconsistent in quality (R. DeFreaitas & Amrkon, 2015). The industry, however, has recently attracted new investments for large scale operations (See p. 68 for details).

Water Bottlers

Water bottlers own integrated plantations but also source tender coconuts from farmers, manage water bottling plants, and supply bottled water to both domestic and Trinidad markets. Bottlers in Guyana are also typically small entrepreneurs managing plants that range in capacity from 5,000 to 10,000 coconuts per week (Silva, 2015). The only exception is Pomeroun Export Producer’s Association (PEPA). The entity is a business venture between Virgin Caribbean Ltd, a Trinidad-based agro-processor, and the legally registered association of 150 local farmers in Pomeroun, Guyana (IDB, 2014). PEPA⁷ has an existing plant capacity of 60-85,000 coconuts per week; it has also recently invested in expanding the capacity to reach 300,000 coconuts per week within the next three years (A. DeFreaitas, 2015). PEPA received investment support from the Inter-American Development Bank, Enterprise Innovation Challenge Fund. Awarded in 2014, the grant is intended to establish farmer organizations and address the existing asymmetry in bargaining power, inefficiency and coordination issues in the chain (IDB, 2014).

Notwithstanding PEPA’s business, Trinidadian buyers control Guyana’s coconut water trade. Trinidad-based private brands, or traders, set delivery schedules, determine packaging specifications, and generally provide plastic bottles and labeling material to local bottlers (Silva, 2015). Given their control of sea transportation between Pomeroun region of Guyana and Trinidad, these buyers also arrange for inland logistics, custom clearance, and regional transportation usually by boats. The trade pattern is compatible and supportive of small-scale dominated coconut water industry in Guyana.

A handful of local brands also exist. These enterprises are based in Georgetown and manage small operations often insufficient to produce a container-load, a minimum efficient quantity for exports via ports in Georgetown (Trotz, 2015). Accounting for a small segment of the coconut value chain, the fresh water bottling industry will continue to have minimal governance implications for the coconut industry and largely remain dependent on Trinidad for exports.

Guyana Marketing Corporation

Guyana Marketing Corporation (GMC) is a public-sector institution. As an agency, affiliated to the Ministry of Agriculture, GMC has delivered key marketing services to enterprises involved in production and export of non-traditional agricultural products, including coconuts. GMC’s key services include (Sealey-Adams & Hanif, 2015):

- Brokerage of local and international market linkages through ‘Guyana Shop’

⁷ As of August 2015, PEPA was not operational pending resolution of some legal issues.

- Fee-based cold chain services—storage and transport-- to agro-processors and exporters
- Packaging services to exporters of non-traditional products, including coconuts
- Providing documentation services to exporters of non-traditional agricultural products

The agency, however, does not have any regulatory authority.

6.2. Key Trends

The rise of alternative markets has transformed the local value chain. Local coconut prices have sharply increased although the country had to ‘functionally downgrade’. A key trend that was driven by growing export of de-husked coconuts since 2009 and the emerging strong alternative market channel. These market developments not only attracted new investors in non-traditional markets of VCO and coconut water, but also drawn policy attention to support the industry. An overview of key recent trends is summarized below.

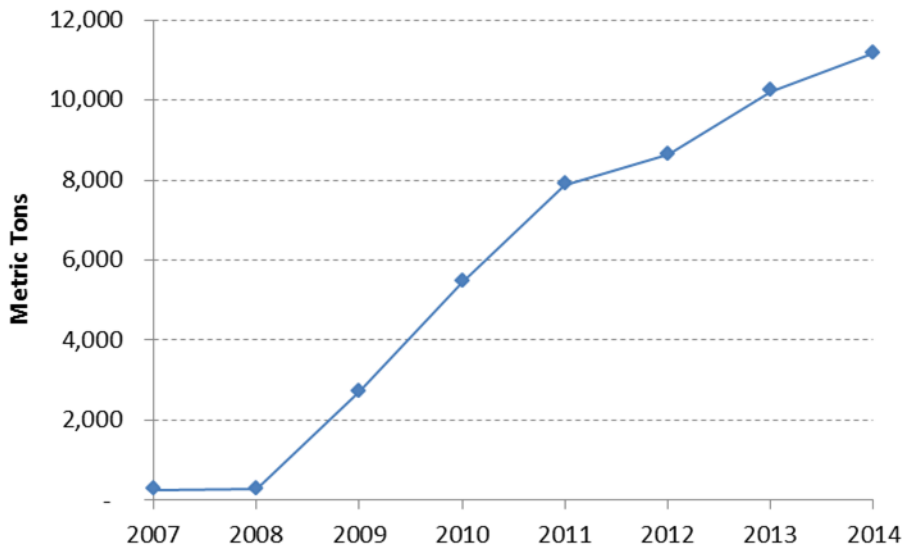
- **Shortage of copra has spurred a rapid decline of coconut oil processing industry in Guyana.** Supply shortages of copra to local processing plants, primarily due to regional market circumstances, seem unlikely to change, at least in the medium term. The shortage of copra has arisen, primarily, due to the development of alternative marketing channels whereby farmers can sell ‘whole coconuts’ instead of undertaking the labor-intensive task of producing copra (Aowmathi, 2015). Alongside export of de-husked ‘whole coconuts’, local coconut water and VCO enterprises have created additional alternative markets for coconuts although they are currently nascent players. Coconut farmers now have the opportunity not to undertake the arduous task of producing copra, instead, participate in the readily available coconut markets offering higher prices.
- **Regional market dynamics compelled coconut oil processors to “downgrade” and seek diversification.** Driven by local shortages of copra, and new opportunities in VCO market, industrial scale copra oil processors had to embrace ‘functional downgrading.’ Over the last five years, Pomeroon Oil Mills Inc., an industrial oil processor with a production capacity of 2,000 tons a month, has itself become a leading exporter of unprocessed coconuts while its processing plant has been deprived of copra and running at approximately 25% of plant capacity (Alphonso & Narine, 2015). Copra supply to Pomeroon’s plant has drastically shrunk, declining from approximately of 340 to just 40 MT per month (Alphonso & Narine, 2015).

As the owner of a local coconut oil brand and the major oil processing plant in the country, the company continues to maintain its presence in the coconut oil market. The firm has, however, recently planned investing in VCO to diversify its operations. Similar to the other countries in the Caribbean region, where coconut oil processing industries collapsed over the last two decades, the ongoing shift in product mix has recently mystified the future of copra oil production in Guyana as well.

- **Guyana has emerged as a regional supply ‘basket’ of coconuts in particular to Dominican Republic.** Since 2008, Guyana has become a major supplier of de-husked coconuts to a growing coconut processing industry in Dominican Republic. The quantity of exports has grown from less than 300 tons in 2007 to over 11,000 tons in 2014, on average six folds per year during the period (Figure 22).

Although this trend is driven by the sourcing strategy of a handful of lead processors in Dominican Republic, the change has strengthened the emergence of a regional coconut value chain.

Figure 22: Guyana's Export of Husked Coconuts, 2007-2014



Source: (Sealey-Adams & Hanif, 2015)

- New investors are targeting VCO production in Guyana.** Whereas VCO is currently produced by cottage industries for the local market, investment plans have been advanced, as of August 2015, in establishing two vertically-integrated plants, one in East Demerara River, and the other in Pomeroon, the two major coconut growing regions in Guyana. In East Demerara, the plant has an integrated plantation of approximately 280 hectares, currently producing 20,000 coconuts a week, with further sourcing option of 300,000 coconuts per week from outgrowers in the area (R. DeFreitas & Amrkon, 2015). As a joint venture between a local plantation owner and a former trader from the Ivory Coast, the prospective cold-pressed plant will produce five tons of VCO per day, sufficient to supply a container-load for export per week. The venture is currently testing export markets in Europe, North America, and the Caribbean region; its acquisition of Ecocert Organic Certification is expected to be completed in 2016 (R. DeFreitas & Amrkon, 2015). As for the Pomeroon-based plant, although the details of business plan, including a timeline for its full-scale operation, were not shared, the plant will enter pilot production to test the markets in the Caribbean and U.S. by 2016 (Alphonso & Narine, 2015).
- Local price of coconuts has increased.** Farmers have benefitted from significantly higher local coconut prices. Since 2008, farmgate price of mature coconuts have risen three-fold, increasing from US\$4 per 100 coconuts in 2008 to US\$12 per 100 coconuts in 2015 (Sealey-Adams & Hanif, 2015). The growth rate, however, has receded. After an initial sharp increase, farmgate prices only grown by 30% between 2011 and 2015 (Sealey-Adams & Hanif, 2015). In contrast, local market price of tender coconuts has apparently continued to rise, reaching US\$17 per 100 coconuts in 2015,

which indicates a 40% premium over mature coconuts (Sealey-Adams & Hanif, 2015). The share of tender coconuts in the export portfolio, however, has been considerably small, so the market prices could be very volatile depending on local supply and demand imbalances. In 2013, coconut water represented just 2% of the total export value.

- **Coconut industry has ‘climbed up’ the policy agenda although policy relevance and consistency could be improved.** The Ministry of Agriculture convened coconut stakeholder conferences in 2009, and then in 2013, expressing strategic policy support to resuscitate Guyana’s coconut industry (Stabroek News, 2013). Policy makers have recognized the importance of local coconut industry in promoting agricultural diversification -- sugar and rice now account for approximately 75% of value of total crop production in Guyana (MoA, 2013). In 2010, the government practically launched a plan to resuscitate the Hope Estate Plantation, a state-owned grove located in East Coast Demerara (Gildarie, 2010). The initiative intended to set up an integrated coconut water plant in partnership with the private sector. Although little details could be found about the initiative and particularly as to why the implementation did not progress, the government has established yet a new board in 2015. The new board is chaired by Dr. Jamei Aowmathi, a local herbal medical doctor, who replaced Dr. Oudho Homenauth, director of National Agricultural Research & Extension Institute (NAREI), and has been tasked to lead governmental efforts in revitalizing the Hope Estate plantation (Aowmathi, 2015). At the time of the field interviews in August 2015, the details of a prospective strategy aimed at resuscitating the state-owned plantation was unclear.

6.3. Upgrading Challenges

The coconut industry in Guyana promises a great potential for the country as well as the Caribbean region. But, the industry’s growth in Guyana is undermined by the following challenges: small-scale and fragmented industry structure for non-traditional products; shortage of labor and competition over workforce from the mining and logging sectors; poor financial services, limited industry statistics, absence of industry leadership and access to market information and quality control infrastructure. A detail overview of these challenges is provided below.

- **Small-scale and fragmented industry structure:** Guyana coconut industry is a ‘world of samples.’ The industry is predominantly comprised of small entrepreneurs. Since 2005, each has launched one or a range of non-traditional coconut products -- including coconut water, VCO, and coconut milk and cream (Brijmohan, 2015). Not engaged in collaborative associations, individual enterprises produce small volumes, typically less than a container-load which is a minimum quota for ship liners (Doris et al., 2015). Aggregation, solely for transportation purpose, is not practiced to avoid unintended consequence related to illicit drug transshipments from the country (Doris et al., 2015; Oditt, 2015).

Due to high costs of transaction as well as market promotion, individual enterprises fail to penetrate and/or maintain export market presence. The only firm exporting milk and cream had to suspend production after the firm lost its broker in European market following the global financial crisis. It has since not been able to find a substitute (Brijmohan, 2015). Whereas Guyana currently exports small volume of coconut products, sustaining the recent industry momentum is hinged on successful

export promotion and growth. The country has a small domestic market, total population of 763 thousand in 2014 (The World Bank, 2015).

Weak trade links with the end-markets have also deprived local firms of access to essential market information and buyer requirements for exports. Firms often face shipment rejection with costly implications due to unclarity about market standards. According to field interviews, each of the two coconut exporters had a container rejected by the Canadian port authorities in 2015 and sustained a loss of approximately US\$25,000 per rejected container (Ali, 2015; Alphonso & Narine, 2015).

- **Shortage of labor in coconut plantations:** With the rising mining sector, labor has become a dominant element of operational cost for coconut plantations in Guyana. Ironically, coconuts' harvest and post-harvest collection with periodic land clearing and preparation are also very labor-intensive activities. Because coconut trees produce regular harvest throughout the year, plantation owners heavily depend on hired labor (A. DeFreaitas, 2015). With the country's small labor force of 323,000 workers, Guyana's coconut industry has to compete for labor with the lucrative mining and logging sectors (Doris et al., 2015; The World Bank, 2015). The plantation sector had to offer competitive wages to attract and retain workforce. The current wages are much higher than the US\$250 per month legal minimum wage, i.e. US\$25 per day in Georgetown and increasingly higher wages, reaching US\$50 per day in remote areas away from Georgetown (Doris et al., 2015).

Although Guyana has comparative advantage in terms of its natural resource endowments, labor cost has largely eroded the margin for plantation owners. Labor cost in Pomeroun is now nearly 50% of the total farmgate revenue (A. DeFreaitas, 2015). Labor shortage is exacerbated with emigration rate for Guyana. It is estimated that 90% of highly skilled Guyanese living abroad (Compete Caribbean, 2014). Shortage of labor is, thus, going to remain a key challenge for upgrading and industry growth in Guyana.

- **Limited financing options for actors across the value chain:** As a common challenge for small businesses, poor access to finance was underlined by value chain operators. Financial institutions in Guyana require very high collateral requirements, 200% and almost exclusively real-estate based (Indar & Roberts, 2015). For small business, the nature of collateral requirement has made borrowing from the commercial banks literally impossible.

Alongside the six commercial banks⁸ in the country (Compete Caribbean, 2014), there are also two micro-finance institutions –Institute for Private Enterprise Development (IPED) and Small Business Development Trust (SBDT), that cover almost all regions of the country. However, they offer short-term lending and also charge high interest rates ranging between 15% and 41% that vary with type of loan and loan security offered (Das, 2015). In agricultural sector, IPED's and SBDT's portfolios are concentrated the on rice and sugar sectors. Loan terms, high interest rates and collateral

⁸ The six commercial banks are Republic Bank (Guyana), Guyana Bank of Trade and Industry, Bank of Nova Scotia, Demerara Bank, Citizens Bank of Guyana and Bank of Baroda.

requirements are the underlying challenges of access to financial services and investment in plantations in Guyana.

- **Absence of R&D and technical extension services:** Coconut industry doesn't have specialized agencies and services similar to those for Guyana Sugar Corporation and Guyana Rice Development Board (MoA, 2013). Access to coconut seedlings is a function of farmers' social networks. Although NAREI owns two coconut groves, having 500 coconut trees, it doesn't have any programs for seedling production and distribution (Sears, 2015). NAREI allegedly serves a networking service to connect farmers seeking seedlings with those that have available for sale. This, however, is a challenging task especially when plantations are small and scattered farming structure. Although farmers currently buy coconut seedlings for US\$0.48 per tree in the local market (Homenauth, 2015), the quality or variety is not certified.
- **Lack of industry statistics undermines long-term planning and investment:** Reliable data on coconut plantations, the stock of trees, their age profile and varieties are not available. As of August 2015, NAREI has started data collection process to benchmark coconut plantations (Homenauth, 2015). Unavailability of reliable statistics heightens investment risk and prevents collaboration by private and public sectors to plan and prioritize investment decisions.
- **Knowledge of quality and processing standards is weak:** The industry faces a dual market system for domestic and/or regional on one hand and the extra-regional export markets on the other. The former doesn't mandate compliance with specific standards although there are national and regional food safety standards. Adoption, however, remains voluntary. A key export constraint, particularly for non-traditional products, which are processed and largely consumer products, is poor understanding of quality standards.

6.4. Potential Upgrading Opportunities

6.4.1. Organizational Upgrading

Create value chain partnerships to reduce transaction costs and build economies of scale in quality control, marketing and service delivery. Any future investment in Guyana's coconut value chain related to process, product, and/or functional upgrading, particularly at an industrial scale, strongly depends on reducing transaction costs involved in assuring flow of raw materials and linkages between agents in the value chain. With several alternative markets now competing over raw material supply, a fragmented supply chain imposes high risk and transaction costs.

The risk profile has significant implications for future investment and industry growth in the country. Most obviously, the recent 'functional downgrading' by the country's major coconut oil processor has heightened risk perception of potential investors for industrial scale processing ventures that heavily rely on an out-grower supply chain model.

Alignment of upgrading strategies across the value chain is, therefore, an underlying competitiveness driver to reduce transaction costs and investment risks due to asset specificity. In Guyana, not only capable firms are limited in number, but also for the handful of firms present, such as Sterling Products

Ltd., investment has become conditioned to possibility of vertical-integration (Indar & Roberts, 2015). On the other hand, vertical-integration has proven infeasible due to the predominantly smallholder production structure and prohibitively high cost of land preparation for new plantations (Alphonso & Narine, 2015). Without organizational upgrading to strengthen value chain linkages, the industry will suffer from the vicious cycle of underinvestment.

Organizational upgrading represents transition from fragmented to coordinated marketing channels for the value chain. It involves ‘firms-farmers’ partnership or alliances to facilitate coordinated forms of transaction governance. It ensures guaranteed market access to smallholders as opposed to potential alternatives: vertical-integration or fragmented supply chains. The goal is to avoid the high costs involved before and after effecting the transactions pervasive in fragmented supply chains. The former are costs related to search, information gathering, and negotiations needed to make the transaction. The latter occurs – both in the form of social and financial costs--when one side of the transaction fails to uphold their commitments, especially in the context of coconut value chain in Guyana where actors rely on oral commitments, not a written contract. Under such market conditions, opportunistic behavior is the risk.

Very importantly, the convening or facilitating intervention of institutions (including international agencies) is required to address value chain power asymmetry, an inherent barrier against partnerships in value chains (See pp.47-48 for details). Informed by GVC governance concepts and the coordinating role of lead firms, interventions by international agencies can facilitate establishment of a stakeholder platform between firms, farmers, and relevant public agencies. Sustainability of these interventions is strongly dependent on a shared strategic vision for value chain upgrading committed to by private sector actors, institutions, and policy making bodies. External facilitation should focus on efforts that results in inclusive growth, maximization of benefit-cost ratios, and minimization of transaction costs at an industry level.

6.4.2. End-market Upgrading

Leverage the nascent market linkages established by de-husked coconut exports to expand export portfolio. Guyana exports de-husked coconuts to fresh fruit consumer markets in the U.S. and Canada. Alongside the processing industry, the consumer market segment accounts for a sizeable share of coconut markets in the region and North America. The highest grade coconuts are actually channeled to this segment. Buyers in destination markets are typically retail supermarkets.

According to interviews with the Guyanese coconut exporters, the U.S. market offers an approximately 60% price premium over export markets in the Caribbean region, and buyer requirements are also less stringent than the Canadian market (Alphonso & Narine, 2015). While Guyana has already entered into these markets, it has remained a marginal supplier (Table 20). In 2013, Guyana accounted for less than 0.3% of the total US\$46 million de-husked coconut exports to the U.S. market, supplied mainly by Thailand (36%), Philippines (26%), Mexico (26%) and Dominican Republic (11%) (UNComtrade, 2015).

The existing market linkages, however, offer Guyana the opportunity to expand fresh coconut exports as well as progressively develop new export products. Besides fresh coconuts, the retail supermarkets in the U.S. have developed private brands of coconut products, such as VCO or coconut milk, which

Guyana could supply. Strengthening market relationship with these buyers would also help access to critical market information particularly in light of regulatory changes in the U.S market. The FSMA, which is being rolled out over 2015-2018, requires supplier verification, food safety certification, and traceability for all food imports to the U.S.

6.4.3. Product Upgrading

Establish industrial-scale VCO production for export. VCO offers Guyana considerable opportunity for investment and export from several perspectives. First, VCO plants are comparatively scale independent when compared to coconut water processing or the traditional copra oil industry. Besides their comparatively low-fixed costs, VCO plants also offer remarkable operational flexibility (Black, 2015). Second, high-quality VCO can be produced from different grades of mature coconuts. Third, unlike coconut water, another non-traditional export product, VCO has low storage and transportation costs due to its long shelf-life in ambient temperatures.

Although large-scale investment by a handful of local firms is underway to expand VCO production, the VCO is also very compatible with the small-firm dominated structure of the coconut industry in Guyana. Collaboration of large and small firms would make export to high value markets more feasible when they collaborate in quality control and marketing area. Currently, only a handful of small enterprises produce VCO of varied quality for the local market (Cheung, 2015; R. DeFreitas & Amrkon, 2015). Guyana's weak end-market presence currently limits the flow of market intelligence to the related producers and stakeholders in the country.

Besides the main or coconut-kernel-based products, Guyana can also produce husk products. The country is only second to Dominican Republic in terms of husk production volume. Although currently coconut husks aren't processed in the country, Guyanese industry can attract investment by Growrite and/or La Mundial de Coco. These firms are present in the region and can initially support technology acquisition and facilitate market linkages for Guyana.

Table 21: Recommendations for Upgrading

Recommendation	Rationale	Potential Lead Organizations	Stakeholders Workshop's Prioritized Strategy Objectives
Facilitate public-private partnerships to develop and implement a national upgrading strategy	<p>Actors across the industry expressed frustration that lack of a national vision, and a coordinated approach between public and private stakeholders, is a barrier to investment.</p> <p>Public-private partnership is essential to champion private investment and policy action in support of inclusive industry growth.</p>	<ul style="list-style-type: none"> • Guyana Marketing Corporation • National Agricultural Research & Extension Institute • Farmer groups • Exporters • Processors • Water bottlers • Guyana National Bureau of standards • Financial Services • Caribbean Agricultural Research & Development Institute • International Trade Center 	<p>Strategic Objective - Improve organization of coconut supply through an industry alliance between VC stakeholders to promote organization, planning, information flows and policy support</p>
Develop a comprehensive database of coconut plantations, local coconut supplies and alternative market channels	<p>Insecurity of raw material supplies is a major risk and barrier to private investment at the processing level.</p> <p>Local producers face multiple market channels. Industry level information system helps to prioritize markets channels in maximizing benefit-cost ratios and minimizing transaction costs.</p>	<ul style="list-style-type: none"> • Guyana Marketing Corporation • National Agricultural Research & Extension Institute 	
Strengthen extension services and seedling supply to increase productivity, variety diversification, and control of pest and diseases (See pp.29-34 for regional details).	<p>Extensive natural resource endowment is Guyana's regional comparative advantage in production of coconuts.</p> <p>Coconut industry provides a viable alternative for the dominant but slowing rice and sugar sectors.</p>	<ul style="list-style-type: none"> • National Agricultural Research & Extension Institute • Caribbean Agricultural Research & Development Institute 	<p>Strategic Objective -Improve research for availability of and multiplication right varieties for planting</p>

	<p>However, access to seedlings is constrained and prevalent pests, such as Red Palm Mite, threaten plantations.</p>		
<p>Develop new financing models focused on both operational and investment finance for small-scale actors.</p>	<p>The aging and old plantations are in need of investment. Current financing mechanisms, such as IPED and SBTD services that support rice sector, don't provide longer-term financing needed by actors in coconut farming.</p>	<ul style="list-style-type: none"> • Ministry of Agriculture • Bank of Guyana • Institute for Private Enterprise Development • Small Business Development Trust 	<p>Strategic Objective - Improve access to finance and promote innovative schemes that respond to the needs of the sector</p>
<p>Strengthen market intelligence and promotion activities to support entry into high value markets.</p>	<p>Exporters lack market information and frequently experience shipment rejection.</p> <p>Small-scale exporters have limited resources and expertise in marketing and product development.</p>	<ul style="list-style-type: none"> • Guyana Marketing Corporation • Processors • International Trade Center 	<p>Strategic Objective - Develop a business plan for the sector and profitability studies to support commercially driven development and value addition</p>
<p>Develop a quality control mechanism to enforce local standards in food and drink markets and support exporters in complying with food safety markets in export destinations (See p.31 for regional details)</p>	<p>Market actors disregard the de jure local food safety standards because compliance remains voluntary.</p> <p>While almost entirely Guyanese coconut processor and exporter firms are small, they are not organized in industry associations to address collective action problems.</p> <p>Currently, regulatory agencies don't have the means to enforce food safety standards in domestic market.</p>	<ul style="list-style-type: none"> • Processors • Guyana National Bureau of standards • Guyana Marketing Corporation • Inter-American Institute for Cooperation in Agriculture • CARICOM Regional Organization for Standards and Quality 	

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