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A study on skills for trade and economic diversification (STED) in the non-traditional coconut export sectors of the Philippines

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Abbreviations and acronyms

AAGR	Average Annual Growth Rate
ARMM	Autonomous Region in Muslim Mindanao
ATI	Agricultural Training Institute
B	Billion
CAGR	Compound annual growth rate
CALABARZON	Cavite Laguna Batangas Rizal Quezon (Region IV-A)
CARAGA	Caraga Administrative Region (Region XIII)
CBOs	Communiy-Based Organizations
CDA	Cooperative Development Authority
CHLP	Community/ Household-Level Coconut Processing
CMP	Coconut Milk Powder
DA	Department of Agriculture
DAR	Department of Agrarian Reform
DCN	Desiccated Coconut
DEPED	Department of Education
DOLE	Department of Labor and Employment
DOST	Department of Science and Technology
DOST SETUP	Department of Science and Technology Small Enterprise Technology Upgrading Program
DPWH	Department of Public Works and Highways
DSWD	Department of Social Welfare and Development
DTI	Department of Trade and Industry
FGDs	Focus Group Discussions
FOB	Freight on Board
GAP	Good Agricultural Practice
GDP	Gross Domestic Product
GOs	Government Organizations
Ha	Hectare
HYV's	High Yielding Varieties
ILO	International Labour Organization
ILO CO-Manila	International Labour Organization Country Office-Manila
KAANIB	Kasaganahan sa Niyogan ay Kaunlaran ng Bayan
KEDP	Kasaganahan sa Niyogan ay Kaunlaran ng Bayan Enterprise Development Project
Kg	Kilogram
KIIs	Key Informant Interviews
L or li	Liter
LGU	Local Government Unit
M	Million
MC	Moisture Content
M&E	Monitoring & Evaluation
MPC	Multi-Purpose Cooperative
MSMEs	Micro, Small and Medium Enterprises
MT	Metric Ton
NAPC	National Anti-Poverty Commission
NGAs	National Government Agencies
NGOs	Non-Government Organizations
NTCPEs	Non-Traditional Coconut Philippine Export Sectors
OPA	Office of the Provincial Agriculturist
OTOP	One Town One Product
PCA	Philippine Coconut Authority

PDP	Philippine Development Plan
PhilFIDA	Philippine Fiber Development Authority
PhP	Philippine Peso
PhP M	Million Philippine Pesos
PLGU	Provincial Local Government Unit
PSA	Philippine Statistics Authority
QFUC	Quezon Federation and Union of Cooperatives
REECS	Resources, Environment, and Economics Center for Studies Inc.
SEA-K	Self-Employment Assistance-Kaunlaran
SOCCSKSARGEN	South Cotabato, Cotabato, Sultan Kudarat, Sarangani and General Santos City (Region XII)
S&T	Science and Technology
STED	Skills for Trade and Economic Diversification
STRENGTHEN	Strengthening the Impact of Trade on Employment
TESDA	Technical Education and Skills Development Authority
TRAVERA	Trade and Value Chains in Employment-Rich Activities
TOR	Term of Reference
UCAP	United Coconut Associations of the Philippines
UPLBFI	University of the Philippines Los Baños Foundation, Incorporated
VCO	Virgin Coconut Oil
VLCPs	Village Level Coconut Processing Plants
4Ps	Pantawid Pamilyang Pilipino Program

Contents

Executive summary

This report presents the results of study on Skills for Trade and Economic Diversification (STED) in the Non-Traditional Coconut Export Sectors (NTCPEs), focusing on coconut sugar, Virgin Coconut Oil (VCO), and coconut coir and peat. Due to time constraints, data gathering was concentrated in provinces of Laguna and Quezon, Region IV-A, Philippines. The STED was part of the International Labour Organization's Project on Strengthening the Impact of Trade on Employment (STRENGTHEN) which was implemented from April 2016 until September 2019. The overall objective of the project was to help the Philippines harness international trade and trade-related foreign investment and leverage its export industries towards providing more opportunities for decent work within developing countries and raising the number of developing-country workers who are productively employed.

Traditional coconut by-products such as coconut oil, desiccated coconut, copra oil cake or meal have consistently been in the top ten agricultural crops exported, various coconut by-products have recently been identified. However, the ILO's Project partners noted that since the traditional coconuts exports are already well-established and various value chains mapping studies, initiatives and plans have already been developed, there is a need to go beyond the traditional sectors by focusing on the potentials and opportunities that the non-traditional coconut export products present and represent in the Philippine coconut industry, as a whole. Moreover, given competition from vegetable oil and palm oil, international demand for Philippine coconut oil had declined thereby affecting world prices and consequently local prices. Hence, this study concentrated on NTCPEs such as coco sugar, VCO, and coco coir and peat.

The main objective of the STED project is to identify current and potential skill needs, to estimate skill gaps, and to provide recommendations for the design of effective and coherent skills development policies to support growth and expand opportunities for the creation of productive employment in the non-traditional coconut export sectors of VCO, coco sugar and coco coir. Specifically, this study intends to: (1) Conduct desk research review of government policies and programs and private sector-led initiatives on skills and human resource development, review of relevant and related literature on skills, and analysis of past and current statistical data on skills and employment, among others; (2) Incorporate results and findings of the TRAVERA (value chain) enterprise survey for the STED study to identify and map out the skills needs, gaps and issues from the demand-side perspective; (3) Conduct series of key informant interviews, focus group discussions, stakeholder workshops, and sectoral consultation and dialogues with industry leaders, skills providers and training institutions, among others, should and would already be organized and conducted to also provide data and information on skills issues in the non-traditional coconut export sectors (VCO, coco sugar and coco coir) from a supply-side point of view; and (4) Provide concrete recommendations at the policy, institutional, and enterprise level to enhance exports, promote economic diversification, enable more and better jobs, ensure that firms find workers with the right skills, and help workers acquire skills needed to find productive employment in the non-traditional coconut export sectors of VCO, coco sugar and coco coir.

To attain the objectives of the study, primary and secondary data were gathered. Key Informant Interviews, Focus Group Discussions and a consultation workshop were conducted to gather primary data. FGDs were conducted with farmers/grass roots level organizations, KIIs were administered to Government Agencies and a consultation workshop was held with firms involved in the manufacturing of the three coconut derivatives. Secondary data were gathered through a review of the literature and delving into the TRAVERA survey results on skills developed and gaps in the coco sugar, VCO and coco coir sectors; past and current statistical data on skills and employment; market

prospects and industry problems. Three case studies, representing each of the three coconut derivatives were also done to determine and discuss forward and backward linkages. All cases involved farm-level participation, specifically at the village-level or as an association. A supply and demand analysis based on projected output and requirements in the domestic and international markets were also undertaken to estimate the demand and variances for skills in the three NTCPEs.

Since 1990s, programs introduced by both GOs and NGOs were geared towards liberalizing coconut farmers from producing copra alone and achieving higher value for their produce. One intervention that had been conducted by both the private and public sector is the implementation of a wide array of trainings or skills enhancement measures. Different government agencies had conducted programs and projects on capacity development for the coconut industry at the farm or village level but most of them are geared towards increasing knowledge of farmers on new production technologies so as to increase farm productivity. Moreover, capacity building or enhancement had also been extended specifically for non-traditional coconut products such as coconut sugar, virgin coconut oil and coco coir. These capacity building activities are usually anchored on various projects and programs that government entities administered. DOLE Region IV-B in 2017 implemented the coco coir processing under the Integrated Livelihood Program (ILP) or Kabuhayan Program to provide livelihood opportunities to 3,000 workers who were affected by the suspension of two mining companies in Palawan. The project provided assistance through training and equipment for coco net weaving. To secure adequate supply of skilled laborers for various agri-business enterprises like VCO and coconut sugar production, coconut coir twining and weaving, appropriate trainings should be done in partnership with TESDA. Skills training on marketing, sales, business planning and inventory management is likewise deemed necessary to ensure sustainability of nucleus-estate enterprises.

Several production and processing manuals developed by government and the private practitioners for the three NTCPEs provided practical knowledge and valuable skills in all areas of producing VCOs, coco sugar and coir fiber from choosing the best raw material to final packaging including quality control, good manufacturing practices and record keeping. Further processing of residual by-products and downstream products were likewise included in the manuals (i.e. soap, culinary oil, massage oils, skin care products, coco-vinegar, sap syrups, etc.). Detailed training modules on the village level processing of the three NTCPEs seems to be available from different NGAs, NGOs, academic institutions, private companies and even on-line sources. However, actual skills training on the different stages of the value chain appears to be lacking particularly on coconut harvesting, dehusking and sap tapping.

The report highlights the various states of these NTCPEs in terms of their competitiveness against global and domestic markets as well as the assessment of value chains for each sector. It utilized primarily the results of a related project entitled Trade and Value Chains in Employment-Rich Activities (TRAVERA) which provided the different areas from which problems, issues, and gaps in the sectors were determined. Moreover, the results of the project also provided valuable insights on the current skills, skills demands, and skills gap among the NTCPEs. This was the forefront application of STED in the Philippines.

In terms of the market competitiveness, NTCPEs were, in general, found to be expanding over the last five years. Results of the TRAVERA showed annual growth rates (AAGR) of 25%, 35% and 10% for virgin coconut oil (VCO), coco sugar, and coco coir, respectively. However, there are also factors seen through the years which contributed to sharp declines such as meeting demands for domestic and global markets (low productivity); poor technological transfer; lack of equipment, facilities, and infrastructures

(i.e. road networks, communal facilities, etc.); lack of production of value-added products; power and transport costs; price declines of the NTCPEs in the global market and lack of access to other export markets; lack of access to financing mechanisms and non-prioritization of the government of NTCPEs; lack of awareness and local utilization of NTCPEs; and weak community participation in production.

In addition, market trends for coco sugar showed that the industry is valued at US$ 1.3 B in 2017 (GrowAsia, 2017 as cited by TRAVERA). It is a booming industry with a generally increasing price trends from 2016 (US$ 3,603/MT) to 2017 (US$ 6,860/MT). Market forecasts for the product, particularly organic coco sugar, has a CAGR of 41% which from 2017 to 2023 (www.digitaljournal.com as cited by TRAVERA). Top producers of the product are The Philippines, Indonesia, and Thailand with a total percentage of global exports of 80%; with the country having more than 50% of global shares. Currently, the industry is not formally tracked in global trade flow databases but, among the aforementioned top-producing countries, The Philippines was deemed more centralized and scaled in the production of the NTCPE compared to Indonesia.

For VCO, current estimates for the industry is the highest among all coconut derivatives which is valued at US$ 40.5 M. In the last five to six years, the production of VCO is constantly fluctuating in volume but has seen highest yield in 2015 at 64,316 MT before declining in 2016 to 41.09 million MT and reaching the lowest point of 27.72 million MT in 2017. However, since its lowest production point, the industry is currently recovering with values reaching to 39.02 million MT in 2018 (28.95% AAGR). This trend is also mirrored by its value except that it has seen no recovery yet and continued to plummet from its highest point in 2015 at US$ 279,674,000 to its current lowest of US$ 40,487,836 in 2018 (-71.94% AAGR). VCO produced in the country is currently number one in the world accompanied by Indonesia and Sri Lanka.

While for coconut husk-based products, its current global and market trends are continuously increasing both in volume and prices from 2011-2017. However, the Philippines is not one of the top producers as this is dominated by Sri Lanka and India. Current global shares are at 49,041 MT tons and valued at US$ 4.451 M. From 2011-2018, an average of 17,754 metric tons of coco peat/dust were exported annually. The biggest volume exported equivalent to 93, 589 M metric tons was recorded in 2018. In terms of value, the highest was recorded in 2017 at 2.03 million US dollars FOB. The country's biggest market of coco peat/dust since 2011 is China with 86.8 percent share of the total volume exported annually. Similarly, the coco husk cubes export performance and market destinations from 2011-2018 is almost the same with the coco peat, with China as the primary market having 87.1 percent share of the total export volume. Another coir product exported is the baled coir with an average volume of 22,015 metric tons exported from 2011-2018.The highest volume of baled coir exported was in 2018 which totaled to 52,403 metric tons while the highest value was registered in 2016 which reached 12.58 million US Dollars FOB. coco twine and coco pads/liner showing an average volume of 447 metric tons and 89 metric tons exported foremost to the USA from 2011-2018, respectively.

Furthermore, in terms of value chain, production of coco sugar is impeded by collection of sap in old trees that produce low toddy. Production is also affected by the lack of skilled tappers. It was indicated that trained tappers are often pirated by other producers. This means that a company or organization trains skilled workers only to lose them because of higher offers and/or better working conditions. This creates a problem that in order to solve one corporation's lack of skilled workers, they need to pirate from another, thus creating a cycle of lack of skilled workers. In terms of processing, current scenarios are well-beyond optimized parameters. Efficiency, costs, and capacities to production are generally below set "best" scenarios. In coco sugar producing areas, the main concern is the availability of technology that can mechanize collection of sap but

would not affect quality. Current practices are still rudimentary and production is generally manual. While in terms of marketing, linkage, promotion and product development are key elements for the product. DTI had been striving to be proactive in engaging stakeholders and partners in developing packaging of products that meets certification standards. However, the vital factor contributing to low appeal of the product is due to the highly niche-based (or targeted, narrow, specified market; i.e. consumed only by select sectors with knowledge of the product, willingness and capacity to pay) and export-oriented (i.e. product is developed for export and has not been marketed for local consumption) marketing strategy. While the latter is beneficial to the country, domestic consumers have low awareness of the product because current markets only caters to select sectors with access.

The value chain for VCO involves stakeholders such as coconut producers and/or intermediate processors, consolidators, tertiary processors-exporters and wholesalers/retailers. The key stakeholders in the value chain are the processors-exporters which produces the marketable VCO product. Coco meat is the main raw material used in VCO production. The challenge of the sector is obtaining the appropriate volume and quality of inputs to sustain domestic and global demands. Production of VCO is affected by the lack of financing mechanism for small-enterprises as well as the decline of skilled workers for collection and recovery of coco meat. Production processes use manual, manned mechanized wet processes and dry processes. These processes require a lot of fundamental labor training and skills training to bridge the gaps of varying qualities and making the entire production cost-efficient. In terms of marketing, VCO is price competitive because current processes meet the meticulous global standards. However, the supply of VCO is currently static, if not declining, because of the erratic supply that will sustain production. Most of the producers also have very limited rated capacities that cannot meet the demand. Currently, the markets for VCO are varied but can also be niche-oriented, particularly with cosmetics and aesthetic products of firm-level enterprises. Wide-scale consumption of the product, as stated in the different information elicitation activities, can be augmented if trainings and skills development for promotion and marketing of VCO will also be implemented at smaller production scales. The primary market for VCO in the Philippines is in the export sector due to the growing demand globally. The existing export markets of the firms are Europe, Middle East, Canada, US, Malaysia, Singapore, China and Japan.

For coco coir, its general production is currently utilizing decortication of husks. A critical component of fiber production is drying and baling. There is a need to supply skilled workers for optimal recovery and sustain supply of inputs. The process is laborious and production is impeded by seasonality of income. It was noted that, while there are standards set for coconut fiber (coir) and coco peat, it is up to the market (whether domestic or global) to provide their own standards based on their application. This is specifically true for export markets wherein buyers have their own standards, which are stipulated within the contact of Purchase Order. In terms of processing, twining of coco coir to produce the raw materials for handicrafts is generally done manually. Development of technology for twining has not been met and the process remains to be done manually. Promotional activities are needed to streamline domestic and international marketing of the product. At present, expanding markets is limited by the lack of knowledge on the domestic and international demands that also impede the determination of the skills required for better marketing of coco coir based products. Current markets of coir, relative to the other NTCPEs are smaller. Moreover, current demand for coco coir based products are generally limited and sporadic. Thus, there is a need to further promote the use of coco coir based products into a more multi-functional products to expand and create new markets.

The study also sought the different factors contributing to the dearth of production volumes. These factors included the decrease in general productivity, unstandardized processes, and lack of cost-effective mechanisms to improve production at all levels. Major insights from the conduct of Key Informant Interviews (KIIs), Focus Group Discussions (FGDs), and other STED activities (i.e., consultation workshop, Round Table Discussion with service providers and Multi-Stakeholders Forum) indicated that the main reason may also be attributed to the lack of skills of the workers involved in the different NTCPEs in the main components of the value chains. At the production component, all three NTCPEs lack sufficiently trained workers in terms of harvesting and pre-processing (i.e. collection of sap for coco sugar; de-shelling and paring for VCO; and manual processing before decortication for coco coir). On the other hand, handling of machineries required for more mechanized production of the NTCPEs needs skills training for greater efficiency in the processing components for each NTCPE's value chain. Lastly, the marketing aspect of the value chains of the NTCPEs needs training for better awareness of the domestic and international demand for each NTCPE; lack of entrepreneurial skills; lack of promotional skills; and lack of developed marketing style for each NTCPE.

At present, skills gaps in the production of the various NTCPEs currently point to the lack of capacity building platforms for different components in the value chains. For coco sugar, skills gaps are attributed to the lack of skilled workers for tapping. There is no particular agency involved in developing this skill. Majority of tappers developed their skills through years of experience. For VCO, skills gaps are on manual deshelling and paring. Similar to tapping in coco sugar, there is also no particular agency involved in developing these skills. These skills were also self-developed. In terms of processing for VCO, gaps are line production using traditional processes, efficient recovery and handling of machineries while marketing gaps are on negotiation skills. Skills gaps in coco coir processing are on manual twining for rope production and lack of technical training for handling machineries for a cost-effective production while in terms of marketing, gaps are the lack of value-addition/product innovation and product packaging and enhancements and management capabilities. It is proposed that government agencies such as Philippine Coconut Authority (PCA), Department of Science and Technology (DOST), and Agriculture Training Institute (ATI) should be more proactive and down to business in providing the necessary skills training for production of coco sugar, VCO, and coco coir. The proactive stance should be more specific for the various needs and cross-cutting concerns of the different producers in terms of enhancing capacities for cost-effective production technologies and methodologies.

In terms of business capabilities, production gaps are generally focused on the lack of skilled workers for manual labor. In addition, selection of varieties for planting, fixed inputs, management practices and capital are generally those in need of enhancement. Trainings for selection of high-yielding varieties must be the first initiative of the businesses involved in NTCPEs. Management practices to control pests and diseases are also generally lacking, if not rudimentary. Integrated pest management and fertilization are required to ensure quality inputs for the production of NTCPEs. On the other hand, fixed inputs, such as land, and financing are cross-cutting concerns for further enhancement of business capabilities.

In terms of processing, it was a general concern for the three NTCPEs to have a more mechanized but cost-effective processes. There is also a need for skills training in all aspects of operation and processing to ensure that quality meets standards. Businesses should also focus in enhancing skills of current workers through self-initiative trainings or by sending them in government provided skills development workshops. Trainings should also cascade to line workers from managerial levels.

For marketing, business capabilities are generally sufficient but there is a need to increase promotional capabilities, especially at the domestic level. It was emphasized by PCA that the business involved in NTCPEs are generally struggling to meet domestic markets because of poorly promoted products. Product developments are also limited to those with the capacity to improve packaging and those that can attend trainings.

The perceived gaps in furthering NTCPEs production are found at the policy, institutional and enterprise levels. At the policy level, there is no apparent or well-defined monitoring of NTCPEs that will guide players about market movements and trends. Meanwhile, trade in NTCPEs are largely unregulated which results in considerable price volatility that may inevitably affect enterprise viability. There is also a dearth of awareness among consumers and incentives on producers that impinge on domestic demand and supply situations.

At the institutional level, there seems to be a confounding of the roles on skills development for the production of NTCPEs among the various national government agencies such as PCA, DOST, and DA. If and when there are initiatives they are not coordinated, which are usually manifested in the training that are provided to stakeholders. There is also room for improvement as far as creating awareness among the potential consumers of NTCPEs.

At the enterprise level, there are localized paucity of skilled workers and standards for acquired skills and product quality are wanting. Marketing skills are also found to be meager which constrain the development of the NTCPEs. Safety and health training are occasional and usually provided by firms that employ regular workers and in cases of seasonal workers these are virtually nil.

To address the identified skills gaps, strategies at the policy, institutional and enterprise level were recommended. At the policy level, eradication of skills gap relies on cross-cutting social issues of adequacy of economic gains from the sector and by providing active financing mechanisms, especially for village-level production. Measures of changing perceptions should also be viewed as major driving force in eliminating skills gap because these will eliminate the lack of skilled workers because of their short-term view of economic gains. This is proposed to be included in the agencies' IEC and coordination activities. In relation to this, it is also proposed that skills gaps should be identified in all sectors and stakeholders to produce a manual of good practices that can be replicated.

At the institutional level, skills gaps in the production of the various NTCPEs currently point to the lack of training for different components in the value chains. In the enabling environment, it was proposed that government agencies such as PCA, DOST, and ATI should be more proactive in providing the necessary skills training for production of coco sugar, VCO, and coco coir beyond peculiar firms that were reached by these agencies. The proactive provision should be more specific for the various needs of the different producers in terms of enhancing capacities for cost-effective production technologies and methodologies.

At the enterprise level, for the production aspect, skills gaps are more attributed to the lack of skilled workers for tapping and harvesting in VCO and coco sugar production, while lack of skilled twiners is apparent for coco coir. This was addressed and proposed by the various participants in the information elicitation activities that pooling of skilled workers should be implemented. It was indicated that handling of machineries is a necessity in all NTCPEs and require constant trainings for operating equipment. Moreover, skills development for manual processes in VCO production was highlighted as a means to close skills gaps for the sector. This can only be achieved by harmonizing the roles of

identified agencies and including the support of the private sector for skills development where gaps in service provision are present.

Aside from the aforementioned recommendations, a proposed hub integration business model for the production of coco sugar, VCO and coco coir at the village-level setting is also recommended primarily to address the problem of seasonality of labor demand which is heavily dampening the growth of the three NTCPEs . Since, current production of NTCPEs in the areas visited was done in small and disaggregated farm parcels which lead to low volumes primarily because of the low tree per unit area ratios and 'one-type production' schemes in these small farms. Moreover, the processes involved in the conversion of raw coconut to the NTCPEs are greatly unstandardized because of this considerable disaggregation. In turn, the quality of products is greatly varied. In order to address these problems, integrated production of NTCPEs can be viewed as a suitable approach. Benefitting from economies of scale and economies of scope are primary. The integration of these farms into hubs provides the mechanism for sustainability of the industries surrounding NTCPEs. Moreover, the integration of parcels into a single hub ensures that skills development and training provision are centralized and better determined.

In the conduct of the study, major constraints and problems encountered revolved primarily on the procedure of elicitation and quality of available data. In terms of elicitation, main problem lies within the coordination of workshops to various companies and agencies concerned in the production of NTCPEs. On the other hand, effectively reporting the state of skills development and needs of the NTCPEs were also inhibited by the lack of available data. The reference sought and considered were those centering on skills enhancement and development. However, to date, there is limited number of studies and/or date which focused primarily on skills development particularly of the three NTCPEs. Thus, it was challenging to search for published articles and/or sufficient literature with specified skills development needs.

1 Introduction

1.1 Background of the study

The International Labour Organization for the Philippines (ILO CO-Manila) implemented a Project on Strengthening the Impact of Trade on Employment (STRENGTHEN) since April 2016 until September 2019. The overall objective of the project was to help the Philippines harness international trade and trade-related foreign investment and leverage its export industries towards providing more opportunities for decent work within developing countries and raising the number of developing-country workers who are productively employed.

One of the major components of the STRENGTHEN Project was to provide programme support to the Philippines in developing and upgrading its export sectors through value chains and skills upgrading and development. The STRENGTHEN Project's programme support component was comprised of two subcomponents which are: (1) Trade and Value Chains in Employment-Rich Activities (TRAVERA) and (2) Skills for Trade and Economic Diversification (STED). The first subcomponent aimed to map out and identify potentials and opportunities along the value chains of an export sector and the second one intends to align skills policies and programmes with value chain strategies for export growth, economic diversification, employment generation and decent work promotion.

This study covers the second subcomponent, the STED, focusing on the Philippines. However, results of the TRAVERA will serve as inputs in the preparation of the STED report. Moreover, this study will center on the coconut industry which remains as the Philippines' leading agricultural export product. In years 2017 and 2018, coconut-based products such as coconut oil, desiccated coconut, copra oil cake or meal and other coconut products were listed in the top ten agricultural crops exported by the Philippines (Table 1). It is worth noting though that the amount of coconut oil exported (in Freight on Board (FOB) terms) declined by nearly 25 percent.

The production of coconut in the country comes second next to grain commodities (i.e. rice and corn) in terms of area and value production. Most recent statistics on the commodity in 2017 showed that it covers 3,612.304 million hectares (historical average of 3,524.220 hectares; PSA, 2018a) and production value of 120,336.29 million pesos (PSA, 2018b). Disaggregated values showed that, in terms of area, Quezon Province covers the largest area (10%) and followed by Zamboanga del Norte (6.6%) and Davao Oriental (4.0%) (PSA, 2018a). Similarly, production values of coconut also follows this order but with the inclusion of Maguindanao. Percentage of production values showed that 9.5% comes from Quezon Province; 5.6% from Zamboanga del Norte; and 5.1% from Maguindanao (PSA, 2018a). Aggregated contribution of the commodity the country's agricultural output was 3.52% in the same year (PSA, 2018A) with at least 3.5 million farmers dependent on the industry (DA-ARMM, undated).

Table 1. Top ten agricultural crops exported by the Philippines in 2017 and 2018.

Agricultural Crops	2018		2017		
	FOB[a]	% Share	FOB[a]	% Share	Growth Rate
Bananas, Fresh	159.31	48.71	40.22	18.69	296.09
Coconut Oil, crude and refined	79.60	24.33	105.90	49.20	(24.84)
Pineapple and Pineapple Products	26.69	8.16	24.59	11.42	8.55
Desiccated Coconut	21.75	6.65	15.07	7.00	44.30
Processed Tropical Fruits	16.49	5.04	14.56	6.76	13.30
Copra Oil Cake or Meal	8.21	2.51	4.96	2.30	65.48
Other Agro-based	4.26	1.30	2.42	1.12	76.30
Other Fruits and Vegetables	3.83	1.17	1.60	0.74	138.70
Other Coconut Product	2.39	0.73	2.69	1.25	(11.11)
Mangoes	2.29	0.70	0.95	0.44	141.93
Abaca Fibers	2.28	0.70	2.29	1.06	(0.11)
TOTAL	**327.10**	**100.00**	**215.25**	**100.00**	

[a] Freight on Board, In Million Philippine Pesos
Source: Philippine Statistical Authority

1.2 Rationale for the selection of non-traditional coconut export sector

Production and market competitiveness of the selected derivatives: While traditional coconut by-products such as coconut oil, desiccated coconut, copra oil cake or meal are consistently in the top ten agricultural crops exported, various coconut by-products have recently been identified. A total of 42 coconut derivatives are produced in the country (PSA, 2018a) which include coconut water, coco coir, coco peat, coco vinegar and coco sugar, among others. In 2018, virgin coconut oil (VCO) produced was 29,487.57 m.t. and valued at 3,837.55 million pesos. Given the volume of production, 78.9% is exported to USA (50.4%), Brazil (15.5%), and Germany (13.0%) while the remaining 21.1% is consumed domestically for the different coco-food processing plants in the country. Based on the Trade Directory of the Philippine Coconut Authority (PCA, 2017a), there are at least 63 manufacturers, processors, traders and exporters of VCO. At least 60% of these export the VCO manufactured with at least 35 entities coming from Regions IX to XIV in Mindanao.

On the other hand, coconut coir produced in 2017 was 7.7 m.t. and valued at 650,462.40 pesos (PSA, 2018a). The entirety of the production in that year was exported to the USA. While the domestic utilization of the derivative is generally unknown, coconut coir is utilized by the Department of Public Works and Highways (DPWH) in its green engineering projects (i.e. bank stabilization and erosion control) as in the case of Unisan, Quezon (Dela Cruz, Pobre & Gabrino, 2002 as cited by PCA, 2003). In addition, based on the trade directory for coir peat husk, at least 51 entities produce the derivative with at least 63% as trader-exporters (PCA, 2017b). Similar with the production of VCO, coconut coir is extensively produced in Mindanao particularly from Regions X to XIII based on the trade directory.

For coconut (sap) sugar, 381.39 m.t. was produced and valued at 77.51 million pesos (PSA, 2018a). Revenues from the derivative came from exports to Germany (23.6%), Sri Lanka (17.7%), and USA (16.7%) totaling to 58% of the overall production (PSA, 2018a). Utilization of the remaining 42% of the total production is generally unknown but at least 32 entities are listed as coconut sugar suppliers in the PCA's trade directory (PCA, 2017c).

At least 63% of these suppliers are processor-exporters and 63% comes from Regions X to XIII in Mindanao.

Unfortunately, disaggregated values of these derivatives, in terms of top producing areas, were lacking. In addition, while the country exports these products, a consolidating agency or institution was not identified because the values presented were derived from the trade directories only. Number of farmers engaged in the production of each derivative was also not identified because of the lack of sufficient statistics and data sources. Moreover, closely-related data on the number of farmers reflected in the database of PCA only showed the farmer beneficiaries of programs such as accelerated planting/re-planting and fertilization (PCA, 2017d). These indicated 8,499 farmers were serviced coming from the database of the KAANIB Enterprise Development Project from 2014 to 2016.

Needs and prospects of coconut derivatives: Prades, Salum & Pioch (2016) showed that, while the markets for coconut and its derivatives are on the rise, lack of technology and artisanal methods serve as the primary hindrance in gaining greater production. Moreover, since most products of coconuts are related to ingestion, nutritional benefits should be fortified because raw materials, culture conditions, and post-harvest techniques are mostly condoning their sources in terms of their innate nutritional values. In addition, the cultivation systems in top-producing countries are mostly family owned and are greatly subjected to preferential choice of commodity, vis-à-vis, conversion to organic agriculture or other land-uses. These insights are particularly directed to the production and marketing of VCO and coconut flour.

According to the Coco-Coir Industry Road Map (2013-2016), the following are the different needs of the derivative: a) market development and promotion (domestic and export) in order to strengthen awareness and improve value chains; b) production and productivity in terms of machination and sustainability of supply of raw materials; c) technology development transfer as a need to lack of technology and machinery; d) entrepreneurial development in developing skills for coconut farmers; e) institutional development for greater participation; f) access to financing and generation of investments to address aggregated financial concerns; g) policy improvement and business development in order to attain regulatory processes; and h) monitoring and evaluation as a tool for verification of actual production, particularly trade competitiveness (National Coco Coir Inter-Agency Technical Working Group, undated). It was stated in the coco-coir road map that its Policy/Program/Project for entrepreneurial development is through continuous conduct of entrepreneurial training to farm organizations without specifying what supposed trainings were these. No actual document regarding the action of the agency for this area of concern is available.

Based on the Coconut Roadmap of the NAPC (2016), the following are the needs of the sector in relation to poverty alleviation: a) agro-enterprise development – aimed to heighten farmer engagement in the value chain of coconut and avoid subsistence farming practices; b) facilitation of agrarian reform in coconut areas – aimed to achieve tenure security for farmers in coconut areas; c) social protection – geared towards developing safety nets for poor farmers in relation to externalities (i.e. typhoons, pests, and economic and social shocks) and improve general well-being; and d) institutional reforms – provision of strengthened policy and governance oversight on the industry towards the improvement and empowerment of coconut farmers. To date the road map has not been implemented and is still on its formulation period. The aspects related to training and skills development is agro-enterprise development under the SEA-K (Self-Employment Assistance-Kaunlaran) under the Department of Social Welfare and Development (DSWD) particularly on orienting and providing skills training on enterprise development and management, crop processing, and marketing.

Institutional views on promoting non-traditional coconut export products: The ILO's Project partners noted that since the traditional coconuts exports are already well-established and various value chains mapping studies, initiatives and plans have already been developed, there is a need to go beyond the traditional sectors by focusing on the potentials and opportunities that the non-traditional coconut export products present and represent in the Philippine coconut industry, as a whole. It was also noted that given competition from vegetable oil and palm oil, international demand for Philippine coconut oil had declined thereby affecting world prices and consequently local prices.

In particular, given that they are non-traditional and still emerging as discussed in the previous sections, then all the more that these non-traditional coconut export sectors and products should be given attention and focus by identifying their export value chain strengthens, weaknesses, threats, and potentials and opportunities.

Furthermore, project partners specifically chose to focus on non-traditional coconut export sectors such as VCO, coco sugar and coco coir as the because of their recent encouraging export performance and the government's effort on growing, developing, expanding and upgrading the competitiveness of these non-traditional export sectors.

In addition, the government's anti-poverty reduction programmes in the coconut sector are also centered and anchored on these sectors, particularly under the KAANIB Enterprise Development Program (KEDP) of PCA, which implements community/household-level coconut processing (CHLP) programmes that include livelihood and entrepreneurial activities promoting and encouraging coir-based processing (e.g. coir-based fertilizer production), coco sugar production, and VCO processing through the establishment of processing facilities, and the provision of machineries and equipment for coir-processing, and VCO and coco sugar production.

1.3 Objectives

The main objective of the STED project is to identify current and potential skill needs, to estimate skill gaps, and to provide recommendations for the design of effective and coherent skills development policies to support growth and expand opportunities for the creation of productive employment in the non-traditional coconut export sectors of VCO, coco sugar and coco coir. Specifically, this study intends to:

1. Conduct desk research review of government policies and programs and private sector-led initiatives on skills and human resource development, review of relevant and related literature on skills, and analysis of past and current statistical data on skills and employment, among others;

2. Incorporate results and findings of the TRAVERA (value chain) enterprise survey for the STED study to identify and map out the skills needs, gaps and issues from the demand-side perspective;

3. Conduct series of key informant interviews, focus group discussions, stakeholder workshops, and sectoral consultation and dialogues with industry leaders, skills providers and training institutions, among others, should and would already be organized and conducted to also provide data and information on skills issues in the non-traditional coconut export sectors (VCO, coco sugar and coco coir) from a supply-side point of view; and

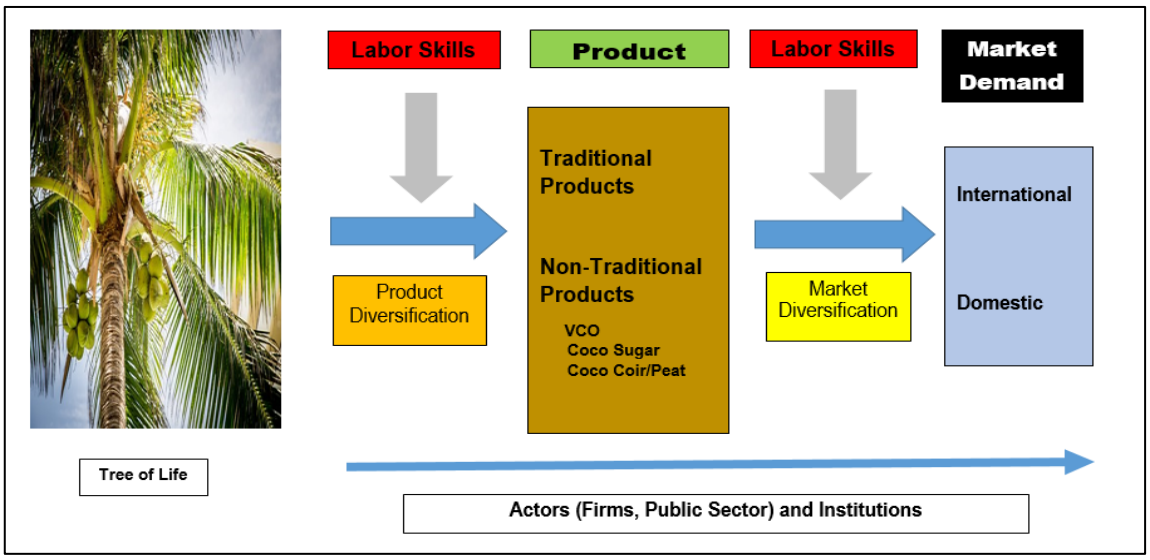
4. Provide concrete recommendations at the policy, institutional, and enterprise level to enhance exports, promote economic diversification, enable more and better jobs,

ensure that firms find workers with the right skills, and help workers acquire skills needed to find productive employment in the non-traditional coconut export sectors of VCO, coco sugar and coco coir.

1.4 Theoretical framework

The coconut is deemed the tree of life for its versatility and multifarious uses. Nonetheless, the coconut industry is beset by low productivity and low value of its products owing to a variety of reasons. Massive replanting, intercropping, use of high yielding varieties and fertilization programs, among others, were launched and touted to address low productivity and incomes of the small farmers. Meanwhile, there is a recurrent bid to shift from the traditional copra making to other commodities that creates value addition. Product diversification has been beckoned to settle the persistent poverty in the coconut areas by producing non-traditional products including coco sugar, coco-coir/peat and virgin coconut oil that are prized for its health benefits and environmental benefits. Corollary to the product diversification is market diversification that aims to expand the markets and create niches for these products both in the international and domestic arenas. This type of diversification will reduce the adverse effects of the vagaries of the market in traditional products which has a lot of substitutes and oligopsonist tendencies.

Figure 1. Theoretical framework for the STED study.



Product and market diversifications entail the shift in technologies and will require new and expanded labor opportunities and skills. It is in this framework that the study will address the changes and derived demand in labor requirements and competences. In addition, the study will interact with the actors/players and institutions involved in this diversified product and market environment to ascertain the constraints and potential solutions to achieve these goals.

2 Methodology

2.1 Analytical framework

Figure 2 illustrates the analytical framework used to attain the objectives of the study. Primary data were gathered through the conduct of KIIs and FGDs. Moreover, other activities such as multi-stakeholders consultation and dialogues with industry leaders, skills providers and training institutions conducted to derive additional information and solicit data that may enhance recommendations that will be forwarded. Secondary data were gathered and reviewed. All information that will be generated will be used in the analysis of the current and potential skills as well as skills gaps in the three non-traditional export sectors. Issues were identified. From the results of the analysis, recommendations for the design of effective and coherent skills development policies for the creation of productive employment in the identified non-traditional coconut export sectors were provided.

2.2 Data gathering

Two types of data, primary and secondary, were gathered. Key Informant Interviews, Focus Group Discussions and a consultation workshop were conducted to gather primary data. Due to the exigency of the study given that the STRENGTHEN Project is about to be terminated on September 30, 2019, gathering of primary data, as per Term of Reference, was concentrated in the CALABARZON Region, specifically the provinces of Laguna and Quezon. Based on a list of traders, exporters, and processors secured from the Philippine Coconut Authority, interviews or visits were conducted in the 14 enumerated enterprises in Table 2. The list of intended respondents originally contained 16 firms but the number was trimmed down to 14 since some firms had constraints accommodating the STED research team given the short data gathering period while others did not respond positively to our request. It is notable that majority (56%) of the enterprises deal with VCO while only three and four are into coco coir and coco sugar, respectively (Table 3). Fifty-six percent of the respondents are processors cum exporters followed closely (43%) by processors. A larger share (62%) of the respondents is located in Quezon province.

Table 2. List of respondents for the focus group discussions and key informant interviews.

Name of Company	Product Line	Business Activity/ Nature of Business	Office Address	Plant Site	Remarks
Greenlife Coconut Products Philippines Inc.	VCO, Other Coconut Products Producer, Trader/ Exporter	Coco food Processor & Exporter	Km 144 Brgy. Wakas Tayabas City, Quezon	Km 144 Brgy. Wakas Tayabas City, Quezon	In TRAVERA list; Member of VCO Producers and Traders Association of the Phil.
Alex and Lizel VCO	VCO	Processor	Tayabas City, Quezon	Sariaya, Quezon	
Primex Coco Products, Inc.	VCO, Dcn, Cmp, Cocoflour, Coconut Water & Other Coconut Products	Coco Food Processor	Bo. Mangilag Candelaria, Quezon	Bo. Mangilag Candelaria, Quezon	
Pasciolco Agri Ventures	VCO, Coco Sugar, Coconut Tar, Coconut Vinegar, & By Products	Coco food Processor & Exporter	1358 Capistrano St. Lusacan, Tiaong, Quezon	Brgy. Anastacia, Tiaong, Quezon	In TRAVERA list; Member of VCO Producers and Traders Association of the Phil.
Amazing Foods Corp	VC0, Massage Oil, Coco Sugar, Coco Ginger, Vco Soap, Cocojam, Coco Marmalade	Exporter & Trader	124 Sm Brgy. Bagong Pook, Sta. Maria, Laguna	124 Sm Brgy. Bagong Pook, Sta. Maria, Laguna	
Alabat Coco Sugar Producers Association	Coco sugar	Processor	Coco Hub, Brgy. Camagong, Alabat, Quezon	Coco Hub, Brgy. Camagong, Alabat, Quezon	
Cocoplus Aquarian Development Corporation	VCO, Massage Oil, Soap	Coco food Processor & Exporter	Brgy. San Bartolome, San Pablo City, Laguna	Brgy. San Bartolome, San Pablo City, Laguna	In TRAVERA list; Member of VCO Producers and Traders Association of the Phil.
Wua Yei Enterprises.	Coco Fiber, Coco Peat, Coconut Shell Charcoal	Processor & Exporter	848 Purok 3, Brgy. Masapang, Victoria, Laguna	848 Purok 3, Brgy. Masapang, Victoria, Laguna	
O' Mark Enterprises	VCO	Coco food Processor	Science Park, UPLB, Los Baños Laguna	Science Park, UPLB, Los Baños Laguna	
Pilipinas Eco Fiber Corp.	Coco Fiber, Coco Peat	Processor	Km. 79 Brgy., San Mateo, San Pablo City, Laguna	Brgy San Mateo, San Pablo City, Laguna	In TRAVERA list
Quezon Federation and Union of Cooperatives	VCO	Processor	New Zealand St., Phase IV, University Village, Brgy. Ibabang Dupay, Lucena City, Quezon	New Zealand St., Phase IV, University Village, Brgy. Ibabang Dupay, Lucena City, Quezon	
Tropical Prime Coir Corp	Coco Fiber, Coco Peat	Processor	Kanlurang Maligaya, Agdangan, Quezon	Kanlurang Maligaya, Agdangan, Quezon	
Mamala 1 Multi-Purpose Coop	VCO	Processor	Brgy. Mamala, Sariaya, Quezon	Brgy. Mamala, Sariaya, Quezon	
Annato Farm	Coco Syrup	Processor	Brgy. Talim, Lucena City, Quezon	Brgy. Talim, Lucena City, Quezon	

Source of Basic Data: Philippine Coconut Authority

Table 3. Nature and location of enterprise of identified respondents by type of Non Traditional Coconut Philippine Export sector.

Nature/Location of Enterprise	Type of Non-Traditional Coconut Philippine Export Sector*							
	VCO		Cocosugar		Cococoir		Total	
Nature of Enterprise								
Processor only	4	25.00	1	6.25	2	12.50	7	43.75
Processor and Exporter	5	31.25	3[a]	18.75	1	6.25	9	56.25
TOTAL	**9**	**56.25**	**4**	**25.00**	**3**	**18.75**	**16**	**100.00**
Location								
Quezon	6	37.50	3[a]	18.75	1	6.25	10	62.50
Laguna	3	18.75	1	6.25	2	12.50	6	37.50
TOTAL	**9**	**56.25**	**4**	**25.00**	**3**	**18.75**	**16**	**100.00**

Source of Basic Data: Philippine Coconut Authority
[a] VCO shares 3 same respondents with coco sugar
*multiple responses

Arrangements for the FGDs and KIIs with identified respondents and critical agencies, such as the United Coconut Associations of the Philippines and Philippine Coconut Authority, were done initially during the 2nd World Coconut Congress which held from August 27-29, 2019 by the STED research team. Besides the intent of making initial coordination of interviews, papers presented in the conference might add insights to the skills gaps, employment opportunities and market situation of coco sugar, VCO, and coco coir. However, conference papers presented in the 2nd World do not have much information on the skills development aspect rather only provided scenarios of the coconut industry, in general.

Three case studies, representing each of three coconut derivatives were also done to determine and discuss forward and backward linkages. All of these cases involve farm-level participation, specifically at the village-level or as an association. The cases for coco sugar, VCO and coco coir are the Alabat Coco Sugar Producers Association, Greenlife Coconut Products Philippines Inc., and Tropical Prime Coir Corporation, respectively.

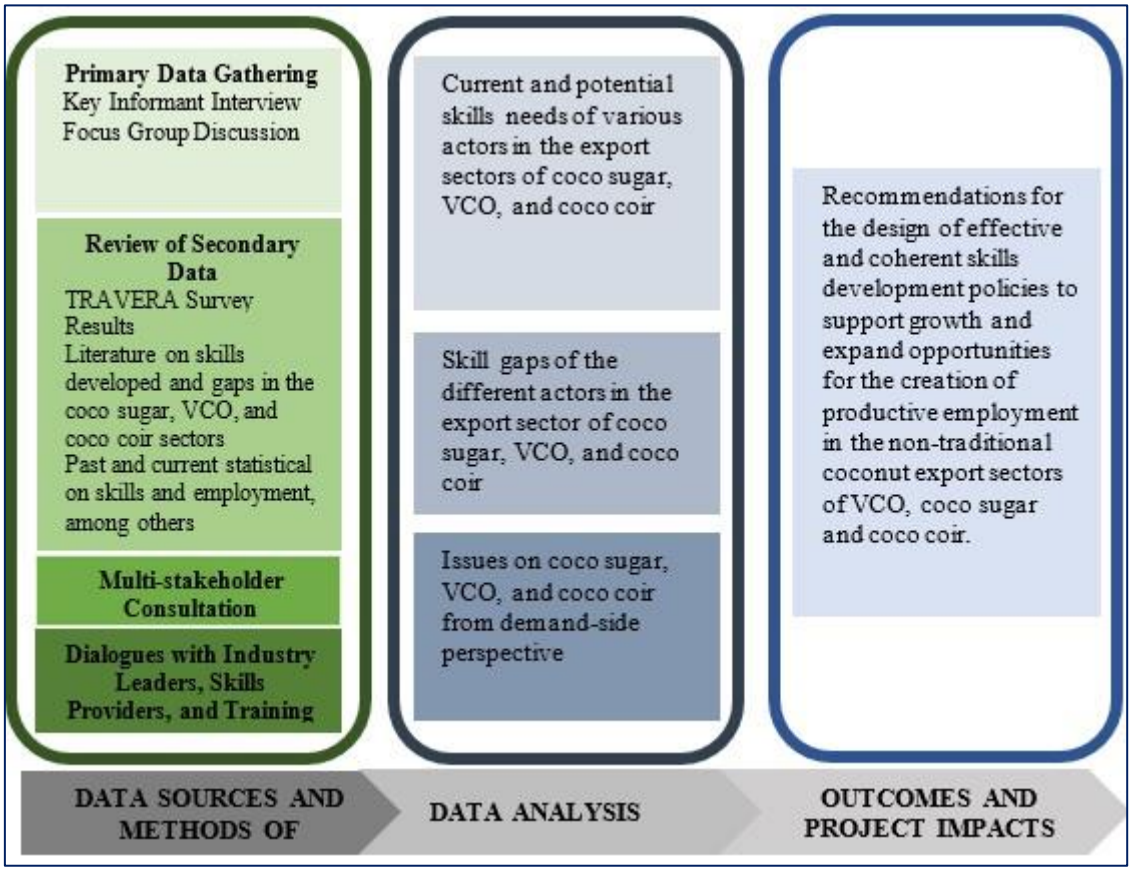
The participants of the consultation workshop were firms involved in manufacturing of VCO, coco sugar and coco coir/peat and representatives from Philippine Coconut Authority (PCA) – Region IV-A and Department of Trade and Industry (DTI) . During the consultation workshop, the participants were divided into three groups (VCO, coco sugar, and coco coir), depending on what their firms were processing/manufacturing. A FGD was held with each group using a set of guide questions. Key Informant Interviews were also conducted with the PCA, United Coconut Associations of the Philippines (UCAP), Department of Trade and Industry (DTI), and Philippine Fiber Development Authority (PhilFIDA). Another consultation workshop with skills providers and training institutions will also be conducted in October.

Different FGDs with farmer/grass roots level organizations were also done for each type of coconut derivative. For coco sugar, the farmers group operating a coco sugar enterprise in Alabat, Quezon was covered. Meanwhile, FGDS among farmers' or village organizations in Sariaya, Quezon and Agdangan, Quezon were conducted as part of the cases for coco coir and Virgin Coconut Oil.

Secondary data were also be gathered, foremost of which is the TRAVERA survey results. Other literatures delving on skills developed and gaps in the coco sugar, VCO and

coco coir sectors and past and current statistical data on skills and employment, among others, were also gathered. Market prospects and industry problems were delved on as well.

Figure 2. Analytical framework for the STED study



2.3 Method of analysis

The study utilized descriptive analysis to address and tackle the objectives of the study. A systematic review of literature including the TRAVERA study, public policies and programs, private sector initiatives on human resource development, among others, was conducted. A supply and demand analysis based on projected output and requirements in the domestic and international markets were also undertaken to estimate the demand and variances for skills in the non-traditional coconut export sectors, i.e., coco-sugar, VCO and coco-coir given production and post-production technologies, financial and market constraints as well as the scale and organization of production enterprises.

A labor market information inquiry that includes information about a specific labor market, its occupations, their locations, wages, supply and demand, and demographics are still being approximated to determine possible supply side constraints.

3 Results and discussion

Determination of the different characteristics of the three NTCPEs were gauged based on market trends (i.e. demand and supply), value chain (i.e. production, processing, and marketing chain integrated from the findings of TRAVERA and STED), and employment needs. Moreover, discussion and findings also focused on the firm-level characteristics and business capabilities of actors in each sector as a precursor in identifying the skills needed in relation to their capacities to engage in exporting NTCPEs. This also put forth the determination of the gaps in their business capabilities with the objective of identifying the areas for improvements in the business aspect of NTCPEs operations. Institutional mechanisms were likewise drawn from the various entities that play facilitating and enabling roles for the development of the NTCPEs. The different problem areas, issues, and opportunities were also determined through a thorough analysis of the policies, political environment, socio-economic, technological, environmental, and legal settings. Lastly, it was also imperative to determine the current skill sets and the skill demands for the three NTCPEs as a means to determine way-forward scenarios.

3.1 Market trends, value chains, and employment needs in NTCPEs

3.1.1 Coco sugar

1. Market trends

The industry of coco sugar was valued at US$ 1.3 B in 2017 (GrowAsia, 2017 as cited by TRAVERA). It is a booming industry with a generally increasing price trends from 2016 (US$ 3,603/MT) to 2017 (US$ 6,860/MT). Market forecasts for the product, particularly organic coco sugar, has a CAGR of 41% which from 2017 to 2023 (www.digitaljournal.com as cited by TRAVERA). Top producers of the product are The Philippines, Indonesia, and Thailand with a total percentage of global exports of 80%; with the country having more than 50% of global shares. Currently, the industry is not formally tracked in global trade flow databases but, among the aforementioned top-producing countries, The Philippines was deemed more centralized and scaled in the production of the NTCPE compared to Indonesia. It was also provided that the current threat for the product stems on the adulteration, i.e. mixing of sugarcane, which brings about trepidations on product authenticity in the global market (Angulo, 2019). Rising opportunities, on the other hand, were reported to be based on ongoing researches in the technological improvement of harvesting and cooking done in Indonesia (Angulo, 2019).

A. Demand settings

Coco sugar is one of the more marketable coconut derivatives in global trade. As the top producer of the product globally, the Philippines exploits export markets in four main global regions: 1) Asia-Pacific – including Australia, China, Japan, New Zealand, Singapore, and South Korea; 2) Europe – including France, Germany, Netherlands, Norway, and United Kingdom; 3) Middle East and South Africa; and 4) The Americas – including Canada, Latin America, and United States. The latter had a share of US$ 22 M in 2015 (ILO and REECS, 2019). In the same year, Indonesia had the bigger share of export which was valued at US$ 38.23 M while the Philippines having a share of US$ 1.24 M in 2017 (ILO and REECS, 2019). It was identified that there are at least 13 global key players for the product with five (5) representatives from the Philippines. International prospects for the industry lies on the increasing demands for natural products like food, beverage, and cosmetics in China, Europe, India, and Korea. Global market rise of the product also

springs from better health and nutritional mindset because of the rising cases of obesity and diabetes.

On the other hand, local demand scenarios are not very well documented. For one, the use of the product is very minimal because of the continued reliance for sugarcane-based sweeteners/additives (Angulo, 2019). In the country, the consumption is granulated in form which was deemed superior in quality because of the non-addition of ant-fermenting agents such as sodium metabisulfite. There is also an active promotion of alternative sweeteners in the country because of the rising cases of lifestyle induced metabolic disorders. As of 2015, local industry of coco sugar is valued at PhP 100 M which is exempted from additional excise tax on sweetened products (Angulo, 2019). A corollary threat to the coco sugar market is the proposed liberalization of sugar imports that will bring in lower priced foreign sugar in the local market which, in turn, will make coco sugar even less competitive price-wise.

B. Supply settings

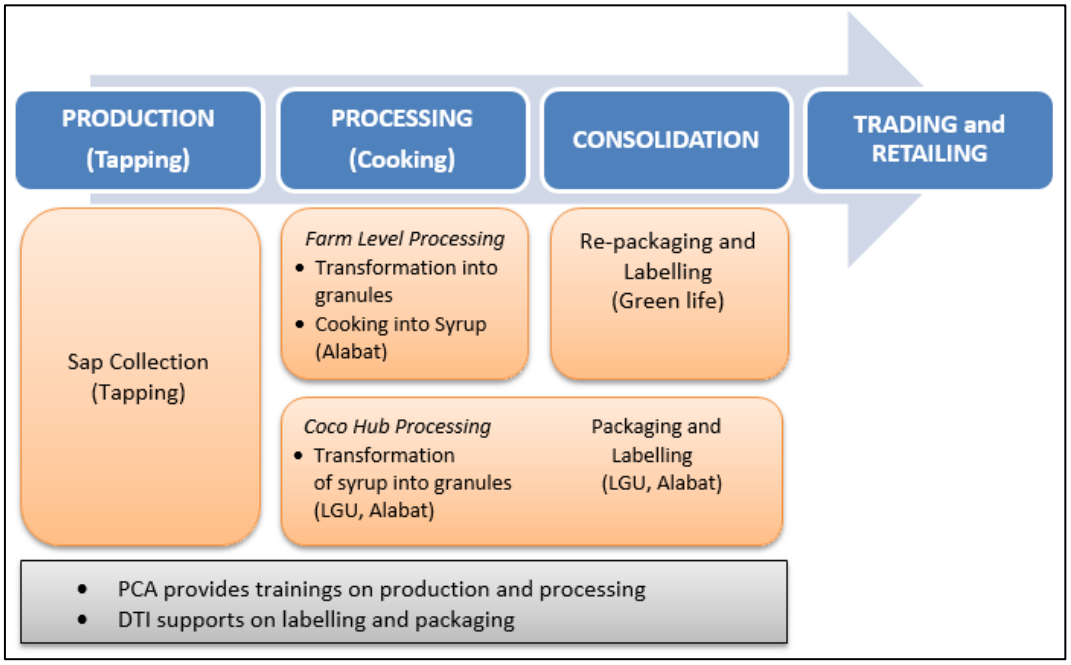
Supply for coco sugar is currently at 4,000 MT/year based on the report of Angulo (2019). The bulk of percentage shares comes from Mindanao encompassing 82% that includes Davao, SOCCSKSARGEN, Northern Mindanao, and CARAGA as primary producers. CALABARZON comes third after Davao and SOCSSKSARGEN and the remaining 9% is contributed by other areas in the country. These percentages of producers were based only on the PCA-Registered processors. Volume of production for export has been increasing from no production in 2014 and 2015 to 0.34 MT in 2016 to 181 MT in 2017 ((ILO and REECS, 2019). Supply scenarios are currently affected by rudimentary sap collection process using bamboo bridges and ladders. In addition, the product is not entwined in the cultural and traditional settings of the country which may also impede supply enhancements. However, it was also indicated that there is an active support for improved sap collection through the use of high-yielding dwarf varieties, technology transfer, and provision of processing facilities that may increase general supply of the product (Angulo, 2019). Current large commercial scale producers of domestic coco sugar are also those engaged in coconut desiccation.

Figure 3. Bamboo bridges connecting coconut trees for sap collection process, at Annato Farm in Brgy. Talim, Lucena City, Quezon.

2. Value chain

During the consultation workshop, the participants identified the process by which the coconut sugar is processed (Figure 4). First, the coconut sap is collected from the coconut flower. One tapper handles 60 trees and collects sap 4 times a day at 4 hours interval. The collected sap will be cooked into syrup and granules at the farm level (small scale). The suppliers of coco sugar bring the product to Green life in sacks for the branding. Green life acts as consolidator of coco sugar. Green life supplies to traders and some retailers.

Figure 4. Process flow of coconut sap sugar



In the case of Alabat, the sap collection is done by a hired stay-in laborer and they are paid Php 60/li. The syrup production is also done at the farm level because of the exceedingly short shelf life of the sap. Usually, the tapper's wife is the one cooking the sap into syrup and they are paid Php20/li. The syrup is brought to the Alabat Coco Hub for further processing into granules and also for packaging and labelling. In this case, the LGU Alabat acts as consolidator of coco sugar. The workers in the Coco hub are contractual on job order basis of the municipality of Alabat.

The government agencies assisting the actors in the chain are PCA and DTI. PCA provides training on production and processing including operation of equipment before distribution, while DTI provides labelling and packaging support. Local Government Units (LGUs) does not keep track of the number of beneficiaries or the reach of various projects or does not implement any strategy for M&E of project effectiveness.

A. Production

It was seen as a general scenario for all data sources that the lack of high-yielding dwarf varieties impedes production of raw materials for coco sugar. In addition, the analysis of TRAVERA revealed that current production are only 1.5 to 2.0 L/tree which is way below the optimized yield of 4 to 5 L/tree. Moreover, production is generally impeded by collection of sap in old trees that generally produce low toddy. Production is also affected by the lack of skilled tappers. It was indicated that trained tappers are often pirated

by other producers which bring a 'solution-to-one-problem-to-the-other' scenario. This means that an agency trains skilled workers only to lose them because of higher offers and/or better working conditions, in general. This creates a problem that in order to solve one corporation's lack of skilled workers, they need to pirate from another, thus creating a cycle of lack of skilled workers. However, in areas where skilled tappers are available, there is a general lack of output-oriented laborers. In Alabat, Quezon, for example, tappers tend to favor job orders because of relatively low and also intermittent income from tapping activities. Continuous production and price demands are also affected by the exorbitant prices of certification that affects the production of certified products. Production areas are also static and even declining, with only 3.5 million hectares, alongside an annual growth in demand of 2% to 3%. General prices are also fluctuating which was valued at PhP 12/li of sap. Current management practices are also not GAP certified which denoted that there is 150% lower nut yield because of non-application of fertilizers. GAP certification entails external audits and the range of activities for certification was not covered in the study. This finding was mentioned once by a respondent and further elaboration was not provided.

The main challenge for coco sugar production identified is the fiscal requirement in putting up a processing facilities needed for expansion. The participants emphasized the need for good processing facilities to ensure the quality of the product. The producers also need adequate cash to pay the daily wages of tappers. Another challenge for the coco sugar industry is to meet the minimum requirement for export. At present, the local suppliers cannot meet the minimum volume requirement which is around 10 metric tons.

B. Processing

In terms of processing, current scenarios are well-beyond optimized parameters. Efficiency, costs, and capacities to production are generally below set "best" scenarios. In coco sugar producing areas, the main concern is the availability of technology that can mechanize collection of sap but would not affect quality. Current practices are still rudimentary and production is generally manual. It was mentioned that Korean designed machines were introduced for greater sap recovery, but it also leads to spoiled sap because of contamination from residues in the pipe. In addition, there is a certain peculiarity in sap collection because production into syrup must be done within continuous four-hour periods throughout the day (i.e. maximum of five (5) collections per day). Some tappers start very early, at 7:00 AM, but are generally affected by the increasing temperatures in farms, thereby, opting to earlier or extended collection periods throughout the day. It was also reported that processing are almost done per liter of sap collected. Recovery and granulation procedures are also done manually, usually by women in the community, which has low yield. Moreover, the focus of producers, especially those that are small-scale, is for financing of mechanization/modernization of instruments used for the production of coco sugar. It was noted during the information gathering that good programs and projects of the government for the sector is often lost due to a sustainability issue – inability of beneficiaries to maintain machinery and sustain production. There is also fragmentation of technology which could be standardized.

Figure 5. Coconut syrup delivered for processing to coco sugar at the Alabat Coco Hub, Alabat, Quezon

C. Marketing

In terms of marketing, linkage, promotion (i.e. branding and positioning), and product development are key elements for the product. In recent years, the Department of Trade and Industry (DTI) had been striving to be proactive in engaging stakeholders and partners in developing only in the packaging of products that meets certification standards. These included record-keeping and general data management to comply with certifying bodies' requirements. However, the vital factor contributing to low appeal of the product is due to the highly niche-based (or targeted, narrow, specified market; i.e. consumed only by select sectors with knowledge of the product, willingness and capacity to pay) and export-oriented (i.e. product is developed for export and has not been marketed for local consumption) marketing strategy While the latter is beneficial to the country, domestic consumers have low awareness of the product because current markets only caters to select sectors with access. Product promotion is also currently supported by various government and non-government sectors, but there was a need for market-related policies (i.e. Free Trade Agreements) to be streamlined to expand market awareness and encourage greater participation. Current state of production are generally below volume requirements which also inhibit the marketing aspect of high-quality products. This is also related to the general quality variability because of the lack of standards of production, which translates to inconsistency of marketable products. There is also weak industry association which can also lead to the lack of consolidators and, ultimately, exporters.

3. Employment needs

General employment needs for the production of coco sugar is concerned primarily on the production aspect of the value chain, particularly employment needs for tapping/collection activities. This is almost always true for labor-intensive and process-oriented industries with multiple products/by-products. It was attributed that the general need for employment in this aspect is because of the decreasing trend of engagement in agriculture-related professions and the increasing preference for office-based jobs. The latter is generally perceived by local communities as more stable and avoid the drudgery of intensive manual labor or working in the field. There was also employment needs in processing of products, but this is generally impeded by the lack of machinery or mechanized procedures. The same perception of manual labor is perceived in this scenario.

In terms of the skills, the cook can be easily trained compared to tapper. According to the workshop participants, the challenge of the coco sugar production is the training on tapping of coconut inflorescence such as the angles of the tap and optimum time to tap. However, skills development for tappers may be faced with difficulties because their schedules on meeting the demands for processors. The participants identified the use of dwarf variety to reduce the sap collection challenges. A consistent challenge for coconut sap sugar producers mainly revolved on the collection of toddy, particularly the risks involved in harvesting sap which is done four (4) time per day. In addition, areas for production should also be identified and these areas should be prepared for the utilization of the dwarf variety which provided higher toddy and avoids the risks of climbing taller palms. Meanwhile, there are no problems cited in processing/cooking as the formulation of granules depends on the quality of the sap collected. One cook can cover a hectare of trees.

Figure 6. Coco sugar filtered before packaging by workers at the Alabat Coco Hub, Alabat, Quezon

3.1.2 VCO

1. Market trends

Current estimates for the industry of VCO is the highest among all coconut derivatives valued at US$ 40.5 M. In the last five to six years, the production of VCO is constantly fluctuating in volume but has seen highest yield in 2015 at 64,316 MT before declining in 2016 to 41.09 million MT and reaching the lowest point of 27.72 million MT in 2017. However, since its lowest production point, the industry is currently recovering with values reaching to 39.02 million MT in 2018 (28.95% AAGR). This trend is also mirrored by its value except that it has seen no recovery yet and continued to plummet from its highest point in 2015 at US$ 279,674,000 to its current lowest of US$ 40,487,836 in 2018 (-71.94% AAGR). VCO produced in the country is currently number one in the world accompanied by Indonesia and Sri Lanka.

A. Demand settings

Global market for VCO was valued at US$ 2.1 B in 2016 and is projected to increase by 100%, at US$ 4.2 B by 2024 (Global Institute for Tomorrow, 2017). Current markets for exports of the product are found in the four market regions including: 1) Asia-Pacific – Australia, China, Singapore, and South Korea with 38% shares of exports; 2) Europe – Belgium, Germany, Netherlands, Sweden, and United Kingdom with 28% shares; 3) Middle East-Africa – United Arab Emirates and Dubai with 12% shares; and 4) The Americas – Canada and United States with 22% shares. However, prices had been declining from $3,000/MT in 2011 to $2,522/MT in 2017. Current domestic demands for the product is generally undocumented, but existence of multi-billion food and cosmetics companies in the country would denote that domestic use is present. In addition, demand for VCO is also propelled by conscious efforts to eradicate chronic diseases such as diabetes and stroke. Moreover, the call of cosmetic lines to for bio-safe products are also motivators for continued production.

There is still a growing demand globally for VCO. To tap the growing demand, VCO from the Philippines can be marketed as having the highest lauric acid characteristics of the coconut compared to other countries.

Foreseeing the growth in the VCO industry, there is a great availability of possible employment in the Philippines due to its current high unemployment rate. In addition, International Organization is willing to extend assistance to the Philippine Coconut Industry. Quezon Federation and Union of Cooperatives is granted with a Shared Service Facility Set-up by the World Bank.

B. Supply settings

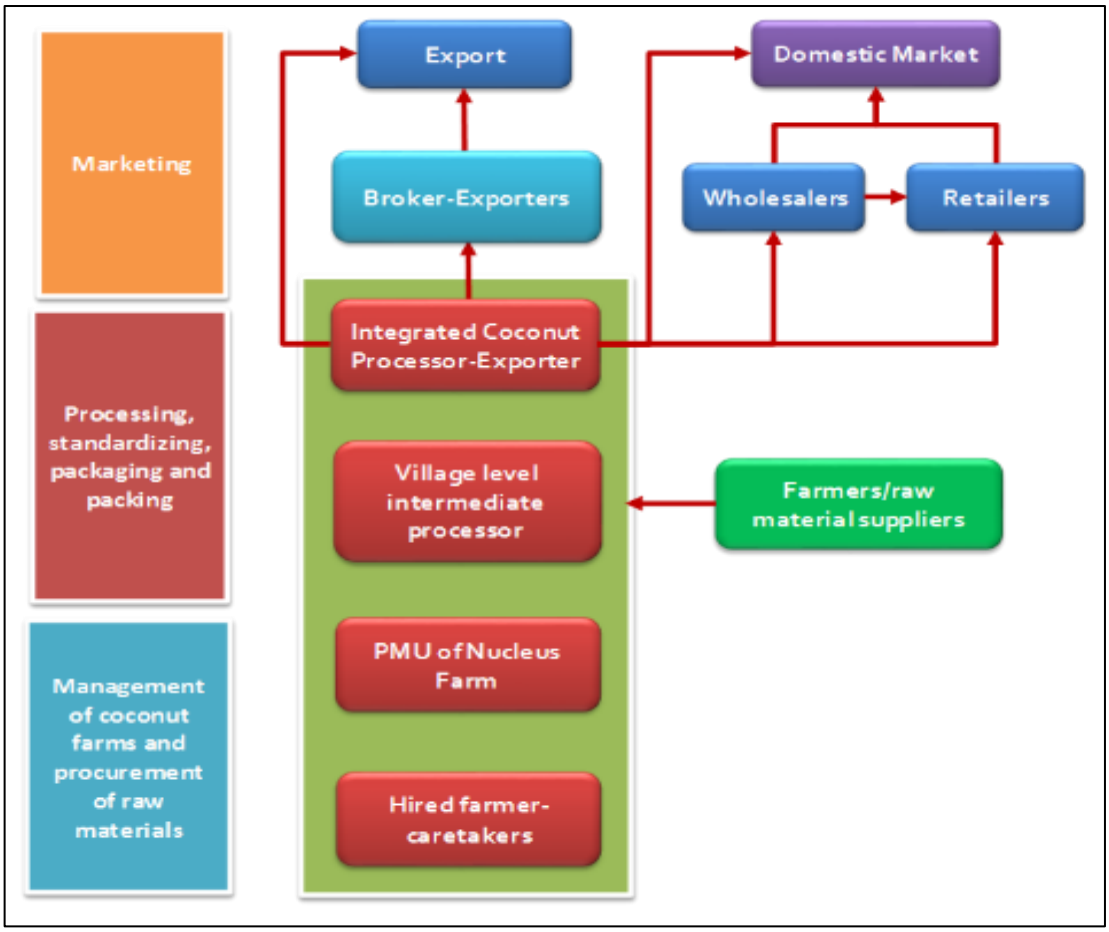
Market trends in the country for production of VCO is currently at around 4.0 M MT/year. In the report of Castillo (2019), producers and processors of the product in CALABARZON has the rated capacity of 33,215 MT/month and distributed in the Province of Laguna (6), Quezon (7), and Rizal (1). Most of these producers are found in Quezon Province including the highest rated producer, Primex Coco Products, Inc, with 30,000 MT/month output. The lowest output is 10 MT/month all of the 11 out of the 13 entities are producers that supply domestically and internationally. The other two are service agent and trader-exporter.

2. Value chain

The Value Chain for the VCO follows the Recommended Value Chain Business Model from the presentation of TRAVERA study results on March 13, 2019 at ILO-Philippines, Makati City (Figure 6). Processor-exporter has a backward integration with the export market to control supply and volume as well as quality and comply with standards. It employs a central processing plant (usage of centrifuge machine) for standardization/quality. Processor-exporter encourage intermediate processing for supply control. Farmers/intermediary processors forwards integrate in order to have a more stable client. Farmers/intermediary processors organized themselves into production clusters to have a greater trade advantage.

However, unlike the recommended Value chain of TRAVERA study, the VCO value chain for the respondents in Laguna and Quezon does not include broker-exporters (Figure 7). There is also no middlemen or trader encountered. But, there is a consolidator which sells its own products. The presence of hired farmer-caretakers was also noted.

Figure 7. Recommended value chain business model for VCO (by REECS, presented during the Validation Forum of TRAVERA on March 13, 2019 at ILO-Philippines, Makati City)

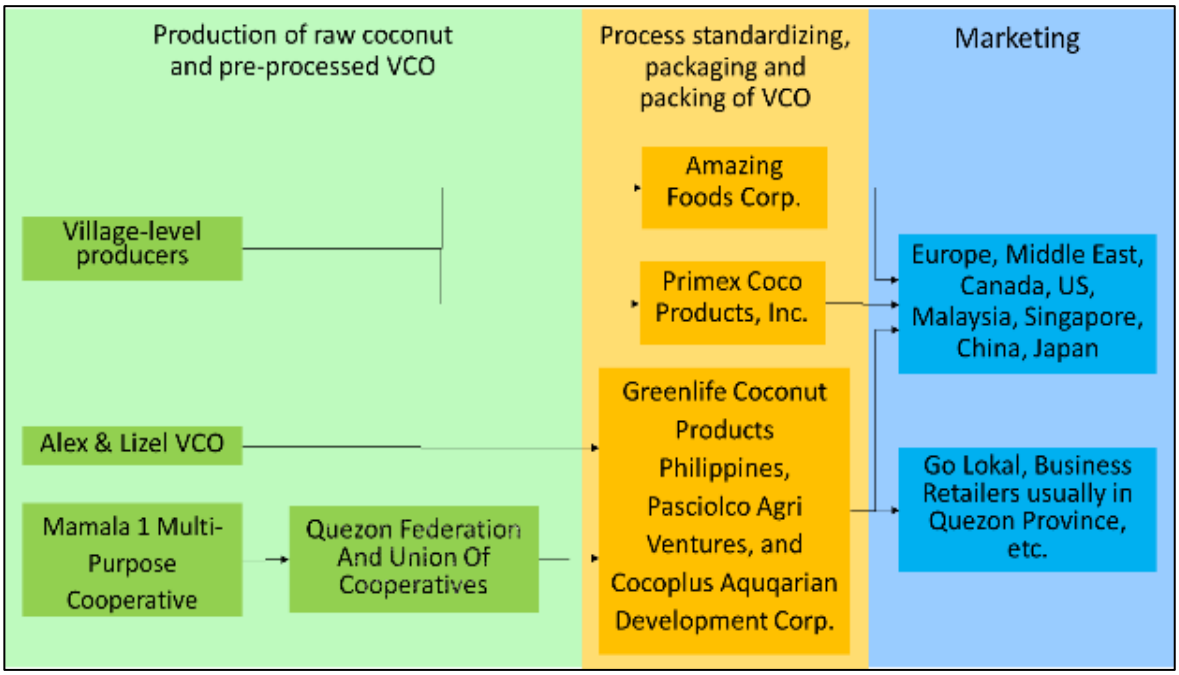


The Value Chain for VCO involves the following stakeholders: coconut producers and/or intermediate processors, consolidators, tertiary processors-exporters and wholesalers/retailers. The key stakeholders in the value chain are the processors-exporters which produces the marketable VCO product. The processors-exporters in this study include Amazing Foods Corp. (Amazing Foods), Primex Coco Products, Inc. (Primex), Greenlife Coconut Products Philippines (Greenlife), Pasciolco Agri Ventures (Pasciolco),

and CocoPlus Aquarian Development Corp. (CocoPlus). Most of the VCO exported are produced by integrated processors, such as Primex and Peter Paul, while the least volume for export are exported by tertiary processors who use farm-based fermented VCO as raw material.

Since export market orders in bulk, processors-exporters are forced into backward linkaging in order to comply with volume requirement. Backward linkage allows the assurance of supply and price competitiveness from village-level or micro-scale coconut producers. Also due to high quality standards of the export market, coconut producers and/or intermediate processors are required to comply with the requirements of the processors-exporters. Processors-exporters ensure the quality of raw fermented VCO from each intermediary processor. As tertiary processor, raw fermented VCO undergoes standardization under the centrifuge processing.

Figure 8. Value chain of VCO manufacturing firms in Laguna and Quezon Provinces.



A. Production

Raw material used in the production of VCO is coco meat. In recent years, the challenge of the sector is obtaining the appropriate volume and quality of inputs to sustain domestic and global demands for the NTCPE. Production of VCO, similar with that of coco sugar, is affected by the lack of financing mechanisms for small-enterprises as well as the decline of skilled workers for collection and recovery of coco meat.

B. Processing

Production processes in VCO use manual (i.e. deshelling and paring), manned mechanized wet processes (i.e. shredding/grating, extracting, and filtering), and dry processes (i.e. drying, desiccating, extracting, and filtering). These processes require a lot of fundamental labor training and skills training to bridge the gaps of varying qualities and making the entire production cost-efficient. Current processing to enhance yield of VCO uses centrifuge but are of limited use because of the costs entailed in purchasing and maintaining the machinery. In addition, the skills required for maintenance should also be

focused for prolonged efficiency and sustained production. VCO production can also be considered to have the simplest processes among the NTCPEs but the skills required to maintain quality are paramount to adhere to prevailing local and international standards. Training of workers for VCO should maintain the following based on the DA Administrative Order No. 2005-01: 1) identify characteristics – composition of fatty acids using Gas Liquid Chromatography; 2) quality characteristics – odor (natural coconut or no rancid odor), color (colorless and sediment-free), and taste (no rancid taste); properties (i.e. moisture and volatile content, lauric acid%, peroxide value, food additives, contaminants (max matter volatile at 105°C), heavy metals (Fe, Cu, Pb and As); 3) hygiene; 4) labelling; 5) methods of analysis and sampling; and 6) compliance and specification – provide the lot number from which batch the samples were drawn. These processes are independent of what type of extraction method is used with the limiting factor to method being the capital of the producer.

Skills on sorting and grading especially on VCO (food grade, cosmetic grade, etc.) is needed in order to attain high quality standards of both local and international markets.

Figure 9. Manual deshelling, paring of coconut, shredding/grating of coconut meat at Alex and Lizel VCO, Sariaya, Quezon.

Based in the interviews and FGDs conducted among respondents in Laguna and Quezon, there are two ways to extract virgin coconut oil and these are through the Dry and Wet Processes. According to PCA's VCO production manual, the dry process has the highest oil recovery rate at 88% while the wet process has yield/recovery rate of 17%. The prior process is employed by Primex Coco Products, Inc. While the Wet process is further classified by the processes: Centrifuge and Fermentation. The previous process is being used by Greenlife, Pasciolco, and Cocoplus.

Mamala 1 MPC, Alex and Lizel VCO, and Amazing Foods make use of the cold or fermentation process. The fermentation process is considered an intermediary processing of VCO for the products of Greenlife, Pasciolco and Cocoplus. On the other hand, Quezon Federation and Union of Cooperatives (QFUC) acts as the consolidator of de-husked coconuts and tolls at Cocoplus in its centrifuge-processed VCO.

It is a must to note that QFUC is a consolidator of raw material for VCO production. Its 'Primero' VCO products undergoes the centrifuge under toll processing with Cocoplus. Mamala 1 MPC is a supplier for QFUC. Alex & Lizel VCO is a supplier for Greenlife. It is also worthy to note that Amazing Foods' product line 'Sta Maria' is a refined fermented VCO which not subjected to any heat or tertiary processing.

C. Marketing

In terms of marketing, VCO is price competitive because current processes meet the meticulous global standards. However, the supply of VCO is currently static, if not declining, because of the erratic supply that will sustain production. Most of the producers also have very limited rated capacities that cannot meet the demand. Currently, the markets for VCO are varied but can also be niche-oriented, particularly with cosmetics and aesthetic products of firm-level enterprises. Wide-scale consumption of the product, as stated in the different information elicitation activities, can be augmented if trainings and skills development for promotion and marketing of VCO will also be implemented at smaller production scales. Technical and administrative trainings and skills development in putting up databases or simple production documentation should also be employed because these would facilitate fervent marketing of the product While some firm-level enterprises conduct their own trainings to address these gaps, there is still dependence on PCA to determine the appropriate agency to provide these trainings.

The primary market for VCO in the Philippines is in the export sector due to the growing demand globally. The existing export markets of the firms are Europe, Middle East, Canada, US, Malaysia, Singapore, China and Japan.

Although there are an existing export markets, some firms (like Greenlife, Cocoplus, and Pasciolco) still tend to gear towards local distributorship. Greenlife and Cocoplus already tied-up with Go Lokal Stores. Products of both Greenlife Coconut Products Philippines (labelled as GreenLife Home of Coconut Products) and Pasciolco Agri Ventures (labelled as Quezon's Best Organic) are sold in retail by businesses in Quezon Province.

In the local market, VCO is envisaged be promoted as a multi-functional daily product (as food, supplement, cooking oil, etc.) in order to increase per capita consumption. The producers are in a consensus that promotion of the VCO must be backed up by 'science', i.e., research and testing for its nutritional and health advantages.

3. Employment needs

In the process of VCO production, labor is most important during the production of coconut, deshelling and paring of coconut meat. After paring, all other stages in the processing includes machineries or equipment with 1 to 2 operators.

Currently, the seasonality of the production is directly proportional to the seasonality of work. This is because VCO must be manufactured in bulk which is also dependent on the orders. Seasonality of work makes the payment option usually on a per piece basis. Payment range from 45 to 60 centavos per piece depending on the labor process (deshelling, paring, shredding/grating). In Primex, the payment for labor is measured per day.

Due to seasonality of work, companies, even one as large-scale as Primex cannot accommodate regular manual laborers. This somehow result in high turn-over of laborers. Often, laborers choose other occupation/work which are relatively stable or with higher income or with less demanding tasks. This does not augur well in terms of job security on the side of the worker and training costs on the viewpoint of the producer.

Despite all these, there is still a high employment opportunity in the VCO industry particularly during the manual stages of production (i.e. deshelling and paring of coconut

meat). These stages do not require high level of education but are substantially needed by producers at a regular basis. In large scale integrated firms such as Primex which produces VCO and desiccated coconut, more manual laborers are needed due to scope economies. Thus, more employment can be generated for local communities with members that do not have high educational attainment.

Skills development is done within the organization/firm. There are no trainings provided in skill development that the firms know of. Research centers of PCA are not intended/focused for business venturing. DOST, through its Small Enterprise Technology Upgrading Program (SETUP), provides assistance to Micro-Small and Medium Enterprises (MSMEs) to address their technological requirements and limitations to improve productivity and efficiency. Before the technology is transferred, the recipient undergoes training on how to use the machine/equipment. Under this program, five (5) strategies were provided including: 1) Provision of Technology – needs assessment and sourcing of technology, technology acquisition, S&T training, and consultancy and technical advisory services; 2) Product Standards and Testing – product development with DTI-Bureau of Product Standards and Product testing and enhancement of testing laboratories; 3) Packaging and Labelling – development of functional designs for packages and identification and development of suitable or alternative packaging materials especially from indigenous materials; 4) Database Management and Information System – list of available technologies, list of S&T experts, list of testing laboratories including available testing services, and development of website for MSMEs for product promotion and access to information; and 5) Linkaging and Networking – raw materials sourcing, marketing, financing and equipment design and fabrication. Applicants are provided with the necessary trainings depending on which strategy is best suited for them.

A recipient of the SETUP assistance was Greenlife, which successfully utilized the technological assistance provided to them according to DOST. However, DOST SETUP is no longer applicable with the current business model of Greenlife nor is it appropriate for business venturing given that the focus of SETUP is more on technology. The owner of Greenlife clarified during the October 21, 2019 Multi-Stakeholders' Forum that because of the rapid changes in technologies and opportunities, DOST has to undertake SETUP II which is a revision of the first SETUP. Prior to the implementation of SETUP II, a dialogue between DOST and training recipients should be conducted to assure that interventions to be provided will fit the needs of future recipients. In addition, current trend by large scale processors are located in places such as Sorsogon City (Peter Paul); Brooke's Point, Palawan (Cardinal); and Gloria, Oriental Mindoro (All Coconut Organics). These areas provide a good opportunity for skilled workers. Moreover, Axelum in Medina, Misamis Oriental with a rated capacity of 800tons daily for coconut water, coconut milk, coconut cream and desiccated coconut provides good employment opportunities for the local population.

3.1.3 Coco coir

1. Market trends

Current global and market trends of coconut husk-based products are continuously increasing both in volume and prices from 2011 to 2017. However, the country is not one of the NTCPE's top producers as this is dominated by Sri Lanka and India. Current global shares are at 49,041 MT tons and valued at US$ 4.451 M.

From 2011-2018, an average of 17,754 metric tons of coco peat/dust were exported annually. The biggest volume exported equivalent to 93, 589 M metric tons was recorded

in 2018. In terms of value, the highest was recorded in 2017 at 2.03 million US dollars FOB. The country's biggest market of coco peat/dust since 2011 is China with 86.8 percent share of the total volume exported annually. It was followed by South Korea (5.5%), Malaysia (2.5%) and Taiwan (1.7%). Other market destinations are Japan, US, Singapore, Hong Kong, Netherlands and Liberia.

Similarly, the coco husk cubes export performance and market destinations from 2011-2018 is almost the same with the coco peat, with China as the primary market having 87.1 percent share of the total export volume. For the period 2011-2018, the average volume of export per year was recorded at 2,515 MT. The highest volume of exported coco husk cubes was registered in 2018 which equal to 13,314 metric tons valued at 1.6 million US Dollars FOB.

Another coir product exported is the baled coir with an average volume of 22,015 metric tons exported from 2011-2018.The highest volume of baled coir exported was in 2018 which totaled to 52,403 metric tons while the highest value was registered in 2016 which reached 12.58 million US Dollars FOB. The primary market destination of baled coir export from 2011-2018 is the United Kingdom with a recorded total volume of 4,659.93 metric tons or 33% share of the total export of the country. Other market destinations are Japan, China, Spain, Malaysia, South Korea, Singapore, India, Egypt, and Taiwan.

Another coir export products of the country are coco twine and coco pads/liner showing an average volume of 447 metric tons and 89 metric tons exported foremost to the USA from 2011-2018, respectively.

A. Demand settings

China is consistently the major importer of husk cubes, baled coir and peat/dust from 2011 to 2018 (PCA, 2019). However, the United States is the major importer of coco twines and pads/liners.

B. Supply settings

Based on PCA's monitoring of production, CALABARZON produces 11,886.87 MT of husk and 3,566 MT. Rated capacities for husking of coconut are currently at 80,000 husks/day in the region. Proposed initiatives to increase supply of coco coir in the region include PCA initiatives in the Coco Hub project, capacity development through the KAANIB Enterprise Project with 24 M equipment allotment to 19 CBOs, and capacity enhancement through regular monitoring and training of CBOs on coir processing and marketing and entrepreneurial skills development. These are also motivated by skills development and training for the production of bio-fertilizer from coco peat wastes and use of the wastes for waste water management system.

2. Value chain

Figure 6 illustrates the value chain for coco coir/peat based on the KIIs and FGDs with respondents from Laguna and Quezon. Husks are bought either directly from farmers or from traders. Using a machine, the husks are decorticated into fibers while coco peat is produced as by-product. The fibers are then baled as coco coir using a machine while the coir dusts are collected and made into peats. For product improvement, secondary processing is done to produce coco twines, bio logs, geo nets and other products such as plant pots and liners, and mats. Basic products such as baled coir and peat are marketed domestically and internationally. Secondary processing products are also sold both in the

local and global markets. However, it was mentioned that due to the stringent export requirements and the high demand in the domestic market, the firm-respondents prefer to sell locally.

A. Production

General production of coco coir is currently utilizing decortication of husks. A critical component of fiber production is drying and baling. There is a need to supply skilled workers for optimal recovery and sustain supply of inputs. The process is laborious and production is impeded by seasonality of income. It was noted that, while there are standards set for coconut fiber (coir) and coco peat, it is up to the market (whether domestic or global) to provide their own standards based on their application. This is specifically true for export markets wherein buyers have their own standards, which are stipulated within the contact of Purchase Order. For coco coir and peat, it was mentioned that drying standards are higher in the international market which require 20% moisture content (MC) for coco coir and 18% for coco peat. This is best achieved by mechanical drying to achieve the required moisture content but can be expensive to operate and would require higher fiber volume feeds before economic levels are reached. In addition, specifications may involve site requirements such as pH and slope for the installation of geo-net mats, to name a few. Meanwhile, the local market is not strict and is contented with whatever level of drying is attained through the use of a machine.

Figure 10. Decorticating machine and solar drying of coco coir at Wua Yei Enterprises in Victoria, Laguna.

B. Processing

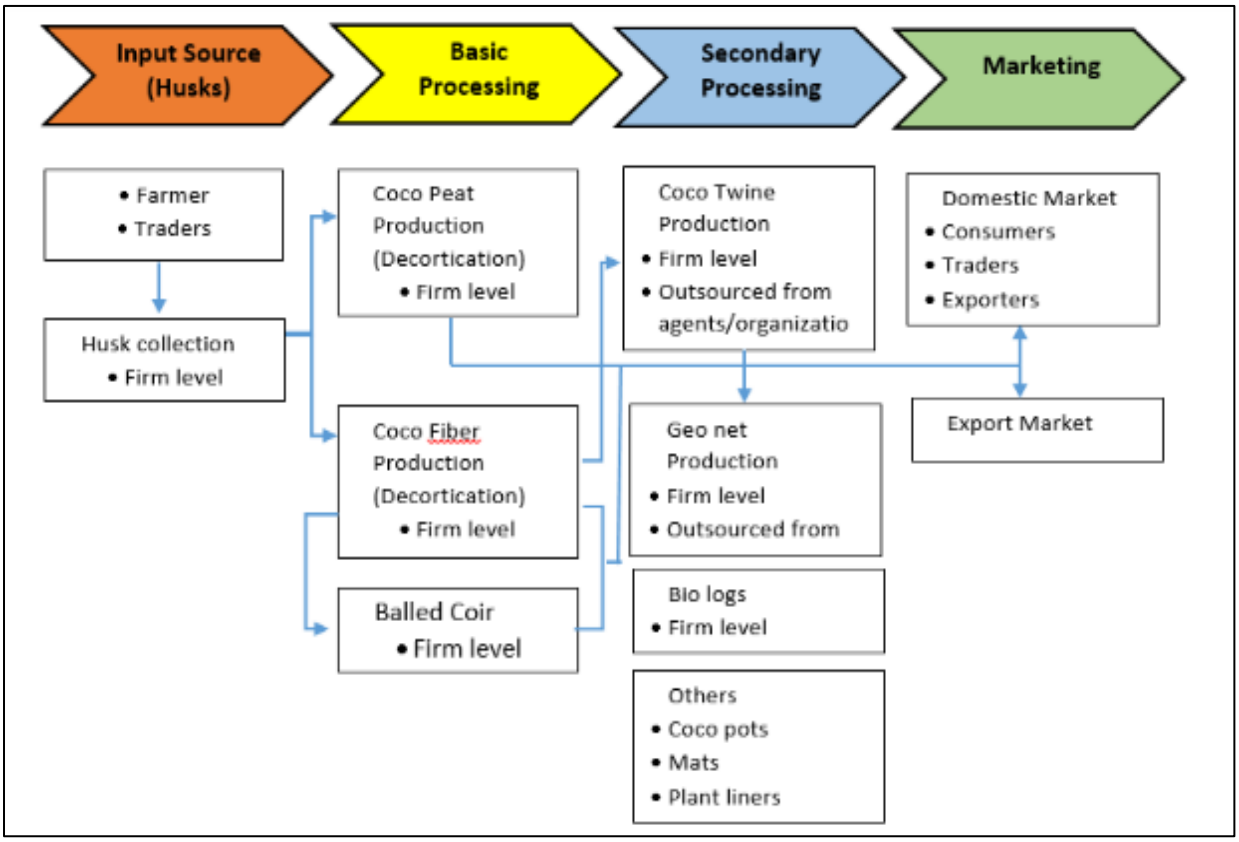
Twining of coco coir to produce the raw materials for handicrafts is generally done manually. Mechanization of the process of twining the product is generally needed by the sector to perform better in domestic and global markets in reaching volume quotas. Development of technology for twining has not been met and the process remains to be done manually.

However, should the process be mechanized, labor is still needed and workers should be trained for machine operation including feeding husk and uniform thickness of twines. Repair and maintenance should also be included in the training. Even with the presence of twining machines, it is not practical for manufacturers to mechanize twining since labor, mostly female and elderly, is readily available.

In addition, the products are considered textiles that are also used as raw materials for other products such as handicrafts. Skills development in the processing of coco coir into twines is also needed by the sector because of the general older age groups of those engage

in the industry. The challenge is to entice younger generation to engage in coco coir twining.

Figure 11. Value chain of coco coir/peat based on Key Informant Interviews and Focus Groups Discussions, Laguna and Quezon, 2019



C. Marketing

Promotional activities are needed to streamline domestic and international marketing of the product. At present, expanding markets is limited by the lack of knowledge on the domestic and international demands that also impede the determination of the skills required for better marketing of coco coir based products.

Current markets of coir, relative to the other NTCPEs are smaller. Moreover, current demand for coco coir based products are generally limited and sporadic. Thus, there is a need to further promote the use of coco coir based products into a more multi-functional products to expand and create new markets.

Based on Key Informant Interviews, there is a huge demand for coco coir in the international market except there is a problem in meeting standards. On the other hand, local markets are readily available for coco peat/dust due to its high demand for horticultural purposes.

3. Employment needs

Employment opportunities particularly for twiners and weavers in this industry are related to the available markets. Based on interviews made, there is a demand for twiners

and weavers. Moreover, twines and nets can be developed into more handy products that will require further skills training on design and product refinements.

Figure 12. Village-level twining of cococoir of Tropical Prime Coir Corp. at Unisan, Quezon.

Figure 13. Village-level weaving of geonets at Tropical Prime Coir Corp., Padre Burgos, Quezon.

Operators for the decortication and baling machines are also needed in the industry. For large exporting firms, a tractor operator is required when collecting and placing the fibers into a confined area. Moreover, manual labor that will collect the fibers and peat are likewise necessary. For those firms that will venture further into the production of pots, plant liners, etc., designers are essential. Manual labor for further drying of coir and peat (given that export markets require them to be dried) needs to be hired but only on a seasonal basis. The main challenge is the logistics needed to collect the husks from farms going to

the decorticating site. Due to the low price of husks, farmers wait for the processors to collect the husks. The consolidator needs to schedule collection for maximum load, meaning the husks collected should be at least a truckload worth.

Figure 14. Bio-logs making at Tropical Prime Coir Corp., Agdangan, Quezon.

3.2 Firm level characteristics and business capabilities

At present, the business capabilities of the sectors are generally limited to those that produce the NTCPEs at a commercial scale operation. However, with the results of information gathering, figures on the characteristics and business capabilities are at best lacking or generally unknown. Currently, PCA and DTI does not have any published manual or output that will determine the firm level characteristics of the NTCPEs.

3.3 Gaps in business capabilities

There is a gap in the business capabilities of firms since no established benchmark of the NTCPE industry in the Philippines has been developed. Based on the FGD, market research, research and development, credit line, quality management, meeting health and safety standards, etc. are some of the business capability gaps for the export-market.

For production, gaps are generally focused on the lack of skilled workers for manual labor. In addition, selection of varieties for planting, fixed inputs, management practices and capital are generally those in need of enhancement. Trainings for selection of high-yielding varieties must be the first initiative of the businesses involved in NTCPEs. Management practices to control pests and diseases are also generally lacking, if not rudimentary. Integrated pest management and fertilization are required to ensure quality inputs for the production of NTCPEs. On the other hand, fixed inputs, such as land, and financing are cross-cutting concerns for further enhancement of business capabilities.

In terms of processing, it was a general concern for the three NTCPEs to have a more mechanized but cost-effective processes. There is also a need for skills training in all aspects of operation and processing to ensure that quality meets standards. Businesses should also focus in enhancing skills of current workers through self-initiative trainings or by sending them in government provided skills development workshops. Trainings should also cascade to line workers from managerial levels.

For marketing, business capabilities are generally sufficient but there is a need to increase promotional capabilities, especially at the domestic level. It was emphasized by PCA that the business involved in NTCPEs are generally struggling to meet domestic markets because of poorly promoted products. Product developments are also limited to those with the capacity to improve packaging and those that can attend trainings.

3.4 Institutional mechanisms

Analysis of the institutional mechanisms also conformed to the supply chain structure. Based on this approach, PCA leads all government institutions in ensuring that all coconut-based products meet the national thrusts. PCA, in coordination with DA and DAR, also provide for the planting materials, fertilizers and financing mechanisms in ensuring that there is enough input supply or raw materials. At the processing level, DA-ATI, DOST and coco-based National Government Agencies (NGAs) are at the forefront of ensuring that trainings, machineries, and processing capabilities are provided to the producers of various NTCPEs. Finally, DTI, NGAs and Coco-Hub Partners ensure that there is continued product development and promotion for the business side of the NTCPEs. Other relevant stakeholders are the farmers, tappers, laborers, processors, consolidator traders, exporters and retailers to keep the entire industry functional. Besides government agencies, private organizations as well as some of the firms involved in the manufacture of VCO, coco sugar and coco coir had been providing trainings to enhance skills of workers.

3.5 Scanning the business environment: problems, issues, and opportunities

Although the NTCPEs are generally performing well at the global market, one of the major problems of the NTCPEs is meeting and sustaining the demand and supply, respectively. Currently, NTCPEs volume of production cannot supply both domestic and international demands because of the lack of cost-efficient and high-yielding production and processing capabilities. On the other hand, promotion capabilities in NTCPEs are limited to those with mechanism to develop their products and avail trainings. It was also floated that the trainings provided for small-scale enterprise largely focus on enhancing labor and technical skills but generally lacks the promotional, managerial, and marketing skills for products to be streamlined. However, opportunities for the business sectors related to NTCPEs are currently expanding due to the change in attitude of consumers in choosing healthy and organic products. In addition, government support for the establishment and development of the products are generally present but reach should be expanded for small-scale enterprises. There are also no safety nets for social and economic aspects of the NTCPEs. This was drawn by the lack of measures to circumvent the impacts of seasonality in all three NTCPEs, one of which is the periodic demand for skilled labor.

3.6 Skills development for NTCPEs

Determining Skills Development for the Coconut Industry: Review of Literature and Salient Results of the Study

Coconut as a versatile crop is a source of raw materials for various products and congruently, livelihood. Various GOs and NGOs programs geared towards liberalizing coconut farmers from producing copra alone and achieving higher value for their produce is being introduced since 1990. One intervention that had been conducted by both the private and public sector is the implementation of a wide array of trainings or skills enhancement measures.

Different government agencies had conducted programs and projects on capacity development for the coconut industry at the farm or village level but most of them are geared towards increasing knowledge of farmers on new production technologies so as to increase farm productivity. The PCA, for instance, conducts training on new farm technologies in line with its existing projects which include Coconut- Coffee Based Enterprise Development Project (COCOBED); Coconut Intercropping Project (CIP); Coconut-Cacao Enterprise Development Project (CCEDP); and Coconut Fertilization Project (CFP). The Sustainable Certified Coconut Oil Production (SCNO) Project which was implemented by the PCA together with the Agricultural Training Institute (ATI) and Bureau of Agriculture and Fisheries Standards (BAFS) developed a training curriculum on coconut farming as a business enterprise. Implemented in Southern Leyte, Sarangani and South Cotabato, the curriculum developed a farmers' workbook wherein farmers record the various farm technologies/practices they adopt and their corresponding income and expenses.

The Department of Agrarian Reform also conducted skills development on new technologies in line with the Agricultural Extension Service component of the Agrarian Reform Community Connectivity and Economic Support Services (ARCCESS). Local government units have also conducted trainings on coconut technologies as part of their extension activities. TESDA, another government agency mandated to conduct trainings on skills enhancement mentioned in the STED Round Table Discussion (RTD) held on October 8, 2019, mentioned that at least for Region IV-A, they have not developed any curriculum specifically for the coconut industry.

Capacity building or enhancement had also been extended specifically for non-traditional coconut products such as coconut sugar, virgin coconut oil and coco coir. These capacity building activities are usually anchored on various projects and programs that government entities administered. DOLE Region IV-B in 2017 implemented the coco coir processing under the Integrated Livelihood Program (ILP) or Kabuhayan Program to provide livelihood opportunities to 3,000 workers who were affected by the suspension of two mining companies in Palawan. The project provided assistance through training and equipment for coco net weaving. Geonets from the newly formed 4 associations were contracted with other mining company together with DPWH. Prior to ILP, DOLE implemented the Sustainable Agricultural Production which was comprised of community seed banking, production of cacao, coconut, glutinous rice, banana and ube and skills training on Coconut Products & By-Products Utilization. These were held in Jagna, Bohol and Pamplona, Negros Oriental, in 2014. While in 2015, Bayawan City Coconut Farmers Multipurpose Cooperative (BACCFAMCO) in Bayawan City, Negros Oriental became beneficiary of machinery for coconut by-products processing (decorticator, weaver, etc.) production/coco fiber processing and marketing.

Several village level coconut processing plants (VLCPs) and/or facilities were given by PCA to different farmers' cooperatives/associations in order to augment their income. But due to various problems particularly marketing, financial, technical and even management, most of these VLCPs did not prosper. These were mentioned in the paper of Divina Bawalan (2003). She emphasized that micro and village scale coconut processing enterprises should always be guided by the market demand and the value of the product reinforced by sufficient coconut supply that will match the appropriate scale of production and the adoption of suitable processing technologies. She also highlighted that level of technology to be adopted should be corresponded by the capability of available manpower to ensure sustainability. The availability of skilled manpower and/or worker who have the necessary aptitude to be trained in performing the various processing steps, equipment operation, repair and maintenance is crucial in coconut processing enterprises. Moreover, skills needed for managers to sustain a village level coconut processing enterprise are entrepreneurial/business management skills specifically business planning, plant/production operation and market identification skills while skills needed for workers/laborers are basic operation, repair and maintenance of plant/processing equipment, machineries and facilities (training usually provided by supplier of machineries/equipment upon procurement and installation);

Similarly, capacity and skills development of farmers and farmer's organizations or nucleus-estates were also emphasized in the coconut road map published by NAPC in 2016. It was clearly explained, that "farmers' organizations should learn the value chain orientation that will provide them important market information which will eventually guide them of the current gaps and potential opportunities in the business environment where they can add value to the coconut products". To secure adequate supply of skilled laborers for various agri-business enterprises like VCO and coconut sugar production, coconut coir twining and weaving, appropriate trainings should be done in partnership with TESDA. Skills training on marketing, sales, business planning and inventory management is likewise deemed necessary to ensure sustainability of nucleus-estate enterprises. Bawalan (2003) also cited that members of cooperatives/organizations must undergo rigid training on value formation, cooperativism and processing of the desired products. Alcantara (2013) also reviewed the national coco coir roadmap of DTI IV-A and mentioned that the market development and promotion strategy interventions for domestic market includes: (1) institutionalization of a market information network system (generation, processing, continuous updating and dissemination -to operators at all levels of the VC-of market and other related info); (2) policy advocacy to invoke widespread use of coco coir products, i.e., government projects, private buildings, use in other industries;

(3) facilitation for market matching between community enterprises and big-brother exporters, contractors; and (4) capacity building on market negotiations.

For coco sugar, Masa (2012) recommended that quality control supervisors should be trained on visual examination of sap since this is crucial in determining sap suited for sugar and other allied products like sap syrup, sap spread or saps drinks. Similarly, in the KII with Greenlife, it was mentioned that one skill needed for the processing firm is the ability of distinguish and grade VCO visually into food, cosmetics, etc. since having it chemically analyzed is very costly.

Several production and processing manuals developed by government and the private practitioners for the three NTCPEs provided practical knowledge and valuable skills in all areas of producing VCOs, coco sugar and coir fiber from choosing the best raw material to final packaging including quality control, good manufacturing practices and record keeping. Further processing of residual by-products and downstream products were likewise included in the manuals (i.e. soap, culinary oil, massage oils, skin care products, coco-vinegar, sap syrups, etc.). Implementation of manuals differs depending on the training design and trainors. In two events, the "teaching by showing and learning by doing" was employed in the actual implementation of a VCO production manual for micro and village-scale processing in the FAO sponsored trainors training with the Thailand Institute of Scientific and Technological Research (TISTR) in Thailand (Bawalan & Chapman, 2006) and training courses on VCO processing and related matters in Fiji (Bawalan, 2011).

Meanwhile, the Pasali Philippines Foundation, an accredited Extension Service Provider of Department of Agriculture's Agricultural Training Institute (DA-ATI) Region XII conducted skills training on Coconut By-Products Processing in Sarangani province. The training utilized lecture series and practicum on VCO production process, coco-based soap making and vinegar production. Basic Costing, Operation and Maintenance Procedures and proper use of Personal Protective Equipment were taught. The training was attended by 28 rural women from Kiamba and Maitum as part of the social transformation and women empowerment with the end goal of promoting coconut by-products to increase the income of coconut farmers (Pasali Philippines Foundation, 2016).

The Department of Science and Technology-Negros Oriental Provincial Science and Technology Center (DOST NegOr PSTC) in collaboration with Dumaguete City Credit Cooperative (DCCO) Multipurpose Cooperative and PCA conducted the skills training on coco sap sugar production (DOST Region VII, 2018). Attended by 35 men and women's groups from Sibulan and Dumaguete City, participants were trained on basic coco sap sugar production and business venturing. Participants were able to sell packs of coco sugar ensuing them additional income right after the training.

Another private entity engaged in coco coir and geo-textile production is the Coco Technologies (CocoTech). It is a privately-held enterprise in the Philippines that produces geo-textiles from waste coconut husks (Ganchero, E. & Manapol, P., 2007). It pioneered the application of bioengineering using cocofiber nets (coconets) in slope protection, river and shoreline rehabilitation and erosion control in the Philippines and other countries in Asia and Europe. CocoTech eliminated the middlemen by partnering directly with coconut farmers' cooperatives through its community-business partnership approach. It invested heavily in the capacity-building of individuals, families and local enterprises to ensure a strong and dynamic supply chain. The company provided hands-on-training in bioengineering and own market development to partner communities in addition to continuous skills training workshops on twining and weaving in order to expand current workforce. The company's cocofiber village level processing contributed to the decline of

juvenile delinquency through employment of out-of-school-youth and empowerment of women by giving them source of income.

Detailed training modules on the village level processing of the three NTCPEs seems to be available from different NGAs, NGOs, academic institutions, private companies and even on-line sources. However, actual skills training on the different stages of the value chain appears to be lacking particularly on coconut harvesting, dehusking and sap tapping. Unlike in India where various skills development program was initiated by the Government in response to increasing shortage of skilled workers in the coconut sector and the surging unemployment/underemployment problem (TK Jose, 2016). The Coconut Development Board (CDB) had proposed three skill development program to the Agricultural Sector Skill Council of India (ASCI): the Neera Technician Training, Friends of Coconut Trees Training and the Coconut Cultivation and Nursery Management Training. Approved by the National Occupational Standard (NOS) of India, these training programs are now being implemented in partnership with Coconut Producers Company (CPC) and academic institution with funding from NGOS. Neera Technicians (similar to sap tappers in the Philippines) have enticed unemployed and underemployed particularly the youth to undergo training and become technicians since employment is assured with high compensation as it is partnered with Coconut Producers Companies. Furthermore, Master Neera Technician trainings are also offered for those who aspire to become trainors. Neera technicians are under classified "green collar job" giving them a pride and sense of decency in their jobs. The Friends of Coconut Tree Training on the other hand, focused not only on climbing palm trees with the help of climbing device but also on improving the skill level in identifying pests and diseases with remedial measures. Graduates of this training are called FoCT (Friends of Coconut Trees). As Dy conferred, "The training is an innovative initiative of CDB which elevated the status of coconut tree climbing as an occupation among youth".

Moreover, the training programme for coconut cultivation includes the major aspects of coconut cultivation such as identification of appropriate planting material, procurement and treatment of planting material, land preparation, procedures for application of fertilizers and micro nutrients, nursery management, weed management, technical knowledge on identification of pests and diseases and understanding the infestation symptoms, preventive and curative method, irrigation management, mixed/inter/multiple cropping and other farm operations, harvesting and storage of coconuts and post-harvest management. Dy cited that the production and distribution of quality planting material to meet the demand of farmers especially hybrid seedlings in private sector require skilled manpower. Skilled manpower are essential for profitable coconut farming, hence skills development programme in coconut sector is of utmost importance.

According to Dy, R.J (2016), "ASCI provide certificates to trainees and the certificate is recognized by the coconut industry since training is based on the National Occupational Standards (NOS). As benchmark of good practice, NOS reflects the current desire of industries to agree to national standards of competence, description of skills and common terms among trainees, employers and training providers. It also specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the knowledge and understanding he/she needs to meet that standard consistently".

In the study of Suharto (undated), it was cited that the coconut industry is facing problem on the availability of specific manual skills. In most coconut producing countries particularly Indonesia, problem in recruiting tree climbers, dehuskers and deshellers is being experienced. The same is true with India, where only 2% of their current workforce is formally skilled hence, the Skill Development and Capacity Building Training programs

in coconut sector was introduced in 2012 which they called Friends of Coconut Tree Training, (Indian Coconut Journal, 2016).

Similarly, capacity and skills development of farmers and farmer's organizations or nucleus-estates were also given emphasis in the coconut road map published by NAPC in 2016. It was clearly explained, that "farmers' organizations should learn the value chain orientation that will provide them important market information which will eventually guide them of the current gaps and potential opportunities in the business environment where they can add value to the coconut products". To secure adequate supply of skilled laborers for various agri-business enterprises like VCO, coconut sugar production and coconut coir twining and weaving, appropriate trainings should be done in partnership with TESDA since it has the technical capacity to develop training curriculum. However, TESDA representative mentioned during the consultation workshop conducted for the STED study that currently, no training modules for skills development for the coconut sector had ever been made by the agency. However, in the Multi-Stakeholders' Forum conducted on October 21, 2019, the TESDA representative said that they are willing to prepare a training manual or curriculum in tandem with PCA, DOLE and other experts. Moreover, skills training on marketing, sales, business planning and inventory management is likewise deemed necessary to ensure sustainability of nucleus-estate enterprises.

Some studies, articles and literatures in the Philippines and other coconut producing countries likewise tackled the issue of availability and need for skilled laborers in the three NTCPEs and coconut industry in general. In the study of Suharto (1998), it was cited that the coconut industry is facing problem on the availability of specific manual skills. In most coconut producing countries particularly Indonesia, problem in recruiting tree climbers, dehuskers and deshellers is being experienced. The same is true with India, where only 2% of their current workforce is formally skilled hence, the Skill Development and Capacity Building Training programs in coconut sector was introduced in 2012 which they called Friends of Coconut Tree Training (Indian Coconut Journal, 2016).

Sugar production from coconut palm only involves traditional processing activity, but labor intensive, requiring skilled tapper (Magat, 1998). Thampan (1998) also cited that provision of training facilities for palm climbing, tapping and sap collection, assembling, proper boiling and sugar manufacturing including packaging is necessary to make the business profitable and sustainable. According to his study, palms when properly utilized for tapping and sugar production will provide full time employment to one tapper and one or two women members of the family and will generate 20-25% more income than when they are maintained for nut production.

The coco coir products which enjoy both domestic and export demand could generate employment and help augment income of farmers directly involved in the processing. Skills needed for this particular product involves the manual soaking of husks, drying, coir twining and weaving, balling/weighing and proper storage. Operation of decorticating and twining machine also requires skills training (Dela Cruz, Pobre and Gabrido, 2002).

Meanwhile, specific skills development training program for the coconut sector was carried out in India as featured in the Indian Coconut Journal February 2016 issue. In the article of TK Jose entitled "Skills Development Opportunities-CPCs need to take a lead role" mentioned that Various skills development program was initiated by the Government of India in response to increasing shortage of skilled workers in the coconut sector and the surging unemployment/underemployment problem. The Coconut Development Board (CDB) had proposed three skill development programs to the Agricultural Sector Skill Council of India (ASCI): the Neera Technician Training, Friends of Coconut Trees Training and the Coconut Cultivation and Nursery Management Training.

Another study in the Philippines which touched on the essential skills needed in the three NTCPEs is the Trade and Value Chains in Employment-Rich Activities (TRAVERA) survey which was conducted to: (1) identify value the chain structure of non-traditional coconut product exports (NTCPEs); (2) assess NTCPEs' demand trends and forecasts, constraints, and export related opportunities; (3) determine quantity and quality of employment; and (4) recommend supporting functions, policies, rules and regulations. It covered nine regions having a total sample of 100 SMEs and 71 farmers. The coconut products covered by this study are virgin coconut oil (32%), coco coir/ peat (29%), charcoal/ coco charcoal (24%), coconut sugar (19%), and other miscellaneous product (36%). The study summarized the results into three groups: good performance, needs improvement, and problem areas.

In terms of the skills and attitude of the current workers of the enterprises under good performance, the result showed that about 70% of the enterprises rated their current workers as "very good" and "excellent" in warehousing and shipping, quality control and assurance, management responsibilities/taking a lead, taking initiative, production and inventory management, measuring, grading and feeding batches of raw materials, logistics, numeracy skills/ working with numbers, equipment operation and safety.

Meanwhile, the skills and attitude identified that needs improvement are communication skills, literacy, food safety and handling, operating non-computerized/non-automatic machinery, operating computerized/automatic machinery, computer literacy, customer services skills, green skills, and foreign language skills. Under the problem areas, the study showed the ease and difficulty of hiring workers. About 62% of enterprises consider "recruiting high skilled workers" as difficult or very difficult. It is followed by "recruiting medium skilled workers" (43%), and "recruiting low skilled workers" (19%). Moreover, the difficulty in hiring regular workers are due to seasonality of business(35%), significant increase in labor cost (25%), and business uncertainty (22%).

The study also cited the factors that may cause difficulty or challenges in providing trainings to the workers. These are lack of available/competent skills trainers, difficulty in selecting right people for training, lack of information on skills training/courses, low quality of courses on offer/low quality of trainers, difficulty in funding the training.

At the farm level, the farmers' main source of income is farming (97%). Around 28% of them still rely on stock knowledge/traditional farming practices while others source their knowledge on farming practices from government agencies/institutions, such as PCA (25%), DA (10%) and/or LGU (9%). In terms of technology, the farmers still use the variety since they started coconut farming (69%). Generally, dehusking is done manually and majority (67%) of the farmers themselves do the labor. The cultural management practices done by farmers are weeding (72%), fertilizing (54%), pest and disease control (14%), and irrigating (4%). Eighty-six percent (86%) of the farmers "directly" hire or recruit their laborers. The farm workers have been hired intermittently over a period of 7 years, on the average and there is no written contract or social security provision. More than three-fourth (77%) of coconut production were sold by farmers for further processing in the form of husked nuts (56%). While there are some who sold coconut by products like husks (147%), sap (10%) and coco-sugar (4%). Traders are the usual buyers of produce (72%).

Identified skills and institutional arrangements from the STED study

The succeeding section discusses the findings of the STED study on the skills needed for the three NTCPEs which were identified through the conduct of KIIs and FGDs (as summarized in Table 4).

A. Coco sugar

For the production of coco sugar, village-level scenarios were provided by the cooperative in Alabat, Quezon. It was provided that PCA has given many training in regard to the general methodologies and processing of coconut to supply the product. However, the specifications of these trainings (i.e. purpose, frequency, participants, resource person, etc.) were not provided during the interview. The production of coco sugar, much like VCO and coir, also demands for skilled workers for all its operations, but the biggest chunk of skills demand comes from the harvesting/tapping of coconut. On the other hand, PCA CALABARZON stated that they provide entrepreneurial training for the NTCPEs. Moreover, research and development training were also provided by PCA. These are through the resource people tapped from DTI and ATI. However, the specific trainings conducted were not disclosed and only suggested that these training would suffice any necessary purpose. Additional information also provided that PCA Zamboanga Research Center provides trainings for skills development for the three (3) NTCPEs, including best practices. The site is also known for providing valuable information on general farm maintenance, machine use, and maintenance of machines for coconut fiber processing. However, trainings on deshelling and paring skills are not provided in the center. Moreover, its location from most producers inhibits its popularity as a nationally-acclaimed training center, thus, there is a need for introduction and/or producing manuals from the said institution.

B. VCO

For Amazing Foods Corporation, current skills are met for the cold and manual processes for VCO production which were acquired by the company's owners through trainings. The knowledge base was cascaded to the line operators to properly operate machinery and for the required techniques in employing the cold process in producing the NTCPE. In addition to trainings in handling machinery, the company also conducted trainings on record-keeping and organic farming when the production of VCO was on its high point some years back. These trainings were provided with the assistance of DTI. This is one of the company's initiative to develop village-level linkage in the community where they operate. However, the current need of the company, related to skills, would be the presence of skilled laborers for tapping – the initial process of production. It was stated in the interview that most of the tappers in the area are akin to one another. There was also a need for skilled labor for the line production involving traditional processes. In general, VCO skills development at the production component, there should be focus on enhancing capabilities for more efficient recovery. This also includes trainings and skills development in various areas of operations including machinery handling, standardized production procedures, and zero-waste recovery.

The interview with PCA revealed that the current skill sets for handling machinery is generally lacking. Moreover, skills deficiency in the entire process of producing VCO is basically caused by pirating of skilled workers. The solution found by the agency is to conduct trainings for workers that will be included in pool and will ensure the supply of skilled workers for companies involved in the production of VCO in the country. These trainings will be in coordination with DOST in order for the skills development trainings not to be solely provided by PCA. Coordination with TESDA is also crucial in providing

a pool of skilled workers for the industry but these trainings should be conducted at different levels and based on the requirements (i.e. harvesting, handling of equipment, and other processes) of a particular producer. Moreover, the agency also suggested that, while there are promotional technologies and the accompanying trainings for these, the main problem lies in the lack of workers that would engage in the industry. Other skills development gaps provided during the interview was the provision of capacity for workers to increase domestic utilization of VCO products. It was also mentioned that, while investing on skills development, companies should also focus on providing general safety for their workers.

The interview with UCAP was not able to elicit the necessary skills development for VCO primarily because the agency's roles are solely for coordination with member producers. On the other hand, the workshop conducted involving Primex Coco Products, CocoPlus Aquarian Development Corp., Pasciolco Agri Ventures, Greenlife, Alex & Lizel (supplier of Greenlife), Quezon Federation and Union of Cooperatives, and Mamala I Multi-Purpose Cooperative revealed that the necessary skills development for VCO production is mostly during the first stages of production such as deshelling and paring of coconut meat. It was inferred, that PCA does not provide the training and, ultimately, skills required for the industry. In addition, most of the skills currently used by the participants were self-developed. However, it was emphasized that there is a need for development of negotiating skills in relation to promotion and marketing endeavors.

C. Coco coir

Based on the workshop discussions conducted with Tropical Prime Coir Corporation and Pilipinas Eco-Fiber, skills development in the industry are generally provided to capacitate workers to operate and troubleshoot machineries and equipment. However, these trainings were from skilled workers and not derived from formal means because of the general lack of service providers. It was also mentioned that DOST provided trainings but respondents cannot give specific details. More specified skills development including basic accounting, book-keeping, product development (e.g. fibersheet for footwear and hanging cocopots), product designs, and benchmarking – participating in fairs for market linkage/matching – were provided by DTI. Laborers of Pilipinas Eco-Fiber had undergone trainings but these are related more to upholding safety measures within the work environment which is conducted regularly by DOLE. Moreover, current skills in the industry are largely on manual weaving and geonet-making with laborers working through a 6.5 hour shift, particularly for Tropical Prime Coir Corporation. This firm also provides trainings on twining and weaving to ensure that twiners and weavers abide by the quality standard it had set. As to designing coco pots, bags, coco plant liners and other products made of coco coir, private institutions hold trainings with the condition that products will later on be sold to them. The seemingly dearth of training on coco coir production specifically can be explained by the attribution of the industry not being a member of UCAP.

With these, participants of the consultation workshop suggested that gaps in skills revolve on the product innovation and, possibly, value-addition. Moreover, gaps identified also included the lack of training for technologies that will improve cost-effectiveness and quality in production. Skills gaps should also include capacitation for annual trainings on safety (i.e. first aid) and driving in compliance with DOLE regulations. These gaps were perceived to be filled by the different trainings provided by PCA, DTI, OPA, DOLE and DOST. Moreover, it was also suggested that the DWSD's beneficiaries, through their *Pantawid Pamilyang Pilipino* Program (4Ps), should be tapped as well in these trainings (coco coir twining and geo-net weaving) and proposed a mechanism that allowances should be provided after a certain quota is reached.

At a village-level, particularly in Alabat, Quezon, coco coir trainings needed are on the manual twining of coir to produce ropes. There was also a need for technical trainings in manning mechanized equipment for twinning processes for more efficient production. Lastly, skills development for all NTCPEs should focus on providing promotional trainings - through product packaging enhancements and management capabilities - including database and data management in order to facilitate general knowledge on the different business operation needs in the production of NTCPEs.

Table 4. Skills for the production of the various NTCPEs from STED study.

<table>
<tr><th rowspan="2">Type of NTCPE</th><th colspan="3">Areas for Skills Development/Agency Involved</th></tr>
<tr><th>Production</th><th>Processing</th><th>Marketing</th></tr>
<tr><td>Coco Sugar</td><td colspan="2">Current Skills
• Research and development training – PCA provided by resource speakers from DTI and ATI</td><td rowspan="2">Current Skills
• Entrepreneurial Skills – PCA (Region IV-A)</td></tr>
<tr><td>Skills Gap
• Harvesting/Tapping – no agency involved; skills developed are through experience</td><td></td></tr>
<tr><td>VCO</td><td>Current Skills
• Organic Farming – DTI
Skills Gap
• Pooling of skilled workers – DOST as coordinated by PCA
• Harvesting – TESDA
• Deshelling – no particular agency involved; self-developed
• Paring – no particular agency involved; self-developed</td><td>Current Skills
• Machine-handing/operation – no particular agency involved; in-house training from VCO producers; proposed to be coordinated with TESDA
Skills Gap
• Line production using traditional processes/ standardized procedures – no particular agency involved
• Efficient recovery/Zero waste recovery – no particular agency involved
• Machinery handing – PCA</td><td>Current Skills
• Record-keeping – DTI
• Technology and product promotion – DTI
Skills Gap
• Negotiating skills – no particular agency involved</td></tr>
<tr><td colspan="2">Skills Gap
• Basic safety training – no particular agency involved</td><td></td></tr>
<tr><td rowspan="3">Coco Coir</td><td></td><td>Current Skills
• Twining and waving – developed by producer
Skills Gap
• Cost-effectiveness and quality improvement – no particular agency involved
• Manual twining for rope production – no particular agency involved
• Technical training for machinery handling for cost-effective production – no particular agency involved</td><td rowspan="2">Current Skills
• Basic accounting – DTI
• Book-keeping – DTI
• Product development – DTI
• Product designs – DTI
• Benchmarking – DTI
Skills Gaps
• Value-addition/product innovation – no particular agency involved
• Product packaging enhancements and management capabilities - PCA, DTI, OPA, and DOST</td></tr>
<tr><td colspan="2">Current Skills
• Troubleshooting of machinery/equipment – no particular agency involved
• Basic safety trainings – no particular agency involved
• Design of coco pots, bags, coco plant liners, and other coir-based products – undisclosed private institutions
Skills Gap
• Annual safety training – PCA, DTI, OPA, DOLE and DOST; in compliance with DOLE standards</td></tr>
<tr><td colspan="3">Skills Gap
• Provision of trainings from DOST in all aspects of production
• Skills training for beneficiaries of 4Ps to be tapped in all aspects of production
• Databasing and data management – PCA, DTI, OPA, and DOST</td></tr>
</table>

4 Summary, conclusions and policy implications

The study found that the NTCPEs included in the study have significant impacts on the country's global competitiveness. In addition, the three (3) NTCPEs were found to be developed and motivated by the export market. Moreover, the lack of localized awareness for the NTCPEs with the country's current thrusts to boost localized consumption of the NTCPEs. For the various years analyzed, it was found out that the production volumes and values of the NTCPEs are fluctuating, but have generally positive AAGR in the last three to five years.

For fervent analyses, the value chains and process flows of the NTCPEs were divided into three components, namely: production, processing, and marketing. These aspects were also crucial in providing the necessary analyses of the skills gaps present and the development that are needed to be employed as well as the current capacities of firm- and village-level enterprises included in the study. Further analyses of these showed policy, institutional, and enterprise levels. Elicitation of the various gaps was conducted through village-level FGDs, firm/agency-level KIIs, and informal interviews during the 2nd World Coconut Congress.

The perceived gaps in furthering NTCPEs production are found at the policy, institutional and enterprise levels. At the policy level, there is no apparent or well-defined monitoring of NTCPEs that will guide players about market movements and trends. Meanwhile, trade in NTCPEs are largely unregulated which results in considerable price volatility that may inevitably affect enterprise viability. There is also a dearth of awareness among consumers and incentives on producers that impinge on domestic demand and supply situations.

At the institutional level, there seems to be a confounding of the roles on skills development for the production of NTCPEs among the various national government agencies such as PCA, DOST, and DA. If and when there are initiatives they are not coordinated, which are usually manifested in the training that are provided to stakeholders. There is also room for improvement as far as creating awareness among the potential consumers of NTCPEs.

At the enterprise level, there are localized paucity of skilled workers and standards for acquired skills and product quality are wanting. Marketing skills are also found to be meager which constrain the development of the NTCPEs. Safety and health training are occasional and usually provided by firms that employ regular workers and in cases of seasonal workers these are virtually nil.

Table 5. Policy, institutional, and enterprise level gaps in NTCPE production.

	Gaps
1. Policy Level	• Existing statutes do not include monitoring of NTCPEs, thus, market trends are generally uncertain of, at best, lacking • Current trade laws do not protect the prices of NTCPEs causing fluctuations to values • Trade policies do not dictate volume of production • Domestic markets are generally lacking because of insufficient awareness • Lack of mechanisms in incentivizing participation to production of NTCPEs similar with other government thrusts
2. Institutional Level	• No clear/overlap of roles for institutions on the skills development for the production of NTCPEs – PCA's roles are principal to the production of NTCPEs but these roles are spread to thinly because of the other commodity-derivative from coconut – DOST's roles are not harmonized for all NTCPEs – DA's initiatives are not very clear for NTCPEs • Initiatives to build awareness are generally lacking • Agencies roles are often too many and the trainings they provide are redundant and confusing • A centralized agency for skills development and capacity building is absent • Trainings provided are often unsustainable because marketing capabilities are generally absent
3. Enterprise Level	• Skills for production are generally lacking and often lead to lack of skilled workers • Cross-cutting gaps are mostly within the production stages of the value chain • Standardized procedures are yet to be established • Value-addition is often overlooked because of the need to meet volume requirements • Marketing skills are often too sparse, if not sustainable • Safety trainings are intermittent • Development of products are often limited by unclear markets

Aside from the skills development gaps, one of the major problems deterring production of the NTCPs is the seasonality of labor demand. Production of NTCPEs are also done in small and disaggregated farm parcels which lead to low volumes primarily because of the low productivity per tree. Processing of NTCPEs are unstandardized because of considerable disaggregation while quality of products is greatly varied.

4.1 Recommended strategies to reduce skills gaps and seasonality of labor

4.1.1 Strategies to reduce skills gaps

The roles of various government agencies should be highlighted in order to address skills gaps in the different components of NTCPEs. In the production component, DA, DAR, DOLE, PCA, TESDA, and DEPED were identified to augment skills gap for production activities of NTCPEs such as tapping, harvesting, deshelling and dehusking. These agencies are, in particular, should collaborate to provide for the basic necessities of the sector; with PCA as the primary agency for coconut. Technical, input, and financial assistance are provided by PCA in coordination with DA and DAR. These agencies can also provide farm machineries to established cooperatives or farmers' associations where farmers are already affiliated with. Primary skills development was recommended by respondents that should be honed in schools where DEPED and TESDA should be on the frontline in making the future generations appreciate the value of NTCPEs. Meanwhile, DOLE's roles are primarily to monitor and ensure employees legal rights are properly

implemented (e.g. working hours, wages received, overtime pay, etc.) and safety standards are kept (e.g. protective working gears, proper ventilation, etc.). It likewise provides livelihood assistance for registered organizations as mentioned by DOLE in the conducted KIIs. Assistance from DOLE can be availed of upon submission of a proposal.

For processing of coconut into NTCPEs, DOST, DA-ATI, and PCA are the collaborating agencies. DOST's capacities to provide for appropriate protocols for NTCPEs will be crucial for standardization of products. On the other hand, DA-ATI can also participate and can be tapped for the necessary trainings and skills development needed for any agricultural-related capability provision or enhancement. PCA's roles also include provision of machinery and equipment that can enhance the recovery ratings of the NTCPEs. Trainings on machine operations on grating, extraction, filtering, decortication, twining and weaving can also be spearheaded by PCA in collaboration with TESDA and private agencies. Moreover, development of more efficient recovery and production of NTCPEs should also be ensured to lower costs of mechanization and, ultimately, NTCPEs. To further develop processes and operational management systems, experienced practitioners can also be tapped as resource persons in the skills development activities. All these can be integrated by the NTCPEs as training manuals to ensure that standards are met and all processes are within allowable limits.

On the other hand, aside from PCA, DTI should lead the frontline for marketing of NTCPEs at local and international markets. Further appreciation of NTCPEs will be possible if these are all packaged and labelled based on prevalent certification standards for enhanced global competitiveness. Moreover, the roles of CDA should also be streamlined to promote a cooperative that will oversee the production of NTCPEs at a village-level but with the capacity to perform as a firm. Current mechanisms of DTI and LGUs also integrate the creation of One Town One Product (OTOP), inclusion of package development, and package of technologies for replication. All of these marketing mechanism should be provided in a publication pertinent to the best practices of the NTCPEs which may also be derived from current producers' best practices. Value-addition and promotion of NTCPEs are essential to improve its market. Hence, the importance of research, development, and extension activities should also be highlighted as cross-sectional impacts from these are foreseen to affect the continuity of an integrated production unit.

Table 6. Production, process, and marketing strategies for skills development of NTCPEs

Major Component	Technical Aspect/Non-Sales		Business Aspect/Sales
Skills Development	Production: - Tapping - Harvesting - Deshelling - Dehusking	Process: - Machine operations: 1. Grating 2. Extraction 3. Filtering 4. Decortication 5. Twining 6. Weaving 7. Cooking (i.e. for coco sugar and VCO production) - Creation of manuals of operation	Marketing: - Record-keeping - Promotion - Inventory - Interpersonal communication - Development of best practices
Provision of Skills Development	Production: - DA - DAR - DOLE - PCA - TESDA - DEPED	Process: - DOST (ITDI) - PCA - DA (ATI) - Field practitioners and producers (e.g. Greenlife, Annato Production)	Marketing: - DOST (ITDI) - DTI (OTOP integration) - LGUs - CDA - Third-party certification agencies
Market Establishment			Domestic: - VCO as food and not just supplement - Market research for product diversification of coco coir other than for textiles - Introduction of coco peat for organic agriculture - Introduction of coco sugar as sweetener replacement - Production of certified products - Market monitoring for VCO, coco coir, and coco sugar Global - Value-addition to coir other than textiles to increase global competitiveness - Market research to minimize cost of VCO to be more globally competitive - Streamlining coco sugar and serious business promotion - Production of certified products - Market monitoring for VCO, coco coir, and coco sugar

Policy level

Eradication of skills gap relies on cross-cutting social issues of adequacy of economic gains from the sector and by providing active financing mechanisms, especially for village-level production (Table 7). Measures of changing perceptions should also be viewed as major driving force in eliminating skills gap because these will eliminate the lack of skilled workers because of their short-term view of economic gains. This is proposed to be included in the agencies' IEC and coordination activities. In relation to this, it is also proposed that skills gaps should be identified in all sectors and stakeholders to produce a manual of good practices that can be replicated. This also involved harmonization of all activities to learn from past failures and determines modalities of success. Strategies

should be able to cover the development of specific curricula or training programs, labor market policies that improve job matching, as well as the overall incentive system (taxes, subsidies, etc.) for innovation and skill formation, ways to enhance coherence between trade, investment, labor market and skills policies. All of these can be incorporated and can be done through more specific policies that can be provided for the NTCPEs.

Institutional level

At present, skills gaps in the production of the various NTCPEs currently point to the lack of training for different components in the value chains. In the enabling environment, it is proposed that government agencies such as PCA, DOST, and ATI should be more proactive in providing the necessary skills training for production of coco sugar, VCO, and coco coir beyond peculiar firms that were reached by these agencies. The proactive provision should be more specific for the various needs of the different producers in terms of enhancing capacities for cost-effective production technologies and methodologies. It can also be suggested that enhancement of relevance of training and educational institutions for the sector's needs, for example by improving dialogue with employers. In addition, the creation or improvement of permanent institutional arrangements for skills anticipation and skills monitoring might be recommended.

In order to address these problems and concerns, it is recommended that the social and economic benefits should be established by the government through participatory means which is the current thrust of PCA. Participatory mechanisms may be done through motivation and organization of communities into cooperatives which, in turn, secures livelihood and social bonds, in general. Various NGAs provide different skills development programs, such as in the case of DA and DAR, in organized communities and, specifically, with registered cooperatives.

In addition, concerned institutions and agencies should also focus on creating opportunities for capacity enhancement of producers and skills development of workers by providing cost-efficient machineries/equipment and providing trainings based on the needs of each component in the value chain. Several salient recommendations, including a registry of trained skilled workers in coordination with DOST and TESDA, were provided. A list of registered and trained skilled workers should be kept to provide a choice for firms to avail of skilled labor. This means that through the hub business model, the workers are to work in all parcels as per the schedule to be provided by the hub. It is very feasible and creates equal opportunities for laborers to be exposed in the various aspects of the value chains. The farmers will have: 1) continuous employment that addresses seasonality problems; 2) they will be exposed in a more holistic approach of far management; and 3) be direct beneficiaries of government-aided projects and programs (i.e. provision of inputs and capital) which they need.

These should also go beyond providing manual labor skills enhancement but should be more holistic in nature and should ensure that all aspects of business development are tackled. However, the holistic approach must also be adaptable with varying needs of the entities needing skills development because current trainings and skills development initiatives of PCA are highly generalized in nature. Moreover, while the trainings are needs-based, experts' pool for technology and knowledge transfers must also be established. Information and education campaigns should also be conducted at varying levels so as to increase awareness and facilitate change of attitudes of producers and consumers alike. This is to address the provided current perception of NTCPE producers that work force is concerned on day-to-day monetary gains and not on a long-term and sustainable mindset.

Enterprise level

For the production aspect, skills gaps are more attributed to the lack of skilled workers for tapping and harvesting in VCO and coco sugar production, while lack of skilled twiners is apparent for coco coir. This was addressed and proposed by the various participants in the information elicitation activities that pooling of skilled workers should be implemented. It was indicated that handling of machineries is a necessity in all NTCPEs and require constant trainings for operating equipment. Moreover, skills development for manual processes in VCO production was highlighted as a means to close skills gaps for the sector. This can only be achieved by harmonizing the roles of identified agencies and including the support of the private sector for skills development where gaps in service provision are present. This was indicative of a call of building government-private sector partnerships in providing the much needed trainings for the production of NTCPEs. Critical factors for skills development, such as in-house training, labor turnover, and mechanisms for social dialogue on training needs and delivery are considered and improvements are necessary.

Table 7. Summary of recommendations to address skills gaps for NTCPEs.

	Recommendations
1. Policy Level	• Provisions of active financing mechanisms to promote greater participation at a village-level • Changing perceptions to deviate from "cash-crop mentality" • Promotion and awareness building through well-structured modalities • Formulation of manuals with well-defined standards • Strategies should be able to cover the development of specific curricula or training programs, labour market policies that improve job matching, as well as the overall incentive system (taxes, subsidies, etc.) for innovation and skill formation, ways to enhance coherence between trade, investment, labour market and skills policies
2. Institutional Level	• Government agencies such as PCA, DOST, and ATI should be more proactive in providing the necessary skills training for production of coco sugar, VCO, and coco coir beyond peculiar firms that were reached by these agencies • Various needs of the different producers in terms of enhancing capacities for cost-effective production technologies and methodologies • Enhancement of relevance of training and educational institutions for the sector's needs, for example by improving dialogue with employers • Creation or improvement of permanent institutional arrangements for skills anticipation and skills governance might be recommended. • Security of social and economic safety nets should be established by the government through participatory means which is the current thrust of PCA • Concerned institutions and agencies should also focus on creating opportunities for capacity enhancement of producers and skills development of workers by providing cost-efficient machineries/equipment • Pooling of skilled workers in coordination with DOST and TESDA • Trainings should be needs-based, experts' pool for technology and knowledge transfers must also be established
3. Enterprise Level	• Addressing the production gaps is pivotal for improvement of enterprises • Handling of machineries is a necessity in all NTCPEs and require constant trainings for operating equipment • Addressing skills development for manual processes • Building government-private sector partnerships in providing the much needed trainings for the production of NTCPEs • Critical factors for skills development, such as in-house training, labor turnover, and mechanisms for social dialogue on training needs and delivery

Aside from these, the invaluable information elicited from the different sectors interviewed may call for the following recommendations. Coverage of the study in other major coconut-producing regions to better understand and determine the deviation of experiences and skills gaps and capability enhancements aside from Region IV-A. These may also provide valuable strategies and recommendations that can be compiled because these are generally site-specific.

4.1.2 Hub integration business model for the production of coco sugar, VCO and coco coir at a Village-Level Setting

To address the problem of seasonality of labor, low production and disaggregated farm parcels, and unstandardized processing of NTCPEs, STED is recommending the setting up the Hub Integration Business Model. Through the Model, skilled laborers will be employed continuously for six days a week, throughout the year. In order to address these problems, integrated production of NTCPEs can be viewed as a suitable approach. Benefitting from economies of scale and economies of scope are primary. The integration of these farms into hubs provides the mechanism for sustainability of the industries surrounding NTCPEs. Moreover, the integration of parcels into a single hub ensures that skills development and training provision are centralized and better determined.

Various activities conducted for the STED project showed that current production of NTCPEs in the areas visited is done in small and disaggregated farm parcels. Most of these farms also produce one type of NTCPE. These conditions lead to low volumes primarily because of the low tree per unit area ratios and 'one-type production' schemes in these small farms. Moreover, the processes involved in the conversion of raw coconut to the NTCPEs are greatly unstandardized because of this considerable disaggregation. In turn, the quality of products is greatly varied. On the other hand, disaggregation may also lead to the competition for skilled workers. It was previously reported that, while manpower requirements are present, skilled workers in one farm can be "pirated" by another in order to produce their target volumes.

In order to address these problems, integrated production of NTCPEs can be viewed as a suitable approach. Benefitting from economies of scale and economies of scope are primary. The integration of these farms into hubs provides the mechanism for sustainability of the industries surrounding NTCPEs. Moreover, the integration of parcels into a single hub ensures that skills development and training provision are centralized and better determined. This is in cognizance of the capital intensive nature of the production of the NTCPEs.

A. General mechanism for integration

Organizing different producers of NTCPEs into one hub may address this because of utilizing a singular facility where all equipment are present. This facility may be provided through budgetary appropriations of the LGUs and NGAs related to NTCPEs. On the other hand, participating farmers are provided with free inputs and specialized trainings which will cater to their current and potential needs. Other incentivizing modalities may be created by the participating LGUs and NGAs. At present, national policies directly for incentivizing production of NTCPEs are currently absent because of their relatively lower market and economic shares to the country's GDP.

Many benefits may be derived when these parcels are integrated. For one, expenses for hauling may also be reduced by providing single service line for all parcels. Moreover,

integrated production can also ensure the quality of product because a single standard will be utilized for all processes. Skilled workers can also be pooled in an integrated approach to avoid competition. This will also be beneficial in avoiding redundant training and creating equal opportunities for capacity and skills development for workers in the locality. Integration may also be a solution for sustainable harvest of coconut for VCO, coco coir, and coco sugar because the number of nuts collected may be monitored. With these, an integrated business model for the production of NTCPEs at a village-level setting is proposed based on the various elicitation activities conducted.

The proposed business model for NTCPEs takes into consideration these factors and integration encompasses a design area of 50 hectares. Moreover, this area will be divided into 30 hectares for VCO and coco coir production while the remaining 20 hectares will be devoted for the production of coco sugar. The first two NTCPEs will be integrated in one area because de-husking activities will recover coir while the coco meat will be utilized for the production of VCO. Based on estimates, the 30-hectare plot for the integrated VCO-coir production area may produce 416 kilograms or 416 nuts for a 20-day working period or at least 27 to 34 liters of VCO. This further translates to PhP 6.49 to PhP 8.17 per coconut equivalent from a presumed PhP 100/L sold to intermediary processor and revenues of PhP 2,700 to PhP 3,400. On the other hand, a segregated area for coco sugar production is devoted because of the difference in source of raw material (i.e. coconut sap). The estimated annual production per tree is 50 nuts per tree and may have a density of 100 trees per hectare depending on the parcel (i.e. ~5,000 nuts per year per hectare or ~250,000 nuts per year in the proposed 50-hectare pilot site). This level of operation will be viable only if the VCO production is not done daily. Otherwise, it is recommended that the pilot area be raised to provide the economies of scale to cover the cost of capital equipment and maximizing the labor cost of workers.

In determining the production capacity of the proposed hub, it is estimated that the average number 48 to 54 nuts per tree (PCA, undated). With this value range, 48,000 to 54,000 nuts can be produced in the proposed hub. These nuts will be utilized for the simultaneous production of VCO and coco coir per year. Although the exact volume per weight of raw coconut is not possible to be estimated because of the obvious variation for each harvest, a practice of the village supplier of Greenlife – a producer of VCO – showed that recovery efficiency is rated at 6-7% from 250 kg of raw coconut to 15-18 kg of VCO but daily operations of the company produces three (3) to four (4) tons per day for an eight-hour operation (i.e. 50-72 kg of VCO following the efficiency rate). On the other hand, based on the interview with Tropical Prime – a producer of geonets, biologs, and coco peat, production of 7-10 ropes with the length of 12 meters can be produced from one (1) kilogram of fiber. In turn, a roll of geonet with the size of 1 x 25 m can be produced by weaving 180 ropes. For the coco sugar, production may vary based on the availability of inflorescence per tree. But, based on the interview with Annato Farm, coco vinegar produced in a week's time was estimated to be 500 kg for vinegar per day and 600 kg of syrup per week (~100 kg per day; 3 days of processing).

For each product, skills requirements elicited mainly depend on manual labor. For VCO, the skills requirement are for the efficiency of splitters, graters, extractor machine operators, harvesters, personnel to filter VCO from the density suspension, cook, and dishwasher. The interview of the village-level supplier for Greenlife revealed that at least nine (9) on-call laborers (i.e. one for each process except for two personnel needed for grating and machine operations) are needed for the production line. They are also compensated differently given by the table below.

Table 8. Compensation for laborers in the VCO production line.

Activity	Compensation (PhP)
Splitting	155/ton
Grating	600/ton
Extraction	155/ton
Harvesting	155/ton
Filtering	125/ton
Cooking	125/ton
Dishwashing	300/day

It was reported that the area has high labor supply and that their peak season operation is within September to December. During this peak season, daily operations ensue. Training these workers require increasing their efficiency to produce the required volume faster and increase recovery rate for VCO. Capital outlay for operations of this scale was estimated by Greenlife to be PhP 500,000 as initial investment. This investment includes an extractor which costs PhP 250,000 for brand new and PhP 160,000 for secondhand. Moreover, the process for recovery of VCO for this investment is done manually as centrifuge costs around PhP 5 million based on the interview with PCA-Region IV-B. This is on top of the annual certification process which costs around PhP 350,000. Most of the in-house operations are women because of the delicate process of extraction but most collection and harvesting processes are generally dominated by men.

For coco coir, primary operations rely on a village coordinator for Tropical Prime. This coordinator is responsible for the distribution of fiber supplies for the twiners. As previously discussed, twining of coco coir relies on a decortication which is done by an external source. Each twiner is paid PhP 2.00 per rope. In the production of geonets, two (2) workers are needed per bed. Information elicited showed that men are more efficient and can produce a roll in two (2) hours or at least four (4) rolls for an eight-hour period. They are compensated with PhP 250 per roll or a maximum of PhP 1,000 per day.

On the other hand, sap production starts in September. Based on the interview with Annato Farm, sap vinegar and coco syrup are primarily produced and their production volumes are generally dependent on existing orders. This set-up is followed because of the four-hour window period for sap collection before being spoiled. Aside from this collection process, coconut syrup collected twice in a 12-hour period is used to produce aminos, coco jam, and balsamic vinegar which is darker in coloration compared to that used in coco sugar production. Skills requirement for the production line still greatly depends on the expertise of tappers. Lack or absence of these tappers would mean that the quality of syrup produced becomes invariable and can cause serious delays in the operations. The current production of the company relies on six (6) tappers, two (2) cooks, and one (1) maintenance personnel. Compensation of these laborers depends on the type of product produced where: PhP 5.00 for *tuba*; PhP 7.00 for syrup; and PhP 8.00 for sugar. Bottling is also done in the area but is dependent on the product's quality. As a supplier of Greenlife, the end-user utilizes under-quality produce for other products. While the gender distribution of the laborers for production is not provided, it is assumed that men dominate the production because of the traditional skills training for men as tappers. All of these activities will assure that the hub will be conducive and safe for all workers.

Table 9 presents the estimated labor requirement at the farm and village levels. At the farm level, a total of five (5) persons will be employed in a contiguous 30-hectare coconut area. They will be employed for 24 days/moth, harvesting 1,500 nuts/day. At the village level, nine (9) workers will be hired to multi-task for the production of VCO and coir/peat. Just like the farm laborers, they will be employed for 24 days, half of which will be on VCO production and half for coir/peat preparation and making of twines and weaving of

geonets. It is worth noting that the 14 people who will be hired will have regular employment throughout the month.

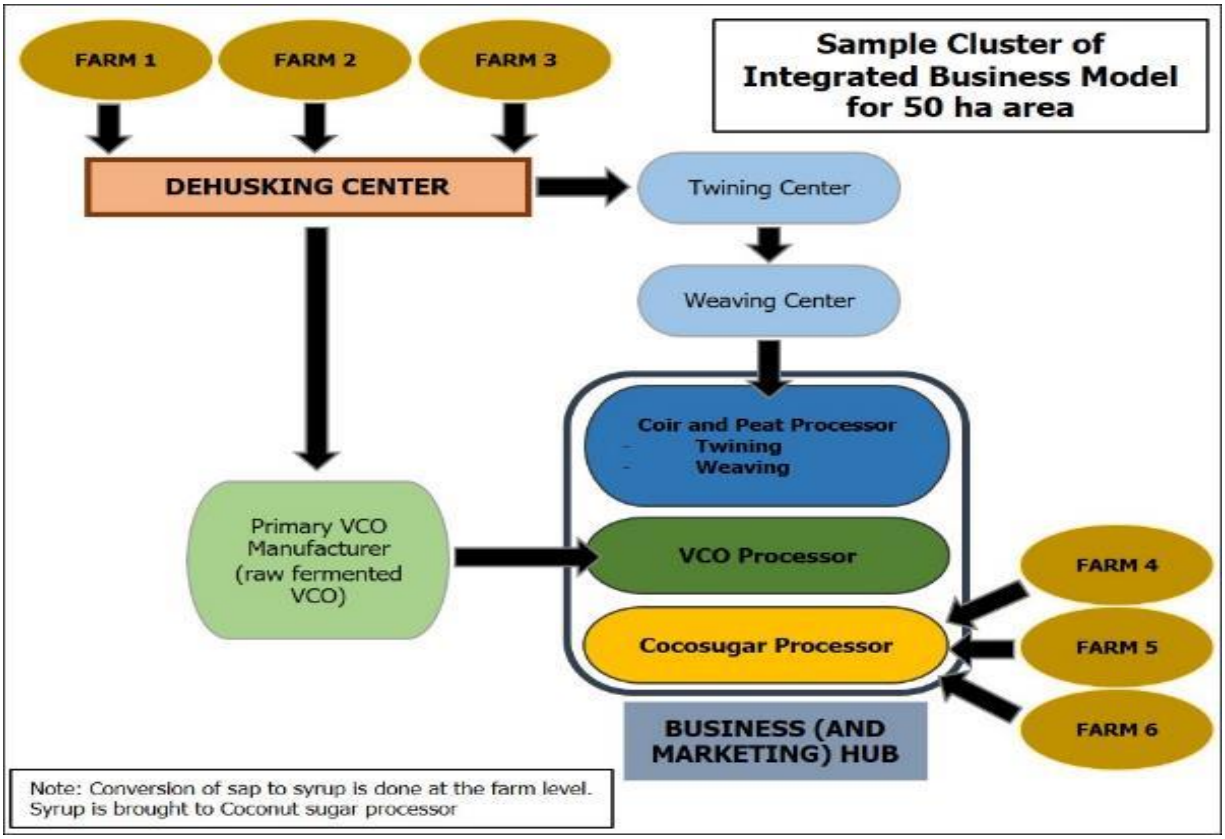
For coco sugar production, 40 tappers will be needed to cover the entire 20 hectare and another 40 cooks that will convert the sap collected will also be needed at the farm/village level. Meanwhile, at the business hub where the syrup will be processed into granulated sugar, another 20 laborers will be needed to cook the syrup into granulated sugar and do the packaging of coco sugar. A total of 100 laborers will be regularly employed by this industry.

Table 9. Labor requirements for the Integrated Business Model for 50 –hectare sample cluster.

Product	Labor Requirement at the Farm and Village Level	
	Number and Type of Laborers	**Number of days employed**
Integrated VCO & coco-coir	***VCO & coco-coir*** Farm level 1 Harvester 1 Nuts gatherer 1 Hauler 2 Dehusker **Village Level Processing** ***VCO @ 3tons/day =1500 nuts*** 1 Splitter 2 Grater 2 Extractor 1 Harvester 1 Filterer 1 Cook 1 Dishwasher ***Coir/Peat*** 1 Husk collector/soaker 1 Decorticator 1 Baler/Peat collector 4 Twiners 2 Geo-net weavers	1500/nuts/day @ 24 days/mo 12 days/mo @8hr/day 12 days/mo @8hr/day *Note: Similar set of manpower will be utilized for the processing of VCO and Coir/peat*
Coco sugar	**Village Level Processing** 40 Tapper/sap collector 40 Cooks – sap to syrup **Processing at the Business Hub** 20 Cooks – syrup to granulated sugar	24 days/mo *Assumptions: A total of 2,000 trees in 20 hectare; 50 trees per tapper per day;1 cook per hectare of tree per day*

Recruitment of laborers for this enterprise will be very crucial. Hence, to secure adequate supply of skilled laborers an appropriate training curriculum should be developed. Attempts to come up with cost estimates for skills development encountered difficulties since modules for the recommended trainings have not yet been prepared or offered by service providers, particularly government agencies such as TESDA, DOLE, DTI, DA and DAR. Nevertheless, TESDA expressed its willingness to develop the appropriate modules during the stakeholders' forum. The proposed framework of the sample integrated hub is provided in Figure 7.

Figure 15. Integration model for a 50-hectare sample cluster



As shown in the figure, individual farm parcels in the 50-hectare cluster are generally divided into coco coir-VCO and coco sugar production areas. The model is simplified to facilitate presentation. Coco coir and VCO are lumped together to maximize the input utilization. This meant that the coir from the nuts to be used for VCO are recovered in the dehusking center. From this point, the coir removed are delivered to twining center, where decortication is also done, to produce ropes that are then weaved. The resulting 'processed' inputs are then delivered to the business and marketing hub where these are utilized by a coir and peat processor. On the other hand, coco meat recovered from the dehusking center are then primarily processed through crude fermentation to derive raw VCO. The intermediate product is then delivered to the hub to be used by a VCO processor. Lastly, peculiarity of the timeframe needed to recover syrup to be used for the production of coco sugar is recognized by the model, thus, conversion from sap will be done at a farm level. This intermediate product is then to be brought to the hub to be processed into coco sugar by an integrating processor. Table 10 presents the capabilities at varying levels, actors, and intervening agencies in the proposed integrated business hub model.

Table 10. Integrated business model for a 50-hectare sample cluster for identified skills.

Product	Actors	Product	Level	Agency and their trainings/interventions
Coconut	Farmers	Raw coconut	Individual (Village)	PCA – fertilizers and HYV's TESDA/DOLE – core competencies DEPED – awareness building
	Dehusking Integrator	Dehusked coconut	Village/coop	PCA – mechanization LGU – dehusking
Coco coir	Twiners	Coir ropes	Individual/ small-group (Village)	PCA/DAR/PLGU/DTI/DOST-mechanization
	Weavers	Geo net	Individual/ small-group (Village)	PCA/DAR/PLGU/DTI/DOST - mechanization
	Centralized Coir (and peat) manufacturer (centralized)	Coir (peat and bio-logs, and other related products)	Business/ Company/ Corporation	Tropical Prime/PCA– coir and derivatives processing DTI – marketing
VCO	VCO Primary Processor	Raw fermented VCO	Individual/ small-group (Village)	DOST/PCA/CDA– mechanization and harvesting
	Centralized VCO Secondary Processor (and Quality control)	Standardized VCO (and other VCO products)	Business/ Company/ Corporation	DTI/DOST/ATI/Greenlife/ PCA/CDA/3rd party Certifying Body– processing and marketing
Cocosugar	Farmers (clustered)	Raw syrup (for sugar and other related cocosyrup)	Individual (Village)	PCA/DOST – tapping, mechanization, and processing
	Centralized Cocosugar Processor	Cocosugar (and other related products)	Business/ Company/ Corporation	DOST/ATI/DTI/CDA/Annato/3rd Party Certifying Body – product development and marketing

B. Linkages and institutional development for hub integration

At the core of these proposed hubs, government agencies play a significant role in providing support mechanisms in the different components of the NTCPEs. Collaboration among agencies such as DA, DAR, DOLE, DOST, PCA, ATI, TESDA and DEPED is deemed important to support skills development and capacity building of the business enterprise. Improving access to financial and non-financial services is also essential to be able to invest in technological upgrading as well as in human capital. PCA together with DA and DAR can provide technical and financial assistance through provision of farm machineries while ATI, TESDA and DEPED can be tapped to provide trainings on primary skills development and other farm related activities. On the other hand, DOST can provide protocols for product standardization. Moreover, in terms of assistance to market-oriented development services, such as technical and managerial assistance and market linkaging, DTI should be the lead to better market the NTCPEs to both local and international markets.

5 Constraints and problems encountered in implementing the STED project

Major constraints and problems encountered during the implementation of the project revolved primarily on the procedure of elicitation and quality of available data. In terms of the procedure of elicitation, the main problem lies within the coordination of the workshop to the various companies and agencies concerned in the production of the NTCPEs. The lack of lead time to invite them significantly affected the data elicitation wherein some important details for each NCTPE was not gathered thoroughly. In addition, there had been some instances that they are also not available for interview. This hampered the conduct of KIIs and FGDs because the team were unable to find common schedule to visit as many agencies and/or companies as possible.

On the other hand, effectively reporting the state of the skills development and needs for the NTCPEs were also inhibited by the lack of available data. The references used and considered are those with skills enhancement and development. To date, there is a limited number of studies and/or data which focused primarily on skills development of the NTCPEs, aside from this study. Thus, it was really challenging to search for published articles and/or any sufficient literature with specified skills development needs. Presently, there is no published material that purposively enumerates or collates all necessary skills for the different stages or components in the production of coco sugar, VCO, and coco coir. This made comparison, let alone the identification, of current and required skills very difficult.

References

Alcantara, M.S. Coconut Industry Road Map (2013-2016). National Coco Coir Inter-Agency Technical Working Group. Available online: http://industry.gov.ph/wp-content/uploads/2015/11/National-Coco-Coir-Road-Map-by-OIC-ARD-Marcelina-Alcantara-DTI-IV-A.pdf

Angulo, C. M. 2019a. Coco Sap Sugar: Industry Status. Philippine Coconut Authority. Presented on September 11, 2019, Lucena City

Angulo, C. M. 2019b. Coir or Coconut Fiber: Industry Status. Philippine Coconut Authority. Presented on September 11, 2019, Lucena City

Bawalan, D. 2003. Coconut Processing Modules for Micro and Village Scale Enterprises. Accessed from: https://www.bioversityinternational.org/ fileadmin/bioversity/ publications/Web_version/198/ch03.htm on August 15, 2019.

Bawalan, D. 2011. Processing Manual for Virgin Coconut Oil, its Products and By-products for Pacific Island Countries and Territories. Secretariat of the Pacific Community.

Bawalan D. and Chapman K.R., 2006. Virgin Coconut Oil – Production Manual for micro and village-scale processing. Published by the Food and Agriculture Organization (FAO) Regional Office for Asia and the Pacific.

Castillo, R. F. Undated. Status and Prospects of Virgin Coconut Industry. Philippine Coconut Authority

DA-ARMM. Undated. Coconut Industry. Available online: http://www.rboi.armm.gov.ph/uploads/ DOC_FILES/CoconutIndustry.pdf (Accessed on July 13, 2019)

DOLE awards P6M grant each to 3 coconut coops. Retrieved from: https://www.bwsc.dole.gov.ph/publications/2014-12-18-06-56-32/press-releases/630-dole-awards-p6m-grant-each-to-3-coconut-coops.html

DOLE Department Order No. 161 (Series of 2016) – Guidelines on the implementation of the Socio-economic projects under the social amelioration and welfare program for workers in the Biofuel Industry, Utilizing Coconut as feedstock. Retrieved from: https://www.dole.gov.ph/news/department-order-no-161-16-guidelines-on-the-implementation-of-the-socio-economic-projects-under-the-social-amelioration-and-welfare-program-for-workers-in-the-biofuel-industry-utilizing-coconut-as/

DOLE MIMAROPA brings Coco Coir in Southern Palawan. Retrieved from: http://mimaropa.dole.gov.ph/default.php?retsamlakygee=482&resource=cfe6055d2e0503be378bb63449ec7ba6

DOST Region VII, 2018. DOST, DCCCO conduct training on coco sap sugar production. Accessed from: http://region7.dost.gov.ph/dost-dccco-conduct-training-on-coco-sap-sugar-production/.

Dy, R. J., Feb. 2016. “Skills Development in Coconut Sector”. Indian Coconut Journal Volume LVIII, No.10, ISSN 0970-0579, p.6-8.

Ganchero, E. & Manapol, P., 2007. Case Study: Coco Technologies: Providing Livelihood Opportunities for Poor Coconut Farmers through Value-Adding. UNDP Growing Inclusive Markets. Accessed from https://www.growinginclusivemarkets.org.

International Labour Organization (ILO) and Resources, Environment, and Economics Centre for Studies, Inc. (REECS). Undated. Slide presentation on *Trade and Value Chains in Employment-Rich Activities (TRAVERA): Survey of Selected Coconut Export-Oriented Enterprises in the Philippines*

International Labour Organization (ILO) and Resources, Environment, and Economics Centre for Studies, Inc. (REECS). 2019. *Trade and Value Chains in Employment-Rich Activities (TRAVERA): Survey of Selected Coconut Export-Oriented Enterprises in the Philippines Final Report.* Presented in the ILO-Philippines Headquarters, Makati City on March 13, 2019

Magat, S. 1998. Intercropping and toddy/sugar production in coconut-based farming systems: Possible integration with germplasm conservation and varietal improvement. Proceedings of a workshop, 26-29 September 1996, Chumphon, Thailand. IPGRI-APO, Serdang. Accessed from https://www.bioversityinternational.org/fileadmin/bioversity/ publications/ Web_version/198/ch03.htm on August 15, 2019.

Masa, Dina B., 2012. Coco Sugar: Current Processing Technologies, Utilization and Recommended Practices. Accessed from: http://www.pca.da.gov.ph/coconutrde/images/sugarpdfs/ DBMasa _ PCA.pdf on December 6, 2019.

National Coco Coir Inter-Agency Technical Working Group (NCCIA). Undated. Coco Coir Industry Road Map 2013-2016. Available online: http://industry.gov.ph/wp-content/uploads/2015/11/National-Coco-Coir-Road-Map-by-OIC-ARD-Marcelina-Alcantara-DTI-IV-A.pdf (Accessed on July 13, 2019)

National Anti-Poverty Commission (NAPC). 2016. Integrated Coconut Industry and Poverty Reduction Road Map: Moving towards poverty alleviation and inclusive growth. Open Door Review, Issue # 2. Available online: http://www.napc.gov.ph/sites/default/files/documents/articles/Issue%20No.%202%20-%20Coconut%20Road%20Map.compressed.pdf (Accessed on July 13, 2019)

[PCA] Philippine Coconut Authority. 2003. Coco Coir/Fiber Production. Available online: http://pca.da.gov.ph/pdf/techno/coir_fiber.pdf (Accessed on July 13, 2019)

PCA. 2017a. 2017 Summary of Virgin Coconut Oil Registered Processors/Exporters. Available online: http://pca.gov.ph/pdf/tradeDirectory/2017/updated/VCOTD.pdf (Accessed on July 13, 2019)

PCA. 2017b. 2017 Summary of Coir Processors/Exporters/Traders. Available online: http://pca.gov.ph/pdf/tradeDirectory/2017/CoirPeatHuskTD.pdf (Accessed on July 13, 2019)

PCA. 2017c. 2017 Summary of Coco Sugar Suppliers. Available online: http://pca.gov.ph/pdf/tradeDirectory/2017/SugarTD.pdf (Accessed on July 13, 2019)

PCA. 2017d. Annual Report CY 2016. Available online: http://pca.gov.ph/pdf/accomp/AARCY2016.pdf (Accessed on July 13, 2019)

PCA. Undated. A Briefing on Guide on the Subject: Coconut Industry Production Status, Growing Zones, Productivity and Potential to Increase Nut Supply in Coconut Farms through Practical and Efficient Farming Technologies (PEFT). Available online: http://pca.da.gov.ph/coconutrde/images/gen8.pdf (Accessed on July 13, 2019)

PPF, 2016. Coco By-Product Processing: Skills Training for Rural Women. Available online: https://www.pasaliphilippines.org/extension-service-provider/coco-by-product-processing-skills-training-for-rural-women

Prades, A., Salum, U. N. & Pioch, D. 2016. New era for coconut sector. What prospects for research? Oilseeds and fats Crops and Lipids (OCL), 23 (6) D607. EDP Sciences 2016. DOI: 10.1051/ocl/2016048.

[PSA] Philippine Statistics Authority. 2018a. 2017 Commodity Fact Sheets, November 2018. Available online: https://psa.gov.ph/sites/default/files/CommodityFactSheets_2017.pdf (Accessed on July 13, 2019)

PSA. 2018b. Selected Statistics on Agriculture 2018. Available online: https://psa.gov.ph/sites/default/files/Selected%20Statistics%20on%20Agriculture%202018.pdf (Accessed on July 13, 2019)

Sanchez, Priscilla C., Undated. Potential of value-added products for coconut for the South Pacific. Accessed from: https://www.bioversityinternational.org/fileadmin/bioversity/ publications/ Web_version/ 198/ch03.htm.

Suharto, J. 1998. Potentials for increasing farmers' income and enhancing competitiveness of the coconut industry through alternative uses. Proceedings of a workshop, 26-29 September 1996, Chumphon, Thailand. IPGRI-APO, Serdang. Accessed from https://www.bioversityinternational.org/fileadmin/bioversity/publications/Web_version/198/ch03.htm on August 16, 2019.

Thampan, P.K. 1998. On-farm production and utilization of coconut products. Proceedings of a workshop, 26-29 September 1996, Chumphon, Thailand. IPGRI-APO, Serdang. Accessed from https://www.bioversityinternational.org/ fileadmin/bioversity/ publications/ Web_version/ 198/ch03.htm on August 16, 2019.

TK Jose. “Skills Development Opportunities-CPCs need to take a lead role”. Indian Coconut Journal. 2016, Volume LVIII, No.10, ISSN 0970-0579.

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